

Parental and peer influence on adolescent smoking in Vietnam



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อิทธิพลจากเพื่อนและครอบครัวต่อการสูบบุหรี่ในกลุ่มวัยรุ่นในประเทศเวีย
ตนาม



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ดวง ไส เชน :

อิทธิพลจากเพื่อนและครอบครัวต่อการสูบบุหรี่ในกลุ่มวัยรุ่นในประเทศเวียดนาม

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อ.ที่ปรึกษาหลัก : รัชพันธ์ โกมลไพศาล

งานศึกษามีวัตถุประสงค์เพื่อประเมินอิทธิพลของผู้ปกครองและเพื่อนต่อการระดับการสูบบุหรี่ของวัยรุ่น เช่น สูบ น้อย สูบปานกลางและสูบหนัก และศึกษาความแตกต่างของอิทธิพลดังกล่าวระหว่างเพศและกลุ่มอายุโดยใช้ข้อมูลทฤษฎี มิ จ า ก ก า ร ส ำ ร ว จ รั ะ ด ำ ช า ด ี ว ัย ร ุ่น อ ย ุ รั ะ ห ว่าง 13 ถึง 15 ปี จำนวน 18,912 คนในสองปี พ.ศ. 2550 และ 2557 ในการสำรวจการบริโภคยาสูบในกลุ่มเยาวชนทั่วโลกในประเทศเวียดนามถูกใช้ในการวิเคราะห์ การศึกษาใช้ทั้งการวิเคราะห์เชิงพรรณนาเพื่ออธิบายลักษณะทั่วไปของตัวแปรแต่ละตัว และใช้สมการการถดถอยโลจิสติกส์แบบมีลำดับในการประเมินความสัมพันธ์ระหว่างพฤติกรรมสูบบุหรี่ของผู้ปกครองและเพื่อนต่อระดับการสูบบุหรี่ของเด็กในวัยเรียน การวิเคราะห์ได้ใส่ตัวแปรอื่นๆในสมการถดถอยด้วยเพื่อเป็นการควบคุมปัจจัยอื่นๆที่อาจมีอิทธิพลต่อความสัมพันธ์ การศึกษาได้ทำการศึกษาในกลุ่มตัวอย่างแบบเฉพาะเจาะจงด้วย โดยทำการศึกษาแบบ่งตามเพศและกลุ่มอายุ การวิเคราะห์พบว่าวัยรุ่นมีแนวโน้มที่จะสูบบุหรี่หนักขึ้นเมื่อมีผู้ปกครองและเพื่อนที่สูบบุหรี่ โดยอิทธิพลของเพื่อนต่อการสูบบุหรี่มีค่าสูงกว่าอิทธิพลของผู้ปกครอง อิทธิพลดังกล่าวมีความแตกต่างกันในแต่ละกลุ่มอายุและเพศของวัยรุ่น อิทธิพลของเพื่อนและผู้ปกครองจะเพิ่มขึ้นเมื่อนักเรียนมีอายุมากขึ้น อิทธิพลของเพื่อนพบได้ในทั้งสองเพศ แต่อิทธิพลของผู้ปกครองมีความสัมพันธ์กับพฤติกรรมสูบบุหรี่ของเด็กผู้ชายเท่านั้น

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To estimate the magnitude of the association between parent and peer influences on adolescent smoking as non-, light-, and heavy current smokers. By using data from 18,912 adolescents, ages from 13 to 15 years, from two years 2007 and 2014 of the Global Youth Tobacco Survey in Vietnam, were selected for these analyses. Data collected included measures for the smoking status of the adolescent and their parents and friends. Descriptive analysis was used to describe the characteristics of each individual variable. After that, the ordered logistic regression was applied to estimate the relationship between smoking behaviour of parents and peer, with the level of addiction of current smoking among school-going students. I also added up other variables in the regression model as control variables to further examine the association between the dependent and independent variables. Then, examine this association by some subsample to observe the gender and age trends of these relationships. This analysis confirmed that young people were more likely to use cigarettes when their parents and friends smoked, the status of current smoking here was at a light- and heavy-level as well. Especially, the probability of smoking from the effect of friends' cigarette use was generally higher compared to the effect of smoking of parents. In addition, there were differences in influence from the smoking of parent and peer by groups of age and gender of adolescents. The influence of parent and peer were increased when students became older from 13 to 15 years old. While gender-specific influences were identified in the peer impacts on adolescent smoking for both boy and girl; parental smoking only significantly associated with boy.

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Chapter 1: INTRODUCTION

1.1. Problems and Significances

In all over the world, cigarette use and smoking are still an attractive problem in the public health field and these issues are on the top of the death rates leading to the high incident rates; basing on the statistics of WHO in 2019, globally, there were approximately 8,000,000 people have been killed by health problems and diseases related to smoking behavior per year (World Health Organization, 2019, CDC, 2006). In Vietnam, the Ministry of Health reported that around 12% of the burden of disease was distributed by tobacco users and there were near 20% of deaths caused by cigarette use (Ministry of Health et al., 2014). Although the prevalence of cigarette use has been reduced in developed countries in recent years, on the opposite side, the number of smokers has been likely to increase in developing countries over the past years (Prabhat Jha and Frank Chaloupka, 2000, World Health Organization, 1997a), especially among younger people. The recent trend shows that there have been more and more smokers who have started to smoke since being an adolescent (Sinha, 2002). In Vietnam, following the same trend, the percentage of current and new smokers among youth has tended to increase over time. In 2007, 11% of the participant was classified as students, who had experienced with at least one puff cigarette (CDC), to 2013, this prevalence increased to more 17.6% (Duc et al., 2016).

In understanding the factors which are associated with the smoking behaviors of adolescents in Vietnam, a lot of research has been conducted and published (Anh le et al., 2016, Long et al., 2016, Huong et al., 2016). The previous papers on adolescents smoking indicated that the probability of smoking among Vietnamese adolescents had statistical significance to the easy accessing and availability of cigarettes (Anh le et al., 2016) or students who

could access to anti-messages related to smoking information, had a higher level of knowledge and behaviors about tobacco use; or exposure to information against smoking behaviors in the mass media network and those who have learned about the harms for the health due to smoking from their schools, would have a lower probability to be a smoker (Huong et al., 2016), etc.

The World Health Organization (WHO) defines the term *adolescent* is an individual whose age falls in the range between 10-19 years (World Health Organization). According to the knowledge of the *Social Learning Theory*, in this period of age, the actions and behaviors of adolescents have a higher probability of observation, interaction, reinforcement,... from behaviors of the others in their environment (such as from their parents and peers) (Ennett et al., 2010). The findings and pieces of evidence from other countries, much of researchers have suggested that children tend to be influenced and imitate from observing smoking behaviors of their parents and close friends (Agu et al., 2018, McKelvey et al., 2015, Subramaniam et al., 2015, Villanti et al., 2011, Wen et al., 2005). These researchers suggested that parents and friends smoking were especially important, their influences were strong and were significant predictors on cigarettes uses among adolescents. However, most of the previous and relative papers were published from analyzing information of other countries in the world but exclude Vietnam. Therefore, there is necessary to have a description to show the relationship between the influence of the smoking behavior of parents and friends on smoking among Vietnamese students.

1.2. Research questions

I am doing this analysis to answer some research questions as following:

1. What are the changes in the pattern of the relationship between parental and peer smoking and smoking among Vietnamese adolescents in two years 2007 and 2014?
2. How do parental and peer smoking status influence on smoking status among Vietnamese adolescents?
3. How do parental and peer smoking status influence on smoking status in subgroups, such as between boys and girls; and among three levels of age?

1.3. Research objectives

This study has 2 main objectives:

1. To estimate the magnitude of the association between smoking behavior of parent and peer with the level of current smoking among Vietnamese school-going students those aged 13-15, and how these associations are different between male students and female students, and among three levels of age.
2. To examine the changes in the magnitude of those associations in two years, 2007 and 2014.

1.4. The scope of this study

This study is taking advantage of data that were conducted and collected by the Vietnam Global Youth Tobacco Survey (GYTS) in two waves in 2007 and 2014, to estimate the magnitude of the relationship between two main risk factors (peer and parental smoking status) and main outcome, as well as among different gender and levels of age, when holding constant other factors. The second aim is to test the change in these associations between parental and peer

smoking on current smoking among the young people in two years, 2007 and 2014.

The Vietnam GYTS is a national survey on school-going students who aged from 13 to 15 years (at 8th-10th grade) from secondary schools across the country. A 2 – stage sample design and proportion to population size (PPS) were applied to select samples for this GYTS, then weighting system was calculated to account for sample selection. In this study, I use data from 2 years of GYTS in Vietnam, with a total of participants were 18,912 students: in 2007 there were 15,495 students ages 13–15 who participated; and there were 3,417 students in 2014.



Chapter 2: BACKGROUND

This chapter will provide detailed information that relates to the youth smoking status and the prevalence of cigarette uses among adolescents in Vietnam, and what are the current policies and programs that the Government and stakeholders have done to implement and manage this situation?

2.1. Smoking among adolescents in Vietnam

Vietnam is a developing country, located as one of the countries of the Association of Southeast Asian Nations (ASEAN). According to the newest updating of the Vietnam Population and Housing Census, the population was more than 96,208 people across six geographical regions (Vietnam General Statistics Office, 2019), with approximately 14,000 people who are identified as adolescents at the age group of 10-19 in 2017; the sex ratio were 1:1 with boys accounted for 51% compared to 49% of the proportion of girls (General Statistics Office, 2018).

According to findings from several waves of Global Youth Tobacco Survey among ASEAN countries, which was available published on the CDC's website, Vietnam was on the top countries, where had a lower prevalence rate of current smoking cigarette among students 13-15 years old (CDC), while the rest of countries were quite high percentages (see **Figure 1**).

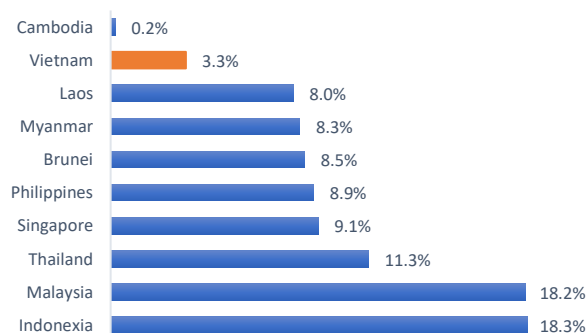


Figure 1. The percentage of current smoking cigarette among 13-15-year-old students from ASEAN countries

From 2003, it was the first time Vietnam had national information and statistics on tobacco use among adolescents since we took part in the Global Youth Tobacco Survey, which is conducted and technically controlled by the advisors from WHO and CDC. Generally, according to the statistics from these surveys, the prevalence of students who were currently using any type or form of tobacco products was declined between 2007 and 2014. These rates of cigarette use in 2007 were 3.8% overall, while it decreased to 2.5% in 2014 (CDC). When comparing smoking percentages among sex, boys were always accounting for a larger and higher proportion, in both two years of the survey (see **Figure 2**).

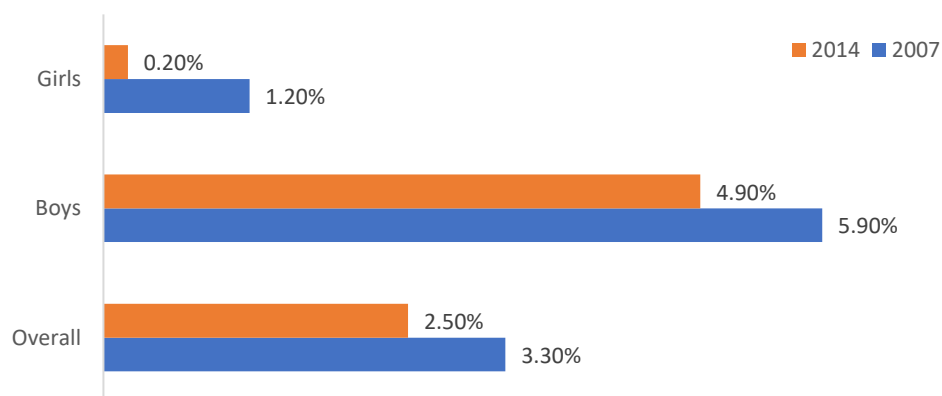


Figure 2. *The percentage of current smokers among 13-15-year students in Vietnam in 2007 and 2014*

2.2. Current policies related to adolescent's smoking management in Vietnam

Smoking-free environment regulations

To protect people from exposure to secondhand smoking, the Vietnam Government had the very beginning actions to include smoking and cigarette using as prohibited activities in halls, cinema and theatres starting in 1989; in military offices in 1996; and from 1997 the sponsors from tobacco companies and factories for sports and cultural events were not allowed as well.

Starting from 2000, the Vietnam Government had enacted the National Tobacco Control Policy 2000-2010, this policy aimed to create and maintain the smoking free living space for non-smokers, at which once again emphasized the regulations of smoke-free public venues prohibited smoking in theaters, offices, health facilities, schools, and other public areas. In the health sector, anyone who violated and had smoking would be fined from 50,000 to 100,000 VND (approximately US\$3 – \$6, in 2005).

In 2005, Vietnam officially signed and became a member of the Framework Convention on Tobacco Control (WHO); then in 2008, the Vietnam Prime Minister has issued the Decision numbered 1315/QĐ-TTg, releasing the Ratification of the Plan for the Implementation of the Framework Convention on Tobacco Control. Until 2012, one of the fully comprehensive prohibitions of cigarette use in public and work-related environments was announced publicly and the Tobacco Control Law which has issued and took impacts at the beginning of May 2013: whereby establishment of the free places of smoking, such as medical care areas, spaces for school and studying; entertainment settings and specific settings for children; spaces with a higher probability of fire and/or burning and/or explosion; inside workspaces; food court; public transportation.

According to the reports from the national survey in Vietnam, participated students those had experiences with tobacco smoke at their home and resident were significantly decreased after (2007) and before (2014) implementing this national law about tobacco control; this number of exposed to smoking in places outside their home was moved in the same trend (See **Figure 3**).

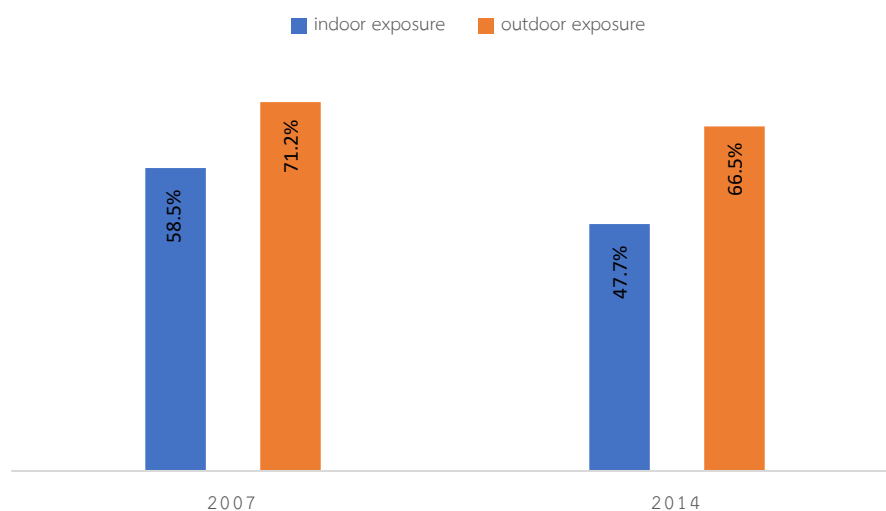


Figure 3. The exposure to secondhand smoking inside and outside among 13-15-year students in Vietnam in 2007 and 2014

Prohibiting to tobacco advertisement, promotion, and sponsorship

Vietnam had the first bans on tobacco advertisements were on both electronic and printed media in 1994 through issuing the Decree 194-CP in December, 31th 1994; and the prohibitions on the media advertisements in 1995 through the Circular numbered 37-VHTT-TT of the Vietnam Ministry of Cultural, Information, and Communication.

In 1997, it was the first-time tobacco companies and factories were banned and prohibited to be sponsorships for sports and cultural events.

In 2007, the Government released publicly the Directive No. 12/2007/CTTTg on the improvement of control actions about tobacco use in

Viet Nam, which were not allowed advertisements and sponsorships related to cigarette and tobacco products. The most comprehensive Law on tobacco advertisement, promotion, and sponsorship was issued by the Prime Minister of Vietnam in 2007, at which, in this national law that tobacco products which are prohibited to advertise, promote, and be sponsored, however, allowed the points of sale displays (World Bank).

Warns of health on the packages and labels of tobacco products

To raise the alarm about the harms for health because of smoking, at the beginning of 1996, the Vietnamese tobacco providers had to print this kind of warns by text through choosing between slogans “*smoking is harmful to health*” or “*smoking causes lung cancer*” on tobacco goods. However, from the time at which these kinds of regulations are issued, there were several ways and violations tobacco advertising, promotions and sponsorship, and printing health warnings on tobacco products packaging as well at the point of sales. According to findings from a study in 2006, only 30% of cigarette packages were printed the text-only warnings on them, which just achieved the lowest level in the condition of the tobacco control framework from WHO. This kind of health alarms might not be effective in the practice in Vietnam, because, in a study in 2009, approximately one-fourth of Vietnamese people could remember and perceive the warning that *smoking can cause lung cancer*; and only 6% of both smoking and no smoking people could remember that smoking can cause COPD.

Increase taxes on tobacco products

There are three kinds of taxations on tobacco products in Vietnam, currently. Firstly, tobacco products will be suffered burden from import duties, in which every cigarette and tobacco products and materials imported will be added into cost, insurance, and freight values. Since becoming a party of the

World Trade Organization in 2007, Vietnam could apply a high import tax on these import cigarettes. Thus, cigarettes and cigars have been the target objects of an import duty rate of 135% of the merchandise's CIF value at the WTO "most favored nation" and 225% of the CIF value for other countries.

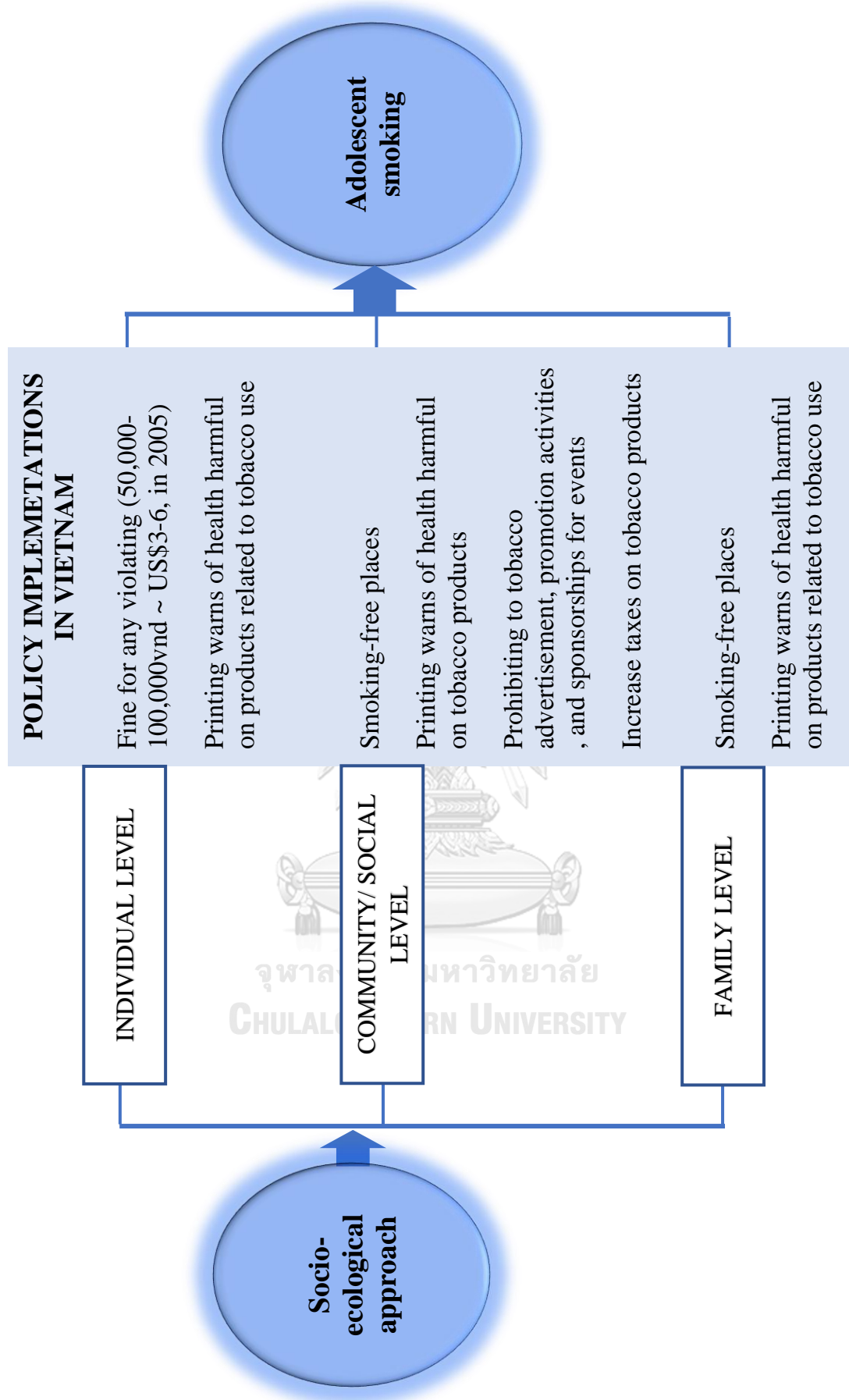
The next layer of tobacco taxation is a special consumption tax. This tax is charged on factory prices of all types of cigarettes, which the domestic markets have been allowed to sell and provide. Through two times of revising, there was an increase in the percentage of special consumption tax which was applied for all kinds of cigarettes which are sold in Vietnam: 55% is accounted for the time between 2006 and 2007 and 65% from 2008-2015, 65% to 70% from 2016-2018 and to 75% starting from 2019.

The final tax on tobacco products is a value-added tax (VAT); whereby, VAT is calculated by 10% of the tobacco value which covers both import tax value and SCT value.

However, in Vietnam, the burden of the tax was accounted for around 42.6% of the retail price. It means that the proportion of tobacco taxation in Vietnam still needs to work hard to achieve the recommended level of 70% of the retail price as a suggestion of WHO.

The policy implications on smoking in Vietnam categorized by the socio-ecological approach

According to the socio-ecological approach, multilevel approaches of community, family, and individual-level factors can provide a deeper understanding of the influences of tobacco control policies on tobacco use among young people. Thus, I tried to summarize and categorize the current policies on smoking in Vietnam at each component of the socio-ecological approach.



Chapter 3: LITERATURE REVIEW

This chapter will provide more detailed information about what has been done so far about the associations between influences from parental and peer smoking behaviors on the current smoking among adolescents, from previous papers and studies all around the world. Then, the author attempted to find out potential gaps from previous papers from the same and related topics.

3.1. Parental influence on smoking among adolescents

The smoking behavior of parents has been strongly associated with adolescents' smoking. There were several pieces of evidence that supported the link between parents' smoking behavior and smoking of adolescents. It has been shown that adolescents were at a higher probability to smoke and smoke more cigarettes when one or both their parents were smokers (Chang et al., 2011, Gilman et al., 2009, Subramaniam et al., 2015, McKelvey et al., 2015). For clarity of reporting, all quantitative papers used a binary variable as dependent variables with "current smoker" or "non-current smoker", then predictors related to parents smoking status were categorized variety, such as "both of parents" or "at least one of parents"/ or more ordered as "father only" or "mother only".

(Gilman et al., 2009) conducted a cohort study on 564 adolescents aged 12-17 of the UK, the research team tried to estimate how does parental influences on the probability to smoke of adolescents among 3 different situations (current smoking parents; quit smoking parent; and non-smoking parent). The discrete-time survival analysis was applied, and they used regression coefficient to interpret key findings. Finally, the team indicated that smoking behavior from parents was related to a higher probability to smoke among the younger people, compared to others whose parents had never

smoked. They also found the possibility of smoking among adolescents increased in the same direction as the number of smoking parents. When compared to those without smoking parents, adolescents who had both parents smoking had a higher risk, while those with only father or mother smoking had half of the level of risk.

This sign of the direction of the relationship between parental smoking and smoking among adolescents was endorsed in findings from (Subramaniam et al., 2015). This was a qualitative study on 91 youth smokers aged 15- 29 years old from Singapore, by using focus group discussion as the main data collection method. The research team wanted to listen to from opinions of students, what were the reasons and factors in which influence on smoking behavior. Theirs participates confirmed that smoking habit since adolescents were younger was influenced by the smoking habit of their family, and the youth had their first cigarettes were offered by their parents. These adolescents were exposed to smoking from their parents and their parents' friends when they were still a teenager, therefore eventually they got okay with this behavior. On the other hand, these youth even can become aware of their smoking habits when they help their parents to buy cigarettes.

Having the same conclusion, Chang at el (2011) used secondary data from a cohort study on 2686 students at nine elementary schools in Taiwan, or McKelvey (2015) used results from self – reported questionnaires over 4-years of 1,454 students from all 7th-grade classes in 19 secondary schools in Syria, these studies wanted to calculate the prevalence and estimate the magnitude of influences in which smoking among family members was one of the factors, then all of them also highlighted the influence of smoking behavior from parents on smoking among their children. They found that smoking behavior from parents was a predictor of children's smoking, in more detail, adolescents who lived with both of their smoking parents had a higher likelihood to smoke,

in comparison with those had either father or mother who smoked ($p < 0.001$) (Chang et al., 2011, McKelvey et al., 2015).

On the other hand, there was a study (Avenevoli and Merikangas, 2003) in which found evidence that parental smoking does not impact directly on the smoking behavior of their children. In 2003, Avenevoli and his team conducted a literature review, they tried to summarize and drew some general conclusions from 87 different existing papers regarding the influences of parent smoking status on adolescent smoking. This review indicated that among individuals who were between 11 and 17 years of age at baseline study, they concluded that the impact of smoking from parents would eliminate when other factors such as the age and gender of adolescents... were included in models. Besides, they also endorsed that there was an inconsistent finding that stated that adolescents who had both parent smoke would be at a higher likelihood of becoming a smoker as compared to others who had single smoking parents.

3.2. Peers influence on smoking among adolescents

While there have been still inconsistent about the probability of parental smoking status on adolescent smoking, the prediction about influence from peers smoking on adolescents' transition to be a smoker, was significant and consistent from the perspective of researchers (Wen et al., 2005) (Villanti et al., 2011, Bahr et al., 2005). In their studies, both Wen who included 44,976 15-18 years students in Taiwan (in 2005) and Villanti who analyzed smoking behaviors of 10-17- year students in the USA (in 2011) found out that when compared to other ones whose friends did smoke, students had smoking friends had a higher probability to be a cigarette user, with statistical significance in associations (Villanti et al., 2011, Wen et al., 2005). Additionally, the number of best friends who smoked was the most important predictor of becoming a younger smoker and peers' smoking appeared as a mediating variable for other predictors (Bahr et al., 2005).

Peer group pressure is considered as a fundamental and important predictor that have impacts on experimentations with tobacco and cigarette among adolescents. The pressure from peers may influence the decision to smoke or not to smoke, with this influence is occurred by their friends. Finding from a review systematically and meta-analysis of (Leshargie et al., 2019), they searched and collected all relevant articles, to assess the association between smoking behavior and pressure from a group of friends among students from high school and university across Ethiopia. They showed that the aggregated meta-analysis revealed a higher possibility of cigarette uses among adolescents who had an experience of peer pressure when compared to other ones who didn't. This main result had no difference in conclusion from another research in Iran, in which students who underwent a pressure to smoke from other friends were found to be a higher likelihood and probability of cigarette smoking, compared to other students who did not (Karimi et al., 2017). In addition, results from another systematic review also endorsed that the most

common predictor of cigarette use was having smoking friends (Haghdoost and Moosazadeh, 2013).

On the other hand, the significance of the association between adolescents' smoking and peers' smoking could be explained by peer selection (Go et al., 2010, Green et al., 2012). Friends and other ones who have the same level of age tend to make friends and share with a group of people having the same habits and same preferences. There is growing evidence that adolescents also seek out friends who are similar to them in terms of smoking.



3.3. Comparative impacts of parents and peers influence on smoking among adolescents

When both parents and peers' smoking behaviors were assessed regarding having impacts on adolescent smoking, some of the studies found out that peer smoking behavior was considered as the most important role in adolescent smoking than parents (Avenevoli and Merikangas, 2003, Bahr et al., 2005). A research team of Bahr et al (2005) used a sample size of 4,230 of 7th-12th grade students, then they applied negative binary regression to estimate the effects of peer and family variables on the likelihood of adolescent smoking. The results showed that the cigarette use of family had a significant association with adolescent cigarette smoking, however, after peers' cigarette use was entered into the model, the prediction from familial use decreased significantly (Bahr et al., 2005). This statement was endorsed once again in the study of Avenevoli (2003), they discussed that the magnitude of parental smoking influence was small, especially when compared to other risk factors such as peer smoking (Avenevoli and Merikangas, 2003). Or even, the effects of parental smoking were often eliminated or non-significant in the model in which included peer' smoking (West et al., 1999).

On the other hand, there was a hypothesis that *Did adolescents overestimate the extent of smoking among their peers*. To address this question, the team of Bahr (2005) included a group of characteristics (such as approving of father and mother about smoking behavior, smoking behavior from cousins, attachment to parents, and monitoring of father and mother). The final results indicated that peers' smoking had a stronger impact than any of the other variables related to family (Bahr et al., 2005). However, another study, (Villanti et al., 2011) showed equal roles in influence on adolescent smoking between parents' and peers' cigarette uses.

Table 1. Summary of reviewing and extracting information from previous papers

Author (year)	Title/objectives	Data	Methodology	Findings	
				Impact factors	Sign of impact
(Agu et al., 2018)	To determine whether parental smoking status was associated with early age of smoking behavior among Jamaican adolescents	Secondary data, from National school survey On 8-12 th grade students Sample size= 3,365	chi2, logistic regression Early age of smoking initiation @ 12.4	Parental smoking Parent's edu Grade of student	No impact Lower edu > higher edu Lower grade < higher grade
(So and Yeo, 2015)	Factors associated with EIS among Korean adolescents:	Secondary data, Source: "Korean Youth Risk Behavior Survey" On 12-18-year	Regression model (with Relative ratio (RR) and 95%CI) Early initiation of smoking @	sex Good health status, Alcohol consumption, Thin/average body image, Low level of happiness,	Male > female

(Lochbuehler et al., 2012)	Smoking of their parents and the attention of children to smoke: => to test the hypothesis that if children who had parents smoking would have a higher attention for smoking cues in comparison with other children whose parents were non-smokers	students Sample size= 73850	13.5 years old	Low academic grade, < high school: Parental edu level,	
		Primary data, Sample size= 30, divided to 2 groups: 19 children had parents who were non-smokers; 11 children had at least one of their parents who smoked	Multivariate analysis of covariance, Control for AGE	Having smoking bans in the home	Children who lived with smoking parent had a higher attention for smoking cues than children without smoking parent (p=0.01) => the mean of age among children was 11.64 among 11 children having smoking parents => can be concluded that children started to have smoking behavior since at very young age
(Valencia et al.,	SES and Early	Secondary data,	Multivariate	Perceived household	Low and middle > high

2019)	<p>initiation of smoking</p> <p>=> examine the relationship between early initiation (at age 12 or younger) of some common behavior among Korean adolescents, including smoking behavior and some determinants of socioeconomic status</p>	<p>Source: "Korean Youth Risk Behavior Survey"</p> <p>On 12-18-year students</p> <p>Sample size= 68043</p>	<p>logistic (OR and 95%CI)</p> <p>Early age of initiation @ <= 12 years old</p>	<p>income level</p> <p>Pocket money</p> <p>Mother's level of edu</p> <p>Living status</p> <p>All p < 0.001</p>	<p>High > low and middle</p> <p>< college < higher than college level</p> <p>With relatives/ welfare centers (without family) > with family</p>
(Gilman et al., 2009)	<p>Parental smoking and Initiation of smoking among adolescent</p> <p>=> whether parental smoking increases the risk of offspring</p>	<p>Primary data,</p> <p>A cohort study,</p> <p>A multistage sampling,</p>	<p>Discrete-time survival analysis (with regression coefficients)</p>	<p>Parental smoking status</p>	<p>There were a higher impacts from parental smoking on adolescent smoking among 13-year-students, compared to those who were younger. (chi2 for the relationship between smoking of parent and adolescent smoking was</p>

	smoking initiation	12-17-year students Sample size= 564			4.2, $p < 0.05$ at a degree of freedom=1)
(Paul et al., 2008)	Aims to estimate whether exposure to parental smoking in childhood was associated with the initiation of smoking; and smoking 20 years later	Primary data, 9-15-year-old students Sample size= 3559	Log binominal regression (with RR and 95% CI) Early age of smoking initiation @ from 9-13	Parental smoking status	Adolescents who had a smoking mother would have a higher probability to smoke, compared to other ones whose mother did not; and that group of students also had more likelihood to start smoking at an early stage of age
(Mays et al., 2014)	Aims to estimate association between having smoking parents and parental nicotine dependence and adolescent smoking	Primary data On 12-17-year-old students Sample size= 406	chi2 logistic regression (controlling vars: about parent: gender,	Pattern smoking among adolescent groups: Regular smoker Early experimenter Late experimenter Non-smoker	Pattern smoking among adolescent was classified as 4

			<p>race, age, edu, household income, marital status); and about adolescent: gender, age, race)</p>	<p>Parental smoking status</p>	<p>Adolescents with parents who were nicotine-dependent smokers were more likely to be early regular smokers (OR= 1.18, 95% CI= 1.05–1.33); and early experimenters (OR= 1.04, 95% CI= 1.04–1.25)</p>
<p>(Villanti et al., 2011)</p>	<p>Aims to examine the association between becoming a smoker and exposure to peer's smoking, smoking at home, and advertising related tobacco</p>	<p>Secondary data, Source: National Youth Tobacco Survey from the US On 10-17-year-old students Sample size= 22111</p>	<p>chi²; multi-nominal logistic regression (interpreting by Odds ratio- OR)</p> <p>Divided adolescents into: (1) early adolescent (who</p>	<p>Peer's smoking</p> <p>Parental smoking</p> <p>Advertising related to smoking</p>	<p>There was significant association between peer's smoking and adolescent smoking:</p> <p>The level of influence decreased when adolescents became older:</p> <p>Significant association</p> <p>Exposure to tobacco advertising was significantly associated with current and former smoking behavior</p>

(Liao et al., 2013)	Aims to examine the change in peer and parental influence on cigarette smoking from early through late adolescents	Primary data, Longitudinal study On 7 th to 12 th grade Sample size= 1001	aged 10-13); (2) middle adolescent (who aged 14-17)	Parental smoking Peer's smoking	among students who were less than 13 years old
			Regression They distinguished: (1) early adolescent= junior high school (7 th and 8 th grade); (2) late adolescent= high school (9 th to 12 th grade) Controlling	Significant association Significant association	The influence of friends' smoking was higher when the student was at an early adolescent, compared to a late adolescent

(So and Yeo, 2015)	Factors associated with EIS among Korean adolescents	Secondary data, Survey named “Korean Youth Risk Behavior” On 12-18-year students Sample size= 73850	vars: program condition, gender, ethnicity, SES, and school type	sex	Male > female
			Chi2	health status at poor condition, the poor condition of mental health, under-stressed, perform moderate exercise, give effort toward weight control, not access to the internet, alcohol user, thinking of suicide, involve in sexual working, and low score at school (p < 0.001)	education level of father <= high school > higher level

				and mother	of edu
(Getachew et al., 2019)	Prevalence and Risk factors with tobacco consumption	Primary data, A cross-sectional, A random sampling, On 13-19-year students Sample size= 3967	Chi2, Multivariate analysis with Odd ratio (OR) and 95%CI Definition of CURRENT SMOKER= who reported having smoked cigarettes in the last 30 days	Approve of family members about smoking at home Mother smoked Best friends smoked Possess item with cigarette brand (no/yes)	+ + OR= 11.78 (3.28-42.23) + OR= 30.81(14.98-63.39) + OR= 3.75 (2.25-6.27)
(Gilman et al.,	Parental smoking and	Primary data,	Discrete-time	Parental smoking status	There were a statistically

<p>2009)</p>	<p>Initiation of smoking among adolescent => How does smoking of parents impact on the probability of adolescent smoking among 3 different situations (current smoking parents; quit smoking parent; and non-smoking parent)</p>	<p>A cohort study, A multistage sampling, 12-17-year students Sample size= 564</p>	<p>survival analysis (with regression coefficients)</p>	<p>significant association between parental smoking and adolescent smoking (OR=2.81) Students who had a higher number of smoking fathers and mothers would have a higher probability to become smoker, compared to other students who did not have Only active parental smoking was associated with an increased risk of smoking in offspring (children whose parents had quit smoking was no more likely to begin smoking than children whose parents had never smoked)</p>
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(Subramaniam et al., 2015)	<p>Perspectives on Smoking initiation</p> <p>=> explore the determinants of smoking initiation</p>	<p>Primary data, A qualitative study from the perspective of youth</p> <p>14-29-year students</p> <p>Sample size= 91</p>	<p>Focus group discussion</p>	<p>Parental smoking</p>	<p>....family members influenced adolescent smoking, but not that much</p> <p>They tended to smoke after they observed this behavior from other members in their family</p> <p>...the reason to have the first cigarette puff because of observation from parental smoking</p> <p>Smoking to fit in and be accepted among friend society</p>
(Chang et al.,	Risk factors	Secondary data,	Survival time	<p>Peer smoking</p> <p>Perceived health risks of smoking</p> <p>Gender</p>	<p>Male > female (p<0.001)</p>

2011)	associated with initial experimental smoking	From Child and Adolescent Behaviors in Long-term Evolution Sample size= 2686	analysis	Residence Family structure Parental smoking Peer smoking	Rural > urban ($p<0.001$) Single parent > full parent ($p<0.001$) Highlight the influences of family and friends Compared to other students had only father or mother smoked, students who had both of smoking parents were higher probability to smoke at an early stage of age ($p<0.001$) Compared to other students had only a few friends smoked, students who had many smoking parents were higher probability to start using tobacco ($p<0.001$)
(Avenevoli and Merikangas,	Familial influences on adolescent smoking	Literature review 87 relative studies		Parental smoking	The author showed the significant association between parental smoking and

2003)				Peer smoking	adolescent smoking, however, this association was not strong and inconsistent +
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3.4. Other factors have impacts on adolescents smoking

Base on the knowledge and theory about adolescent smoking and guiding from reviewing previous papers, the fact is that adolescent smoking is simultaneously determined by several factors, in addition to influence from parental and peer smoking, individual factors (such as age, gender of students, and the perception of students about risks of smoking); social context (such as exposure to secondhand smoking inside and outside their residence; and level of income of family); and environmental context (such as: exposed to advertising and promotion related to smoking on mass media; whether being taught in class about dangers of smoking; exposure to anti-smoking messages; and having bans at schools and home on smoking) were considered to have a statistically significant association with cigarette smoking among youth. Therefore, these variables will be used as control variables to further determine the relationship between the dependent and two main independent variables in this study.

Age: the previous papers illustrated that adolescents who were higher age, were associated with an increased risk of smoking among youth (Duko et al., 2019, Kabir and Goh, 2014, Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019). A research team from Bangladesh (Kabir and Goh, 2014) used data from National Youth Tobacco Survey in 2 countries such as Nepal and Sri Lanka, they showed findings that students who had higher age (15-year-old) were approximately 2 times higher likelihoods to smoke in comparison with lower age students (13-year-old) at a significant level of 10%.

Gender: almost of my previous papers (Dahlui et al., 2015, Kabir and Goh, 2014, Oyewole et al., 2018, Roberts et al., 2015, So and Yeo, 2015, Tezera and Endalamaw, 2019) confirmed the conclusion that male had a higher likelihood of smoking compared to female.

Perception of health risks of smoking: (Dahlui et al., 2015, Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019) suggested that students who had perception about the risk of smoking were positively associated with smoking cigarettes among adolescents.

Exposure to secondhand smoking: The likelihood to have family members who were smokers had statistically significant impacts on adolescent smoking behavior, compared to other teenagers who shared a roof with non-smoker members (Kabir and Goh, 2014, Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019). For example, the likelihood of Nepalese and Sri Lankan to be a tobacco user was 1.8 and 2.4 times more likely, respectively, among children who usually exposure to the smoking behavior of adults (Kabir and Goh, 2014). At the same sign of impacts, exposure to secondhand smoking at outside home was statistically significant to adolescent smoking, this conclusion was confirmed by previous authors such as (Kabir and Goh, 2014, Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019).

Income of parents: previous papers suggested that adolescents who lived in low economic status, then smoking is more prevalent, they experience greater pressure to smoke from parents and friends when compared to other ones whose family had a higher SES; meaning that lower-income of father and mother have negative impacts on the percentage of using cigarettes among younger people.

Advertisements and promotions about smoking on the mass media: (Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019) suggested that students who have exposed to those kinds of marketing and promotions, had a higher probability of smoking and cigarette uses; and adolescents who had more frequency to access to tobacco advertising had a significant association with smoking. While, on the other hand, (Kabir and

Goh, 2014) used data from a national survey on tobacco use of youth in Nepal and Sri Lanka, he and his research team gave the conclusion that there was an insignificant association from the influence of promotions and advertisements seen on the media network.

Learn about the harms of smoking in classrooms: (Dahlui et al., 2015, Kabir and Goh, 2014, Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019) considered this kind of variable as one of the protective factors for tobacco use among adolescents. In both countries Nepal and Sri Lanka, students who were taught at school about the dangers of smoking would have significantly reduced the probability of cigarette use, in comparison with other students who did not; this result was reported by Kabir and his team (Kabir and Goh, 2014).

Having bans on smoking at schools and around life space: Cigarette regulations (such as smoke-free legislation...) were associated with decreased smoking frequency among adolescents. (Roberts et al., 2015, So and Yeo, 2015) suggested that having bans on cigarette use at and around the home might raise the perceptions and awareness against smoking behavior among adolescents and reduce cigarette users. Adolescents who share a living space with non-current smoking people and live in anti-smoking bans had a lower probability to become a smokers in comparison with other ones whose family members and neighborhood were smokers and living without smoking bans. However, on the other hand, schools having smoking-free policies, students were 41% less likely to smoke than students in schools with poor or no smoke-free-school policies. However, there was so evidences in which indicated the fail or unsuccessful of this control condition: they did not observe any effect of the implementation of the ban for smoking prevalence on students.

Table 2. Sign of impacts on adolescents smoking from previous papers

Variables	Sign of impact	Previous papers
Parental smoking	-/.	(Chang et al., 2011, Gilman et al., 2009, McKelvey et al., 2015, Subramaniam et al., 2015, Avenevoli and Merikangas, 2003)
Peer smoking	-	(Bahr et al., 2005, Villanti et al., 2011, Wen et al., 2005)
Age	Higher age > lower age	(Duko et al., 2019, Kabir and Goh, 2014, Oyewole et al., 2018, Tezera and Endalamaw, 2019)
Gender	Male > female	(Dahlui et al., 2015, Kabir and Goh, 2014, Oyewole et al., 2018, Roberts et al., 2015, So and Yeo, 2015, Tezera and Endalamaw, 2019)
Perception of risk of smoking	+	(Dahlui et al., 2015, Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019)
Exposure with secondhand smoking at inside and outside home	-	(Kabir and Goh, 2014, Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019)
Lower income of parents	-	(Gilman et al., 2009)
Advertisements and Promotion about smoking on mass media	-/.	(Gilman et al., 2009, Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019)
Teaching the harms of smoking at the classroom	+	(Dahlui et al., 2015, Kabir and Goh, 2014, Oyewole et al., 2018, Roberts et al., 2015, Tezera and Endalamaw, 2019)
Having bans on smoking at schools and around life space	+/.	(Roberts et al., 2015, So and Yeo, 2015)
Exposure to anti-smoking messages	+	(Roberts et al., 2015, So and Yeo, 2015)

+ : positive impacts

- : negative impacts

. : ambiguous

3.5. The gaps from previous literature

Over the past years, Vietnam has had an increase in the number of current and new adolescents' smokers over time. The Vietnamese researchers have conducted studies and suggested some risk factors of cigarette using among adolescents. However, to the best of my searching and knowledge, they have not ever focused on the influences from parental and peers smoking behaviors, or even in some previous papers in this topic around the world, these authors often just determined and showed whether is there any statistically significant relationship here, they have not gone deeply into how the level of current adolescent smokers is if they have their parents or friends who are smokers as well? Thus, this study may be one of the first studies which attempt to estimate the magnitude of the relationship between parental, peers smoking status, and smoking status among Vietnamese adolescents”.

Chapter 4: CONCEPTUAL FRAMEWORK

Conceptual framework

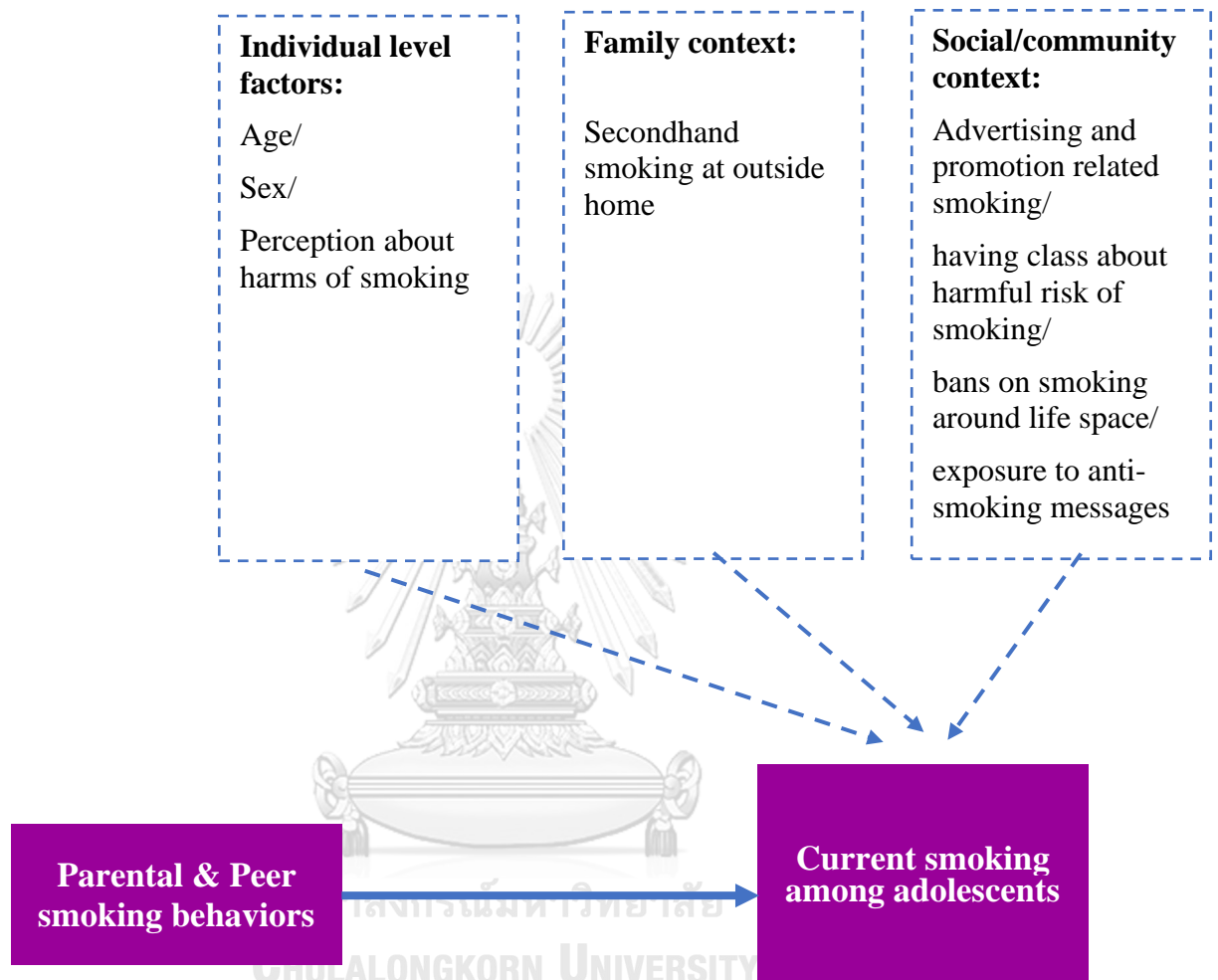


Figure 4. Conceptual framework showing the relationship between parental and peers smoking and smoking among school-going students aged 13-15

Figure 4 provides the conceptual framework of this study. Smoking of parents has been strongly associated with adolescents smoking, adolescents were at a higher risk to smoke and smoke more when at least one parents were smokers (Chang et al., 2011, Gilman et al., 2009, McKelvey et al., 2015). On the other hand, there was a study (Avenevoli and Merikangas, 2003) in which found that parental smoking does not impact directly on the smoking of their children. This impact from parents would be eliminated when other factors

such as the age and gender of adolescents were included in models. While, the peer was an important and significant predictor of adolescent smoking from the perspective of researchers (Bahr et al., 2005, Villanti et al., 2011, Wen et al., 2005). There were two types of influence from peers' smoking on the smoking behavior of adolescents. Firstly, the pressure from peers may influence the decision to smoke or not smoke with this influence is occurred by their friends (Karimi et al., 2017, Leshargie et al., 2019). On the other hand, this significance of association could be explained by peer selection, meaning that someone's peer group tends to be a group with similar characteristics and preferences (Go et al., 2010, Green et al., 2012). When both parents and peers' smoking were assessed regarding having impacts on adolescent smoking, some of the studies found out that peer smoking was considered as the most important role in adolescent smoking than parents.

From literature review, previous authors also indicated that some of the factors have associated with cigarette smoking among young people, such as age, gender, perceived and knowledge about harms of smoking, exposure to secondhand smoking, marketing and promotions related to smoking, smoking bans and anti-smoking messages; be taught about disadvantages from smoking and living in a higher level of economics. Some factors include “younger age”, “having right knowledge about harmful of smoking”, “was taught about harmful of smoking at class”, “having smoking banns at home”, “exposure to anti-smoking messages” were protective factors and had negative effects on being smokers among adolescents. While, “being males”, “exposing to secondhand smoking at outside and inside home”; “living in a lower social-economic” and “exposing to an average level of promotion related to smoking” might increase the probability of smoking among students.

Chapter 5: RESEARCH METHODOLOGY

5.1. Data source

This study used secondary data, which was collected from the Global Youth Tobacco Survey (GYTS) in Vietnam in two years, 2007, and 2014. The GYTS was a school-based survey, focusing on secondary school students those aged from 13 – 15 (grades 8th to 10th); under consultations from advisors of World Health Organization and technical advisors of the Center for Disease Control and Prevention (CDC), every country took part in this kind of survey used a standardized methodology of constructing and sampling, building questionnaire, processing data, and weighting.

With the GYTS in 2007 and 2014, a two-stage sample design was applied; at the 1st stage, schools across the whole country were selected based on probability proportional to enrollment size (PPS); at the 2nd stage, classes from participated schools were chosen randomly and all students in selected classes were eligible to interview. Then, students used a standardized answer sheet to answer several questions, categorized into 6 mains indicators: prevalence, pro-tobacco advertisement, secondhand smoking, cessation, access/availability, and tobacco-related at school (CDC). The data was collected, processed, and weighted by CDC.

Finally, a total of 3,430 students in 2014 with the school response rate was 100%, the student response rate was 95.0% and the overall response rate was 95.0% and 15,610 students in 2007, with the school response rate was 95%, the student response rate was 96.9% and the overall response rate was 92.1%; those aged 13-15 years old were included in these surveys.

The more detailed information about this kind of survey was published elsewhere for 2014 (Giang et al., 2016) and for 2007 (Van Minh et al., 2011).

5.2. Definition of variables

Base on the theory about adolescent smoking and reviewing previous papers, adolescent smoking behavior is simultaneously determined by several factors, including individual-level factors, social-level factors, and environmental-level factors. And the numbers of these variables will be used as control variables in this study to further determine the relationship between the dependent and two main independent variables in this study. However, when using *summarize* command to explore descriptive information, the variable *income of father*, and *income of mother*, and *having bans about smoking at schools* are having problems about missing data (see **Table 3**), thus, to avoid of significant effect on conclusions I decided to drop these data and treat them as omitted variables in my models.

Table 3. Number of observations and missing of each variable in this study

Variables	Number of observations	Number of missing observations
Current smoking among adolescents	18,912	0
Parental smoking	18,603	309
Peers smoking	18,817	95
Gender	18,878	34
Age	18,848	64
Knowledge about harmful of smoking	18,912	0
Exposure to smoking at outside home	18,884	28
Exposure to smoking at inside home	18,748	164
Job of father	2,986	15,926
Job of mother	3,206	15,706
Promotion about smoking	17,703	1,209
Be taught about harmful of smoking at class	16,963	1,949
Having bans about smoking at schools	3,417	15,495

Having bans about smoking at home	18,735	177
Exposure to anti-smoking messages	18,857	55

Besides, when considering the correlations between independent variables, the correlation matrix ranged from -0.0015 to 0.4246 for the variables selected for the regression models – indicated no multicollinearity (**Figure 4**). However, according to the Vietnamese culture, parents and their children often share a house together and live under the same roof, hence, it is making sense that adolescents have a higher opportunity to observe and expose to the smoking of their parents, meaning that there is secondhand smoking within their living space; in addition of correlation between “*smoking of parent*” and “*exposure to secondhand smoking inside house*” was 0.4246. Therefore, I decided to drop “*exposure to secondhand smoking inside house*” from my models.

Finally, the control variables that I used to analyze consist of (1) *individual factors* (such as age, gender of students, and the perception of students about risks of smoking); (2) *social context* (such as exposure to secondhand smoking at outside their residence); and (3) *environmental context* (such as: exposed to advertising and promotion related to smoking on mass media; whether being taught in class about dangers of smoking; exposure to anti-smoking messages; and having bans at home on smoking).

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. cor parent peer age sex knowledge outside inside taught ban_home antismoke promotion
(obs=15,392)
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	parent	peer	age	sex	knowle-e	outside	inside	taught	ban_home	antism-e	promot-n
parent	1.0000										
peer	0.1472	1.0000									
age	0.0078	0.1644	1.0000								
sex	-0.0015	0.1469	-0.0190	1.0000							
knowledge	-0.0165	-0.0903	-0.0034	-0.0841	1.0000						
outside	0.1787	0.1742	0.0596	0.0053	0.0383	1.0000					
inside	0.4246	0.1895	0.0235	0.0066	0.0030	0.3602	1.0000				
taught	0.0001	-0.0284	-0.1292	-0.0083	0.0197	-0.0072	0.0069	1.0000			
ban_home	0.0082	-0.0076	-0.0151	-0.0442	0.0636	0.0014	0.0212	0.1488	1.0000		
antismoke	0.0023	-0.0137	-0.0290	-0.0274	0.0460	0.0193	0.0178	0.1623	0.1975	1.0000	
promotion	0.0309	0.1166	-0.0027	0.0652	-0.0864	-0.0137	0.0460	0.0290	0.0310	0.0568	1.0000

Figure 5. Correlation between independent and control variables in models

Here is detailed information about each kind of variable that I use for analysis in my study.

Dependent variables

Current smoking status among adolescents: In the original questionnaire, *current smoking status* was measured by asking students about the average number of puffs they consumed in a day during 30 days before the survey. There were 7 options: (1) have never tried to smoke; (2) less than 1 cigarette; (3) 1 cigarette; (4) 2-5 cigarettes; (5) 6-10 cigarettes; (6) 11-20 cigarettes; (7) more than 20 cigarettes. In this study, this variable was recoded as 1= “non-current smoker”; 2= “light smoker” (who used to smoked within one month before the survey, and consumed less/ equal 10 cigarettes per day (Schiller et al., 2012, Pabst A et al., 2010)); and 3= “heavy smoker” (who smoked more than 10 cigarettes per day (Pabst A et al., 2010)).

Independent variables

Parents smoking status: was assessed with “Do your parents smoke?”. Response options were (1) none; (2) both; (3) father only; (4) mother only. In this study, this variable was recoded as 0= “none”; and 1= “at least one of parents smoked”.

Peers smoking status: was assessed by the question “Do any of your closest friends smoke tobacco?”. Response options were (1) none; (2) some of them; (3) most of them; and (4) all of them. In this study, this variable was recoded as 0= “none”; and 1= “at least one of peers smoked”.

Control variables

Age of students includes a dummy variable for the age of 13 (*age13*); a dummy variable for the age of 14 (*age14*) and the age of 15 (*age15*). And *the age of 15* was used as an omitted group when compared to two other groups.

Sex of students was a binary variable, with 0= “girl”; and 1= “boy”.

Having perception about health risks from smoking among students was measured by asking students two questions: (1) Do you think the smoke from other people’s tobacco smoking is harmful to you; and (2) Do you think smoking tobacco is harmful to your health? Both two questions have the same 4 answer options: 1= “definitely not”; 2= “probably not”; 3= “probably yes”; and 4= “definitely yes”. In this study, this variable was recoded as 1= “right knowledge” as respondents choose “definitely yes” for both; otherwise was denoted as 0= “don’t know”.

Exposure to secondhand smoking at outside home, to measure whether there is anyone who smokes outside the respondents’ home. There were 2 questions: (1) How many days has anyone smoked outdoor public place, during the past 7 days; and (2) How many days has anyone smoked inside a public place, other than your home, during the past 7 days. Both two questions have 5 options, from 1= “0 day”; 2= “1 to 2 days”; through 5= “7 days”. In this study, 0= “no exposure” with answering “0 day” for both the above questions; and otherwise as 1= “having exposure”.

Exposure to messages against smoking behaviors was measured by the question: how many different communication messages on tobacco control did you see on the television, radio, poster, billboards, newspapers within the last one month? If students answered that they seen a few or many times, it means there was an exposure to the anti-smoking message, then I recoded as 1 in this analysis; and 0 for otherwise.

Having class at schools about the dangers of smoking to consider whether were students taught at school or not. If they answered there was class, then recoded as 1= “yes”; and otherwise as 0= “no”.

Having bans on smoking around life space was measured by this question: (1) Did you see any information on banning people under 18 years old to sell/buy/use tobacco product around your living space, with 2 alternatives: 1= “yes”; and 0= “no”.

In a previous study, (Wellman et al., 2006) defined tobacco-related marketing as the activities which were related to tobacco advertising, promotions and providing coupons, free samples, and the prediction of tobacco-related on the mass media such as the internet, videos, televisions. Thus, in this study, *Advertising and promotion related to smoking* were measured by the following questions:

- “Did you see any people using tobacco on TV, in videos or movies, during the past 30 days?”. Response options were categorized as 1= never watch TV; 2= yes; 3= no.
- “Did you see any adv or promotions for tobacco products at the point of sale, during the past 30 days?”. Responses were as 1= never visit any points of sale; 2= yes; 3= no.
- “Do you have something with a tobacco products brand logo on it?”. Responses were as 1= yes; 2= no.
- “Has a person working for a tobacco company ever offered you a free tobacco product?”. Responses were as 1= yes; 2= no.
- “Did you see any adv or promotions for tobacco products at sports events, fairs, concerts, during the past 30 days?”. Responses were as 1= never attend; 2= yes; 3= no.
- “Did you see any adv or promotions for tobacco products on the internet, during the past 30 days?”. Responses were as 1= never use; 2= yes; 3= no.
- “Have you ever received a coupon from a tobacco company?”. Responses were as 1= yes; 2= no.

In this study, the level of exposure was determined by scoring these above questions. The scores ranged from 0 to 7. Scores 3 and below were defined as “low exposure”; scores between 4 and 7 were defined as “average exposure”.

Table 4 illustrates details of all variables that were used in my analysis.

Table 4. Definition of variables used in this study

Variable	The definition used in this study
Dependent variables	
Current smoker	1= non-current smoker 2= light smoker 3= heavy smoker
Independent variables	
Parents' smoking	1= at least one of parents smoked 0= otherwise
Peers' smoking	1= at least one of peers smoked 0= otherwise
Controlling variables	
Age13	1= 13 years old 0= otherwise
Age14	1= 14 years old 0= otherwise
Age15	1= 15 years old 0= otherwise
Sex	1= male 0= female

(omitted group)

Having perception of risk of smoking	0= don't have 1= right knowledge
Experience to secondhand smoking at outside home	0= no exposure 1= having exposure
Experience to anti-smoking messages	0= no 1= yes
Having class at schools about dangers of smoking	0= no 1= yes
Having bans on smoking around the living space	0= no 1= yes
Exposure to advertising and promotion related to smoking	0= no exposing 1= average exposing

5.3. Ethical review board

The Vietnam GYTS in 2014 was approved by the Vietnam Ministry of Health, Vietnam Ministry of Education, Departments of Education and Training, and schools from 13 participant provinces. The research proposal was approved by the ethical review board from Hanoi Medical University, Vietnam.

5.4. Data analysis

5.4.1. Econometric problems

In my opinion, there are some econometric issues in this analysis, including *endogeneity* and *heteroskedasticity*. According to the theory about adolescent's behavior, those who are in the same age often have influence and

share causes of smoking. Additionally, one of the most vulnerable objects from the impacts of society is younger people. This stage of development tends to fit in to suit their other friends, they likely to make friends with someone who shares this smoking behavior, then, a problem with endogenously might have occurred.

On the other hand, heteroskedasticity could also be determined. Because in this dataset, the variances in cigarette use can be different among those who were non-current smokers compared to other addicted smokers.

5.4.2. Data analysis

In this analysis, both descriptive and regression analyses were used. First of all, I used *summarize* and *frequency* test to describe the general statistics of every variable in this study. Next, I applied the analysis of *ordered logistic regression*, in order to determine the association and the influence of smoking behavior of parents and friends, on the status of current smoking among school-going students in Vietnam. I also added up other variables in the regression model as control variables to further examine the association between the dependent and independent variables.

(1) Ordered logistic regression

Dependent variable: I would like to assess how do smoking of parent and friend influences on the level of current smoking behavior among adolescents. This outcome of interest is an ordered variable, with 3 options: 1= non-current smokers; 2= light current smoker; and 3= heavy current smokers.

The regression equation should be represented as follow:

$$Y^*_i = \mathbf{x}_i\boldsymbol{\beta} + \boldsymbol{\varepsilon}_{1i} = \beta_0 + \beta_1 \text{parent} + \beta_2 \text{peer} + \beta_3 \text{age13} + \beta_4 \text{age14} + \beta_5 \text{sex} + \beta_6 \text{knowledge} + \beta_7 \text{outside} + \beta_8 \text{promotion} + \beta_9 \text{taught} + \beta_{10} \text{ban_home} + \beta_{11} \text{antismoke} + \boldsymbol{\varepsilon}_{1i} \quad \text{Eq (1)}$$

where Y_i^* is a latent variable in which the researcher does not observe, β is coefficient estimates, x_i is independent and controlling variable, and ε_i is error term.

In this study, what can be observed is Y_i , when the latent index (Y_i^*) falls within range corresponding (represented by “ c ”) to a particular choice category, that category will be chosen:

If $-\infty < Y_i^* \leq c_1 \Rightarrow Y_i = 1$ (= that student was a non-current smoker)

If $c_1 < Y_i^* \leq c_2 \Rightarrow Y_i = 2$ (= that student was a light smoker)

If $c_2 < Y_i^* < +\infty \Rightarrow Y_i = 3$ (= that student was a heavy smoker)

The error term in that model is assumed to have logit distribution, then having 0 for mean and $\pi^2/3$ for variance, then we got the following probability expressions:

$$\Pr(Y = 1) = \frac{e^{c_1 - \beta x}}{1 + e^{c_1 - \beta x}} ;$$

$$\Pr(Y = 2) = \frac{e^{c_2 - \beta x}}{1 + e^{c_2 - \beta x}} - \frac{e^{c_1 - \beta x}}{1 + e^{c_1 - \beta x}} ;$$

$$\Pr(Y = 3) = 1 - \frac{e^{c_2 - \beta x}}{1 + e^{c_2 - \beta x}}$$

Estimation method:

The marginal impact of the highest option is shown by the same sign of the coefficients, whereas the opposite trend is applied for the marginal effect of the lowest option, and middle options, the direction of the influence on the dependent variable is ambiguous. The coefficient is estimated following this given formula:

$$L(\beta, c) = \prod_{i=1}^N \prod_{j=1}^J P^{j(Y^j)}$$

where β are the estimated coefficients and c are the cut points.

To interpret the size of the different likelihood to smoke currently among adolescents when each independent variable increases by one unit, I use marginal effect. In the case that independent variables are dummy variables, then marginal effect is calculated by: $\text{Prob}(Y=j | x=1) - \text{Prob}(Y=j | x=0)$. If explanatory variables are continuous variable, then marginal effect will be:

$$\frac{\partial \text{Pr}(Y=j)}{\partial x} = \beta * [f(C_{j-1} - \beta x) - f(C_j - \beta x)]$$

Besides, I also ran equation **Eq(1)** in 5 models to observe the differences in the influence of parental and friends' smoking on current smoking among 13-15-year students in Vietnam in differences of specifications. **Model 1:** running a crude model; **Model 2:** control for *Individual factors*; **Model 3:** control for *Family context factors*; **Model 4:** control for *Social context factor*; and **Model 5:** a full model (see **Table 5**).

Table 5. The different models in this study

(1) crude model	(2) model controls for individual factors	(3) model controls for family context factors	(4) model controls for social context factor	(5) Full model
Dependent variable: Current smoking of adolescent	Dependent variable: Current smoking of adolescent	Dependent variable: Current smoking of adolescent	Dependent variable: Current smoking of adolescent	Dependent variable: Current smoking of adolescent
Independent variable: Parental smoking Friends' smoking	Independent variable: Parental smoking Friends' smoking	Independent variable: Parental smoking Friends' smoking	Independent variable: Parental smoking Friends' smoking	Independent variable: Parental smoking Friends' smoking
Controlling variables: Age Sex Knowledge about harmful of smoking	Controlling variables: Age Sex Knowledge about harmful of smoking	Controlling variables: Secondhand smoking at outside home	Controlling variables: Advertising and promotion related to smoking Having class about the harmful risk of smoking Bans on smoking around life space	Controlling variables: Age Sex Knowledge about harmful of smoking Secondhand smoking at outside home Advertising and promotion related to smoking Having class about the harmful risk of smoking Bans on smoking around life space Exposure to anti-smoking messages

Chapter 6: RESULTS AND DISCUSSION

This chapter will provide some primary results from data analysis, by using frequency, Chi-square test, and estimating ordered logistic regression. I will show the key findings following each of research objective, including:

1. To examine the differences in the pattern of the influences from smoking habits of parents and friends on smoking of Vietnamese adolescents in two years 2007 and 2014.
2. To calculate the size of the influence between cigarette use of parents and friends and the status of current smoking among 13-15-year students in Vietnam
 - 1.1. How these associations are different between girls and boys?
 - 1.2. How these associations are different among different levels of age between 13, 14, and 15 years old.
 - 1.3. How these associations are different from years of data collection?

6.1. Find the best model to interpret the results

As I mentioned in the *research methodology* chapter, I want to observe the change in the coefficient estimations of the influence between tobacco use behavior of parents and friends and the level of current smoking among 13-15-year students in Vietnam in differences of specifications. Then, **table 6** indicated coefficient estimates of the relationship between cigarette uses of parents and friends on adolescents smoking under the different adjusting control factors. First of all, we can recognize that the results of the coefficient were fixed in the sign and have changed in the magnitude among different specifications, however, the changes were not that much. When holding other factors constant, coefficients ranged from 0.2651 to 0.4065 in equation with

parental smoking was the main predictor, and from 2.5640 to 3.0709 equation with *friends' smoking* was the main predictor.

Besides, the results from *Pseudo R2* were shown at the bottom of **table 6** illustrates that compared to other models, the full model is the best for using independent variables to explain the main dependent variable. Hence, in the next part, I will display and discuss the parental and peer smoking influence on current smoking among Vietnamese adolescents by using the full model.



Table 6. The coefficient estimations in different specifications

	(1) crude model (N= 18,516)	(2) control for individual factors (N= 18,427)	(3) control for family factors (N= 18,491)	(4) control for social factors (N= 15,580)	(5) full model (N= 15,507)
	β	β	B	β	β
Having parents smoked	0.3636 ^{***}	0.4065 ^{***}	0.2838 ^{***}	0.3292 ^{***}	0.2651 ^{**}
Having peers smoked	2.9128 ^{***}	2.5640 ^{***}	2.8146 ^{***}	3.0709 ^{***}	2.6500 ^{***}
Male		1.5289 ^{***}			1.6918 ^{***}
13 years old		-0.5777 ^{***}			-0.4795 ^{***}
14 years old		-0.4101 ^{***}			-0.3604 ^{***}
Having right knowledge about harmful of smoking		-1.1093 ^{***}			-0.9150 ^{***}
Exposure to secondhand smoking at outside home			1.0058 ^{***}		1.0804 ^{***}
Be taught about harmful of smoking				-0.2671 ^{**}	-0.1958
Having smoking bans at home				-0.6235 ^{***}	-0.5581 ^{***}
Exposure to anti-smoking messages				-0.5610 ^{***}	-0.4784 ^{***}
Average exposure to promotion related to smoking				0.5694 ^{***}	0.4786 ^{***}
Pseudo R2	0.1274	0.2040	0.1380	0.1517	0.2299

*** = $p < 0.01$, ** = $p < 0.05$, and * = $p < 0.1$

6.2. Controlling variables on adolescents current smoking

6.2.1. Results from descriptive analysis

(1) By settings of sample

Tables 7 and 8 give summary statistics of main controlling variables by different settings of sample and by different levels of current smoking among adolescents, these results were analyzed and displayed as unweighted data. There were 18,912 students in the full sample, 15,495 students in the sample of 2007, and 3,417 students in 2014. Overall, the statistics in the full sample and students' population in 2007 were quite similar, it was made sense because the proportion of sample size in 2007 was approximately 82% of the total sample. In all three settings of sample size, the ratio between girls and boys was around 1.13, consisting of a lower proportion of 47% *male*. There were not significantly different in the distribution of participants among the three groups of age in different sample size. Approximately 80% of all kinds of populations perceived some dangers of smoking and secondhand smoking as well, and around 80% of students in the full sample and the sample in 2007 were learned about the disadvantages of tobacco uses from their classes, teachers and academical materials; while, the statistic among students in 2014 had some differences, only 67%. From data, we can recognize that over time from 2007 and 2014, the percentage of students who study knowledge about the harmfulness of smoking through traditional learning methods such as: learning in the class, was reduced; however, fortunately, students still knew and perceived the disadvantages and negative impacts of tobacco use; it can be explained that students nowadays can expose and use more self-study approaches by the development of the internet and technologies, thus, they can easily and conveniently access the several information sources at any time and anywhere. Besides, in the full sample and the sample in 2007, more than 82% of students were restricted by smoking banns at home and more than 92% of them has seen, read and exposure to anti-messages about smoking; when these

statistics in 2014 had slightly decreased to near 60% and 84%, respectively; those information matches my expectation that since Vietnam has issued smoking-free environment regulations for a long time, and spaces around the home are one of the target places of this policy. While, there were still 20% of the whole population and in 2007 who were identified having an average level of experiences with advertisement and promotions about smoking and cigarette use; however, to the year 2014, this group was accounted for only 5% of the population.



Table 7. Descriptive statistics for controlling variables by settings of the sample – unweighted results

Variables	Full sample (N= 18,912)		In 2007 (N= 15,495)		In 2014 (N=3,417)	
	Mean	SD	Mean	SD	Mean	SD
Male	0.4642	0.4987	0.4610	0.4985	0.4785	0.4996
13 years old	0.3432	0.4748	0.3476	0.4762	0.3237	0.4680
14 years old	0.3629	0.4808	0.3636	0.4811	0.3594	0.4799
15 years old	0.2939	0.4556	0.2888	0.4532	0.3170	0.4654
Having right knowledge about harmful of smoking	0.7980	0.4015	0.7979	0.4016	0.7988	0.4011
Exposure to secondhand smoking at outside home	0.7139	0.4520	0.7005	0.4580	0.7744	0.4181
Be taught about harmful of smoking	0.7921	0.4058	0.8188	0.3852	0.6725	0.4694
Having smoking bans at home	0.8233	0.3814	0.8785	0.3268	0.5754	0.4944
Exposure to anti-smoking messages	0.9227	0.2670	0.9416	0.2346	0.8375	0.3690
Average exposure to promotion related to smoking	0.2330	0.4227	0.2722	0.4451	0.0483	0.2145

(2) By the levels of current smoking among adolescents

Table 8 illustrates the descriptive statistics for controlling variables by the different levels of adolescents' current smoking, using unweighted data. Looking at **table 8**, we can recognize that *light-* and *heavy current smokers* had higher proportions from *males*, approximately 85% and 64%, respectively in comparison with 45% among non-current smokers. When considering within three groups of age, the fact was that younger students had lower percentages being current smokers, because only one-third of 13-14-year-students among the full sample were identified as current smokers, while more than 50% of 15-year-adolescents were heavy smokers during the past 30 days before the survey. The perception of the disadvantages of smoking; exposure to smoking bans at their home; and exposure to anti-smoking messages had negative impacts on being a current smoker of Vietnamese adolescents. In contrast, having experience with secondhand smoking and promotions related to smoking at average levels had the same direction as being current smokers.

Table 8. Descriptive statistics for controlling variables by the levels of current smoking – unweighted results

Variables	Non-current smokers (N= 18,323)		Light current smokers (N= 534)		Heavy current smokers (N= 55)	
	Mean	SD	Mean	SD	Mean	SD
Male	0.4524	0.4977	0.8496	0.3578	0.6364	0.4855
13 years old	0.3470	0.4760	0.2354	0.4247	0.1636	0.3734
14 years old	0.3640	0.4812	0.3296	0.4705	0.2909	0.4584
15 years old	0.2890	0.4533	0.4350	0.4962	0.5455	0.5025
Having right knowledge about harmful of smoking	0.8072	0.3945	0.5356	0.4992	0.2909	0.4584
Exposure to secondhand smoking at outside home	0.7076	0.4549	0.9041	0.2947	0.9636	0.1889
Be taught about harmful of smoking	0.7952	0.4036	0.6981	0.4596	0.4865	0.5067
Having smoking bans at home	0.8270	0.3782	0.7120	0.4533	0.5958	0.4961
Exposure to anti-smoking messages	0.9251	0.2633	0.8682	0.3386	0.6346	0.4862
Average exposure to promotion related to smoking	0.2281	0.4196	0.3937	0.4891	0.550	0.5038

6.2.2. Results from ordered logistic regression

Table 9 displays the main findings from ordered logistic regression about the marginal effects among the influence of some variables on each group of current smoking behavior among Vietnam 13-15-year students.

Firstly, all control variables in this study had a statistically significant relationship to current smoking status among adolescents, when controlled for impacts from parental smoking and friends' smoking. Whereby, "*younger age*", "*having right knowledge about harmful of smoking*", "*having smoking bans at home*", "*exposure to anti-smoking messages*" were protective factors and had negative effects on being *light-* and *heavy current smokers* among adolescents. These were illuminated by the negative and significant coefficients from **table 9**. In more detail, when holding other factors constant, in comparison with 15-year-old students, those who were 13 years old had approximately 0.0093 and 0.0008 lower probability of being *light-* and *heavy current smokers*; and these figures among 14-year-old students were 0.07 and 0.0006. If Vietnamese adolescents had the right knowledge about the harms from cigarette use, the likelihood of being *light-* and *heavy current smokers* was 0.0177 and 0.0016 lower when compared with students perceived the wrong knowledge. Besides, the likelihood of being *light-* and *heavy current smokers* reduced by 0.0108 and 0.001 among students had exposure to smoking bans at their home; by 0.0093 and 0.0008 among groups of youth had exposure to anti-smoking messages comparing with others did not experience with those factors.

While my marginal effect's calculation reflected that *males* were more inclined to be *light* smokers by 0.0327 and be *heavy* smokers by 0.0029 in comparison with females. Besides, experiences with secondhand smoking and marketing related to smoking were negative impacts on the decrease in tobacco uses among Vietnamese adolescents. Supporting this conclusion by statistics that *exposing to secondhand smoking at outside home* and *exposing to an*

average level of promotion related to smoking might increase the probability of smoking at the *light* level by 0.0209 and 0.0093, and the higher likelihood to smoke at the heavy level were 0.0019 and 0.0008 when comparing to those who did not have these exposures. While, variable “were taught about the negative impacts of smoking” does not have any significant impact to explain the likelihood to smoke among adolescents.

Table 9. Marginal effects from ordered logistic regression

Variables	Marginal effects		
	Non-current smoker (N= 18,323)	Light current smoker (N= 534)	Heavy current smoker (N= 55)
Having parents smoked	-0.0056 ** [-0.0105; -0.0007]	0.0051 ** [0.0006; 0.0097]	0.0005 ** [0.00003; 0.0009]
Having friends smoked	-0.0558 *** [-0.0663; -0.0453]	0.0512 *** [0.0415; 0.0610]	0.0046 *** [0.0027; 0.0065]
Male	-0.0356 *** [-0.0426; -0.0287]	0.0327 *** [0.0261; 0.0394]	0.0029 *** [0.0018; 0.0041]
“15 years old” – omitted group			
13 years old	0.0101 *** [0.0041; 0.0161]	-0.0093 *** [-0.0147; -0.0038]	-0.0008 * [-0.0014; -0.0002]
14 years old	0.0076 ** [0.0022; 0.0130]	-0.0070 ** [-0.0119; -0.0021]	-0.0006 ** [-0.0011; -0.0001]
Having right knowledge about harmful of smoking	0.0193 *** [0.0143; 0.0242]	-0.0177 *** [-0.0222; -0.0132]	-0.0016 *** [-0.0023; -0.0008]
Exposure to secondhand smoking at outside home	-0.0228 *** [-0.0307; -0.0149]	0.0209 *** [0.0137; 0.0281]	0.0019 *** [0.0009; 0.0029]
Be taught about harms of smoking	0.0041 [-0.0011; 0.0094]	-0.0038 [-0.0086; 0.0010]	-0.0003 [-0.0008; 0.0001]
Having smoking bans at home	0.0118 *** [0.0067; 0.0169]	-0.0108 *** [-0.0155; -0.0061]	-0.0010 *** [-0.0015; -0.0004]
Exposure to anti-smoking messages	0.0101 ** [0.0029; 0.0173]	-0.0093 ** [-0.0158; -0.0027]	-0.0008 ** [-0.0015; -0.0001]
Average exposure to promotion	-0.0101 *** [-0.0150; -0.0052]	0.0093 *** [0.0048; 0.0137]	0.0008 ** [0.0003; 0.0014]

*** = $p < 0.01$; ** = $p < 0.05$, and * = $p < 0.1$

6.3. Independent variables on adolescent current smoking

6.3.1. Results from descriptive analysis

Table 10 demonstrates cross-tabulation between smoking behaviors of parents and friends and each group of current smokers among adolescents. In the full sample, about the level of tobacco uses of the whole sample in this study, approximately 97% of students were identified as a non-current smoker; approximately 3% of students were defined as a light smoker, meaning that they have experienced and used cigarette but less than 10 puffs per day within a month ago; and only 0.29% were identified as heavy smokers who consumed more than 10 cigarette puffs a day.

Finding from the Chi-square test for full sample showed that there was significant independence between being current young smokers and having smoking parents, as well as having smoking friends ($p < 0.001$). Among the group of students, those were identified to be a smoker at the light level, approximately 70% of the sample had either their father or their mother was a smoker; more than 93% of students who made friends with other smoking peers. With students who were heavy smokers, these percentages were 68% and 96%, respectively (see **table 10**).

Table 10. Cross-tabulation between main predictors and dependent variable

	Smoking status of adolescents (N = 18,912)			p-value
	Non-current smoker (N= 18,323)	Light smoker (N= 534)	Heavy smoker (N= 55)	
Parent's smoking				<0.001
none	8,263 45.8%	156 30.12%	14 31.82%	
smoking parents	9,778 54.2%	362 69.88%	30 68.18%	
Peer's smoking				<0.001
none	10,684 58.59%	36 6.81%	2 3.77%	
smoking peers	7,551 41.41%	493 93.19%	51 96.23%	
Total	18,325 96.89%	534 2.82%	55 0.29%	

The pattern of parental and peer smoking by adolescents smoking

(1) By years of data collection

Figures 6 and 7 provide the different patterns about the proportion of having smoking parents and having smoking peers according to each level of current youth smoking in two years 2007 and 2014. Overall from 2007 to 2014, no matter that Vietnamese students had their parents or their friends who smoked, the percentage of smoking parent/ or friend would reduce among *non-current smoking* students, and among *light current smoking* students; while, in the different trend, the percentage of students those had smoking parents and friends tended to be increased among students who were identified being heavy current smokers, meaning they consumed more than 10 puffs a day.

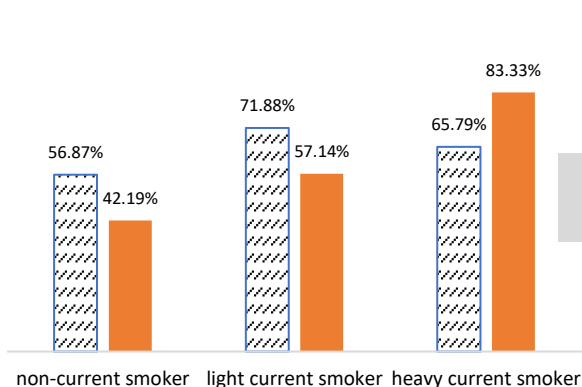


Figure 6. Percentage of having smoking parents among levels of current youth smoking by year

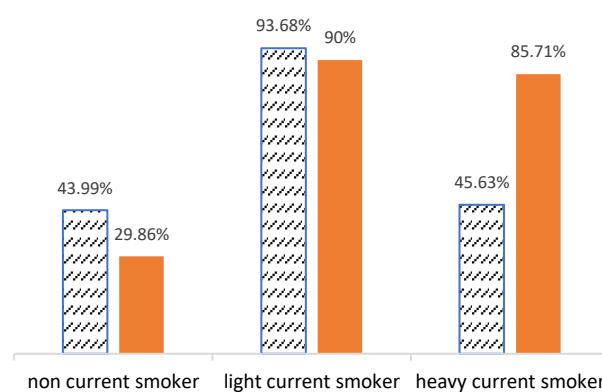


Figure 7. Percentage of having smoking friends among levels of current youth smoking by year

(2) By age

When considering about the distribution of parental and peer smoking on different levels of adolescents smoking by different groups of the age of students, the findings illustrated that no matter that students had smoking parents or friends, students those had *higher age* distributed the larger proportions of being *light- and heavy current smokers* (see figure 8 and 9).

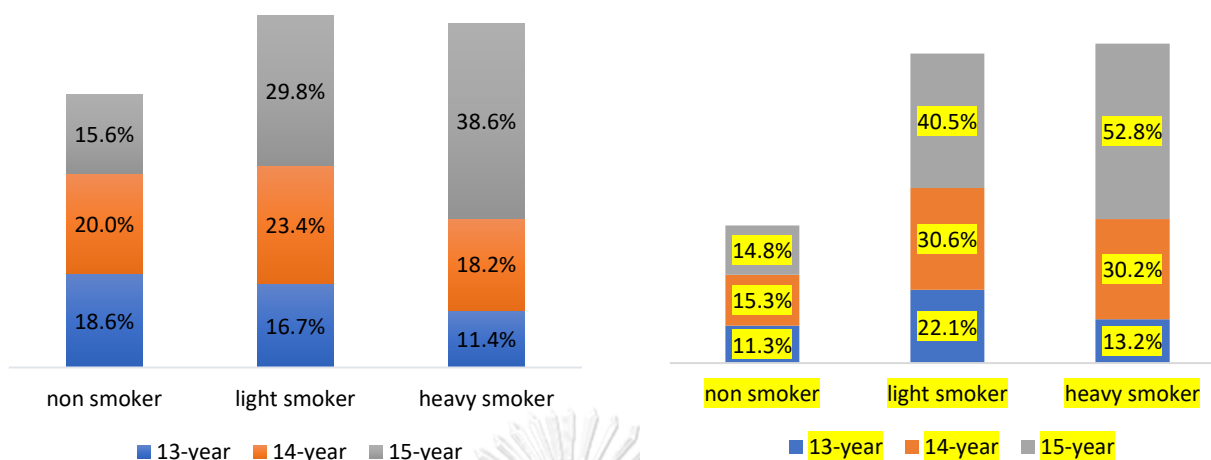


Figure 8. Distribution of parental smoking among adolescents smoking by age

Figure 9. Distribution of peer smoking among adolescents smoking by age

(3) By sex

When considering about the distribution of parental and peer smoking on different levels of adolescents smoking by *sex*, the findings illustrated that no matter that students had smoking parents or friends, being *male* distributed the larger proportions of being *light- and heavy current smokers*, compared to other students who were females (see figure 10 and 11).

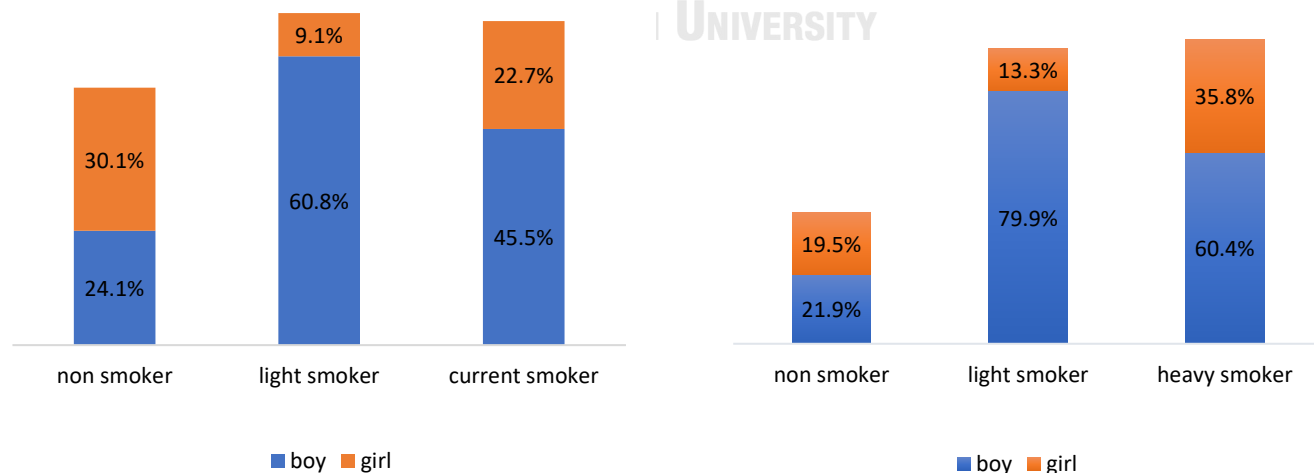


Figure 10. Distribution of parental smoking among adolescents smoking by sex

Figure 11. Distribution of peer smoking among adolescents smoking by sex

6.3.2. Results from ordered logistic regression analysis

Smoking of parent and peer with current adolescents smoking

In terms of influence from parental smoking, there was a positive and significant coefficient association, from marginal effect calculation about the magnitude of the impact on *non-current youth smokers* was -0.0056; on *light youth, smokers* was 0.0051; and on *heavy youth, smokers* was 0.0005 ($p < 0.05$). These implied that when other factors were held constant, any students who exposed from the smoking of parents would decrease the probability of being non-current smokers by 0.0056; while, students who had the smoking parents tended to increase the likelihood of smoking at light degree by 0.0051; and smoking at heavy degree by 0.0005, in comparison with students whose fathers and mothers were not smokers; these associations were statistical significance at the level of 5%.

In terms of suffering from the smoking of peers, the likelihood were 0.0512 and 0.0046 higher to be a light current smoker and heavy current smoker between those who made friends with smoking ones, compared to students' friends were not smokers, respectively ($p < 0.0001$) (see **table 9**).

Additionally, the influence on adolescent smoking from smoking behavior of friends was larger than the impact of parents. In more detail, friends' factors significantly associated with higher predictions on current youth smoking, compared to the impact of smoking of parents. To be clearer, on average, the probability of being a light current smoker: 0.0512 compared to 0.0051; and on average, the likelihood of being a heavy smoker: 0.0046 compared to 0.0005, $p < 0.05$) (see **Figure 12**).

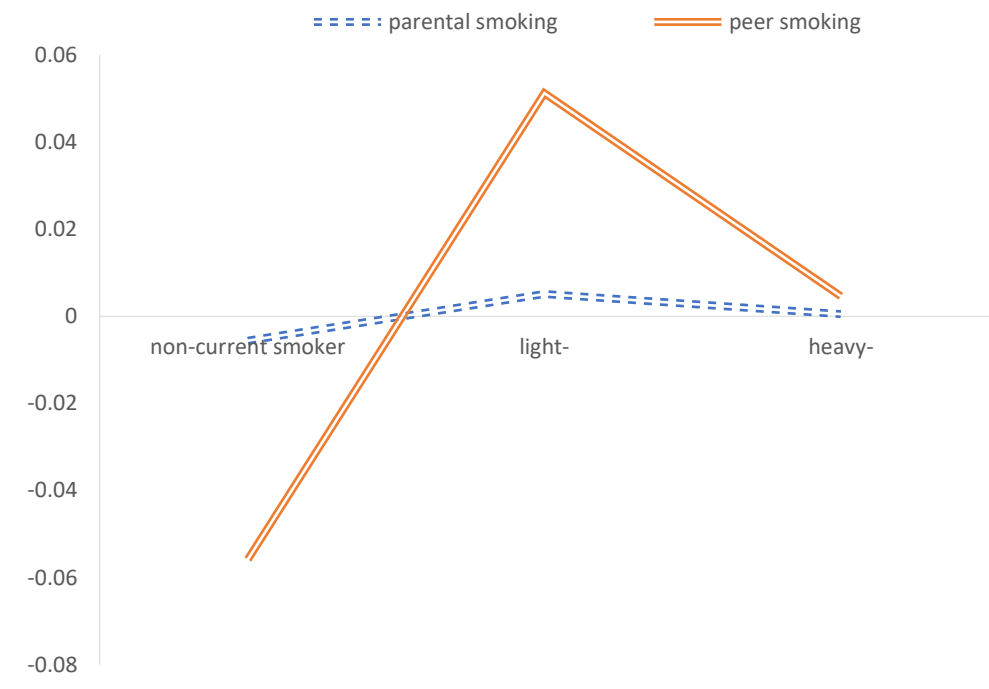


Figure 12. Predicted probabilities of being current youth smokers with having parental smoking and friends smoking compared to students who did not have

Subsample analysis

By the literature review, there were differences in tobacco use due to suffering from parental and peer smoking among girls and boys; and among different levels of the age of adolescents. Besides, I used data from two years 2007 and 2014, then I also want to estimate how much do smoking habits of fathers, mothers, and friends influence on adolescent smoking differ among these two years?

Then, **tables 11** and **12** and **13** show results about coefficient estimates and marginal effects by these subgroups analyzing, when controlling other factors.

(1) By years

I considered how much do smoking habits of fathers, mothers, and friends influence on adolescent smoking differ between 2007 and 2014? The statistic provides the calculations of coefficients and marginal effects in different levels of current youth smoking from parental smoking sorting by different years of data collection. The result showed that when respondents those had their smoking friends, no matter that data was collected from 2007 or 2014, this behavior of cigarette use from friends would increase the predicted probability of youth current smoking at less than 10 cigarettes/day; the magnitudes of prediction from exposing to parental and peer smoking were 0.0521 and 0.0409 in 2007 and 2014, respectively. When other factors were held constant, these kinds of predictions for smoking more than 10 puffs a day were 0.0046 and 0.004, respectively. The magnitude of adolescents smoking from influence of friends was reduced during two years from 2007 to 2014. In more detail, on average, the probability of being a light smoker: 0.0409 compared to 0.0521; and on average, the likelihood of being a heavy smoker: 0.004 compared to 0.0046, $p < 0.0001$).

In contrast, among students who had their smoking fathers and mothers, in 2007, this kind of behavior can increase the likelihood to smoke at a *light level* among students by 0.006 and by 0.0005 for probability to smoke at *heavy level*, while, in 2014, parental smoking had not any significant impacts on current smoking of students.

Table 11. The coefficients of interaction terms

	β		Marginal effect	
	2007	2014	2007	2014
Prediction for being non-current smokers				
Having parents smoked	0.2942 **	0.1106	-0.0065 ** [-0.0122; -0.0008]	-0.0018 [-0.0114; 0.0078]
Having peers smoked	2.5790 ***	2.7591 ***	-0.0567 *** [-0.0688; -0.0448]	-0.0449 *** [-0.0642; -0.0255]
Prediction for being light-current smokers				
Having parents smoked	0.2942 **	0.1106	0.006 ** [0.0007; 0.0112]	0.0016 [-0.0071; 0.0104]
Having peers smoked	2.5790 ***	2.7591 ***	0.0521 *** [0.041; 0.0632]	0.0409 *** [0.0223; 0.0596]
Prediction for being heavy-current smokers				
Having parents smoked	0.2942 **	0.1106	0.0005 ** [0.00004; 0.001]	0.0002 [-0.0007; 0.001]
Having peers smoked	2.5790 ***	2.7591 ***	0.0046 *** [0.0025; 0.0067]	0.004 *** [0.0002; 0.0077]

*** = $p < 0.01$; ** = $p < 0.05$, and * = $p < 0.1$

(2) By sex

Table 12 indicates the coefficient estimates and marginal effects after adjusting for other control variables among boys and girls. The results were found out that when respondents were males, no matter those students who suffered from smoking behaviors of their parents or friends, this behavior of cigarette use would increase the predicted probability of youth current smoking

at less than 10 cigarettes/day; the magnitudes of prediction from exposing to parental and peer smoking were 0.0189 and 0.0989, respectively. These kinds of predictions for smoking more than 10 puffs a day were 0.0013 and 0.0082, respectively, when holding all other variables constant.

In contrast, among female students, only making friends with smoking peers would increase the likelihood of smoking as light smokers by 0.014; and as heavy smokers by 0.0026 in comparison with other ones who did not have smoking friends; in the meantime, smoking of parents did not have any impacts.

Among the statistically significant influence of peer smoking and adolescent smoking, there was a higher influence on male students, compared to females. In more detail, on average, the probability of being a light smoker: 0.0989 compared to 0.014; and on average, the likelihood of being a heavy smoker: 0.0082 compared to 0.0026, $p < 0.0001$). This implied that boys students were more vulnerable objects of being influenced by the cigarette use behaviors from friends and people who have the same age.

Table 12. Coefficient and marginal effect after adjusting for control variables, by sex

	β		Marginal effect	
	Boys	Girls	Boys	Girls
Prediction for being non-current smokers				
Having parents smoked	0.4958 ***	0.3309	-0.0202 *** [-0.0305; -0.01]	-0.0020 *** [-0.0055; 0.0015]
Having peers smoked	2.6872 ***	2.8030 ***	-0.1071 *** [-0.1289; -0.0852]	-0.0166 *** [-0.0239; -0.0093]
Prediction for being light-current smokers				

Having parents smoked	0.4958 ***	0.3309	0.0189 ***	0.0017
			[0.0092; 0.0286]	[-0.0012; 0.0046]
Having peers smoked	2.6872 ***	2.8030 ***	0.0989 ***	0.014 ***
			[0.0784; 0.1193]	[0.0077; 0.0203]
Prediction for being heavy-current smokers				
Having parents smoked	0.4958 ***	0.3309	0.0013 ***	0.0003
			[0.0005; 0.0022]	[-0.0003; 0.0009]
Having peers smoked	2.6872 ***	2.8030 ***	0.0082 ***	0.0026 ***
			[0.0045; 0.0119]	[0.0005; 0.0047]

* for sig. at 10%; ** for sig. at 5%; *** for sig. at 1% two-tail test

(3) By the groups of age

Table 13 presents the results about calculations of coefficients and marginal effects by each level of the age of participants. Key findings reflected that there were differences in the impacts of cigarette use of parents and friends on the smoking habit of adolescents among different levels of the age of students. Separate analyses showed that parents and peers smoking were significant influences on smoking consumed by young people. To be clearer, influence from friends' and parental behaviors of smoking was statistically significant over time and continue to increase from 13 to 15 years old. Going into detail, from findings, overall, no matter those participates had exposed to their friends and their parents, the likelihood of being current smokers were increased when students became older; this statistic implies that among 13- and 14-year-old students, the probability of being a *light current smoker* was 0.0096 and 0.0083 on average, and this probability increased to 0.011 when students turned to 15 years old, compared to other ones did not have parental smoking ($p < 0.05$ and 0.1). Similarly, the likelihood of being *heavy current*

smokers were also increased when students grew from 13- to 15-year-old by from 0.0004 to 0.0015 (see **table 13**).

Among students who had smoking friends, the likelihood to smoke at *light level* was increased significantly from 0.0037 to 0.0825 when adolescent turned from 13- to 15-year-old, and these figures were from 0.0019 to 0.0112 for probability to smoke at *heavy level* (see **table 13**).



Table 13. Coefficient and marginal effect after adjusting for control variables, by age

	β			Marginal effect		
	13 years	14 years	15 years	13 years	14 years	15 years
Prediction for being non-current smokers						
Having parents smoked	0.6739 **	0.4481 **	0.4026 **	-0.0100 ** [-0.0173; -0.0026]	-0.0089 ** [-0.0169; -0.0009]	-0.0131 ** [-0.0244; -0.0018]
Having peers smoked	2.6426 ***	2.6038 ***	2.9420 ***	-0.0389 ** [-0.0519; -0.0258]	-0.0503 *** [-0.0660; -0.0347]	-0.0936 *** [-0.1246; -0.0627]
Prediction for being light-current smokers						
Having parents smoked	0.6739 **	0.4481 **	0.4026 **	0.0096 ** [0.0026; 0.0167]	0.0083 ** [0.0008; 0.0159]	0.0116 ** [0.0015; 0.0217]
Having peers smoked	2.6426 ***	2.6038 ***	2.9420 ***	0.0370 *** [0.0245; 0.0494]	0.0463 *** [0.0318; 0.0608]	0.0825 *** [0.0545; 0.1104]
Prediction for being heavy-current smokers						
Having parents smoked	0.6739 **	0.4481 **	0.4026 **	0.0004 [-0.0002; 0.0009]	0.0006 * [-0.0001; 0.0012]	0.0015 ** [0.0001; 0.0030]
Having peers smoked	2.6426 ***	2.6038 ***	2.9420 ***	0.0019 * [-0.0001; 0.0039]	0.0040 ** [0.0012; 0.0069]	0.0112 *** [0.0051; 0.0173]

* for sig. at 10%; ** for sig. at 5%; *** for sig. at 1% two-tail test

Chapter 7: DISCUSSIONS

In this chapter, I will discuss my findings and results I got from my dataset. In this study, I used data from the Global Youth Tobacco Survey in Vietnam in 2007 and 2014 with a full dataset of 18,912 observations, those were 13 to 15 years old and were students at secondary schools across Vietnam.

Firstly, all control variables in this study had a statistically significant relationship to current smoking status among adolescents. These signs of effects match the findings from the existing literature. To be more details, “*younger age*”, “*having right knowledge about harmful of smoking*”, “*was taught about harmful of smoking at class*”, “*having smoking banns at home*”, “*exposure to anti-smoking messages*” were protective factors and had negative effects on being current smokers among 13-15-year-students in Vietnam. While, “*being males*”, “*exposing to secondhand smoking at outside home*” and “*exposing to an average level of promotion related to smoking*” might increase the likelihood to smoke among groups of adolescents in Vietnam.

In order to discuss the influence of parental and friends cigarette uses on smoking among adolescents, this analysis confirmed that young people had a higher probability to use tobacco products when they had smoking parents and friends, the status of current smoking here was at a *light-* and *heavy level* as well. These statistically significant relationships are similar to other previous results, which have been found and published by (McKelvey et al., 2015) and (Chang et al., 2011) and (Liao et al., 2013). They also studied and found out a stronger impact from parental smoking on the likelihood to smoke of young people and a significant association of peer’s smoking and adolescent smoking. Besides, the findings from my analysis are consistent with the *Social Learning Theory* (Ennett et al., 2010), in which they explained that children tend to start

smoking because of their observation and imitation with smoking habits from others in their living space. I also observed that the probability of smoking from the effect of friends' cigarette use was generally higher compared to the effect of smoking of parents. One possible explanation for my finding may be that when adolescents grow and become older, their identities are started to build up; and additionally, this range of age from 13 to 15 is the transition from junior high schools to high schools in Vietnam academic system, leading to the changes in schools, in classmates and friends. Hence, this transitional period may create opportunities for behavioral changes, youth spend more time with their friends at schools and that is the reason that they tend to be highly impacted from other friends friends and society, meaning that the familiar social environment is likely to be replaced by a new one (for example peer and friend network).

However, there were differences in influence from the smoking of parent and peer on female and male students. While parent smoking had an impact on both smoking use of male and female adolescents; on the other hand, making friends with smoking peers would increase the probability of smoking among only male students. This conclusion was confirmed by other previous studies, in which peer smoking behavior was considered as the most important role in adolescent smoking than parents (Avenevoli and Merikangas, 2003, Bahr et al., 2005). A possible reason is that at this period of age from 13-15, girls are at the late puberty and they are at a period of developing from a child into an adult, thus, in their relationship, they are more focused on emotional sharing (Steinberg and Morris, 2001). While a different pattern was found that boys in this period are still in their mid-stage of puberty (Metzger et al., 2011), hence, they tend to maintain their friendship by sharing behaviors and common habits and boys may be adopting their friends' risky behaviors (e.g., smoking).

The increase in the influences on adolescent smoking from smoking behaviors of their father, mother, and friend were also observed among different groups of age among participants. The likelihood of being current smokers was higher among students who had smoking friends and parents at all three levels of age in comparison with participants who did not have. In Vietnam, students who are from 13-15 years old, are in 8th to 10th grade, which is the transition from secondary school to high school. It is normal in Vietnam, we have secondary at every village, however, with high school, some villages will gather and study in the same high school, called *district high school*. Because of far distance from home, students can choose among day-boarding schools or boarding schools, or even they rent rooms out of campus to live; those situations create an increase in interactions with other friends and peers. On the other hand, it also can be explained that, at this period of turning to higher age, most adolescents were in the relationships with boyfriends/girlfriends, and they might have a higher likelihood to be influenced by their lovers (such as smoking) (Hoffman et al., 2006, Smetana et al., 2006). And once again, this conclusion was similar and confirmed by other previous paper, in their study, they found out that among students who made friends with other smokers, would have a higher likelihood to smoke, and the level of smoking was increased when they changed from secondary school to high school (Liao et al., 2013).

Besides, I also observed a reduction in the impacts on adolescent smoking from smoking behavior of their parents and friends in two years 2007 and 2014. Although, this decreasing trend only occurred among students who were influenced by their smoking friends, while there was not a significant reduction with students whose parents were smokers. Vietnam has started to apply IMPOWER and in 2012 national law on tobacco has issued, these may be the most comprehensive regulations on controlling and preventing tobacco use in Vietnam (Minh et al., 2016). Thus, in my opinion, this policy

implementation has significant impacts on the relationship between the smoking of parents and peers on cigarette use among Vietnamese adolescents at before and after applying these regulations.



Chapter 8: CONCLUSIONS

8.1. Conclusions

This study is trying to estimate the magnitude of the association between parent and peer influences on adolescent smoking as *non-;* *light-;* and *heavy current smokers;* and additionally, examine *gender* and *age* trend of these relationships. By using 18,912 adolescents, ages from 13 to 15 years, from two years 2007 and 2014 of the Global Youth Tobacco Survey in Vietnam, were selected for these analyses. Descriptive analysis was used to describe the characteristics of each individual variable. After that, the ordered logistic regression was applied to estimate the relationship between smoking behaviour of parents and peer, with the level of addiction of current smoking among school-going students. I also added up other variables in the regression model as control variables to further examine the association between the dependent and independent variables. Then, examine this association by some subsample to observe the gender and age trends. Finally, the results shown that young people were more likely to use cigarettes when their parents and friends smoked, the status of current smoking here was at a light- and heavy- level as well. Especially, the probability of smoking from the effect of friends' cigarette use was generally higher compared to the effect of smoking of parents. In addition, there were differences in influence from the smoking of parent and peer by groups of age and gender of adolescents. The influence of parent and peer was increased when students became older from 13 to 15 years old. While gender-specific influences were identified in the peer impacts on adolescent smoking for both boy and girl; parental smoking only significantly associated with boy.

8.2. Limitations

I must note here some limitations from my data and my analysis, then these will be suggestions for other analyses and studies in the future.

Firstly, this kind of survey used the self-completion questionnaires, students would answer by themselves, then the quality of reporting in questionnaires was not controlled and could have mistakes. However, previous author Brener and his team have reported the reliable results of youth smoking when questionnaires were administered and self-completed (Brener et al., 2002).

Secondly, the two datasets that I used to analyze, just covered and included adolescents aged 13-15 years old and they were school-going students on the day this survey conducted. While other adolescents in society, who were homeless and cannot go to school. Therefore, need further and deeper study in the future, to cover all potential subjects.

Thirdly, it is possible to have recall bias because, in the GYTS's questionnaire, students had to answer relevant information in the past, up to at least 30 days before the survey. Students could have something wrong with their memories.

Fourthly, because of using secondary data, some variables such as the social-economic status of parents...were not covered in the original datasets; hence, as a result, I have faced some problems with omitted variables. Then, this missing data could bias the magnitude of the association between the use of cigarettes from father, mother and friends, and adolescent smoking.

Fifthly, when considering about association between parents and friends tobacco use habits and adolescent smoking, it can be better, and we can get more detailed information when using it in order to get many detailed results in this kind of association. and see what the different influences among groups of

students are who have only smoking parents, smoking friends, compared to other students whose parents and friends were smokers. Besides; however, they have not presented in this analysis.

Last but not least, there may have endogeneity problems in this analysis. Because youth is more likely to smoke and smoke frequently when they make friends with smoking people. Because adolescents may tend to choose friends who are similar and can share common things and habits. This implies the fact that having smoking friends can predict for the higher probability of being current smokers among adolescents and might cause an endogeneity problem. However, because of data limitation and at this moment, the author has not had enough knowledge, then appropriate instrumental variables (IV) cannot be applied in order to tackle this problem.

8.3. Policy recommendations

By using data from the Global Youth Tobacco Survey in Vietnam in 2007 and 2014, we may have statistical pieces of evidence to conclude that both parents and friends smoking habits had high impacts on offspring smoking. Therefore, if these findings are true, preventions and intervention should expend their main objects, not only at the individual level, and should focus and pay more attention to adolescents' environment, such as their fathers, mothers, and friends who have the same level of age.

Furthermore, effective campaigns should target their peers and friends, in both groups of adolescents at school and at home. Evidence is shown here is that the higher association between peers and adolescents smoking in comparison with parents, meaning that among adolescents who have the same age, they are easier to share and play more roles in how to model the behavior of each other. On the other hand, based on a meta-analysis, school-based programs and activities-related to friends and persons of the same age are more

effective in the reduction of the smoking behaviors among teenagers than those provided in other places such as hospitals and medical centers; hence, the programs should provide how to defend against negative peer influence and provide more refusal skills and skills to perceive the harms of smoking; especially, at the time before students are at the end of secondary school and begin the high schools, because impacts from friends become more and more important as the adolescent gets older between 13-15 years old.

Although I found out that teaching about disadvantages of cigarette use was not a statistically significant predictor to predict for the likelihood of smoking among adolescent, it can be explained that students nowadays can expose and use more self-study approaches by the development of the internet and technologies, thus, they can easily and conveniently access the several information sources at any time and anywhere. However, we still observed a significant association between having right knowledge and having opportunities to exposure to anti-smoking messages related to smoking, these factors had impacts on adolescents smoking. Hence, from my suggestions, that policymakers should focus and pay more attention to how to gain and raise awareness among students and adolescents about the harms of smoking and tobacco uses.

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