TITLE
SMOKING BEHAVIORS OF ADOLESCENTS AND YOUTH IN CHILINH, HAIDUONG – A PROVINCE IN THE NORTH OF VIETNAM. RISK AND PROTECTIVE FACTORS

A thesis submitted in partial fulfilment of the requirement for the degree of

Master of International Health

by

Hoang Bach Dao

Vietnam

Declaration:

All of other people's work (articles, online data, web page, books, and any other sources) which are used in my study has been carefully refferenced in accordance with departmental requirements.
The thesis **Smoking behaviors of adolescents and youth in Chilinh, Haiduong - A province in the north of Vietnam. Risk and protective factors** is my own work.

Signature ....

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Organized by:

KIT (Royal Tropical Institute), Development Policy & Practice
Amsterdam, The Netherlands.

In co-operation with

Vrije Univrsiteit Amsterdam/ Free University of Amsterdam (VU)
Amsterdam, The Netherlands.

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ABSTRACT

Tobacco use is very common among Vietnamese adolescents and youth. Despite the fact that tobacco is very harmful for health, the prevalence of current smokers among Vietnamese adolescents / youth is still high, especially in male adolescents and youth. In this thesis, I want to draw a brief over view about the current smoking behavior among adolescents / youth at CHILILAB - a research laboratory of Hanoi School of Public Health -and identify the risk/ protective factors for smoking behavior.

The study consists of a secondary data analysis of data collected in 2006 at CHILILAB and a literature review study. The data used in my study is a part of the module 1 of a longitudinal study about adolescents health. Only data in smoking session, demographic information session, and some other risk behaviors sessions (alcohol use and premarital sex) were used in the study. The total sample of my study is 12.447 participants in the age of 10 - 24 who have permanent-residences at Chilinh.

Chi-square was applied to measure the associations between smoking behaviors and other characteristics. Odd ratios were used to measure the differences in the risk of smoking of different groups. Logistic regressions were applied to make a predict model for smoking behavior among male adolescents and youth at CHILILAB. The Hosmer and Lemenshow test was used to check the goodness-of-fit of the logistic models.

Based on literature that I found, risk and protective factors for smoking behavior among adolescents can be categorized into 4 different domains: individual, peer, family, and school. However, due to the availability of the variables, in my study, smoking behavior of male adolescents and youth at CHILILAB was analyzed in three different domains: individual factors, peer's factors and family's factors.

An overview about the "ever tried to smoke" behavior and "currently smoking" behavior of adolescents / youth of both male and female are presented. "Currently smoking" behavior of male adolescents / youth was analyzed using the analytical framework and was divided into three different groups: male adolescents aged 10 - 14, male adolescents aged 15 - 19, and young male adults aged 20 - 24 due to the big difference of prevalence of current smoker among these groups. Risk and protective factors of different groups were identified.

Recommendations are made to suggest which factors should be tackle in order to reduce the prevalence of current smoker among male adolescents / youth at CHILILAB.

ABBREVIATIONS

DESS	Demographic-Epidemiologic Surveillance System
FCTC	Framework Convention on Tobacco Control
GDP	Gross domestic product
HSPH	Hanoi School of Public Health
IEC	Information, Education, Communication
OR	Odd ratio
PGR	Population growth rate
SAVY	Survey Assessment of Vietnamese Youth

DEFFINITIONS:

Ever smoked	Indicates adolescents / youth who had try to smoke even one puff
Current smoker	Indicates adolescents / youth who smoke in the last 30 days.

INTRODUCTION

This thesis on smoking behavior of adolescents is based on my experience in public health. After graduating from the Hanoi school of Public Health (HSPH). I have been working for the Department of Population and Development of Hanoi school of Public Health. As a part of HSPH, our responsibility is not only teaching but doing research as well. Our school has a research laboratory – CHILILAB – located at Chilinh, Haiduong – about 75 km to the east of Hanoi. Many studies have been carried out in CHILILAB about different health problems of different target groups. One of the main studies is the longitudinal study about Adolescent Health, which consists of three different modules to be carried out in about at least 3 rounds. I am one member of the research team for the first module – basic evaluation of the health status and health behaviors of adolescents and youth at CHILILAB. My responsibility was: to participate in the training for data collectors and supervisors at the field; to supervise, double-check the questionnaires collected by data collectors; and participate in analyzing data as well as writing the report. In this module, a series of health problems were measured such as: reproductive health, injury, violence, drug use, tobacco use, alcohol use, and other mental health issues.

Tobacco use among adolescents and youth is one of my field of interest from the start. However, limited studies about tobacco use and related factors were carried out in Vietnam settings. Therefore, in this master thesis, I want to make an analysis about the current situation of smoking behaviors among adolescents and youth at CHILILAB, and identify the risk factors related to smoking behaviors.

CHAPTER 1: BACKGROUND INFORMATION

1.1 Background information of Vietnam
1.1.1 Geography
Vietnam is located in the Eastern part of the Indochina peninsula, bordering China to the North, Laos and Cambodia to the West with a long land border of 4,550 km, and facing the Eastern Sea (South China Sea) and the Pacific to the East and the South. On the map, Viet Nam is an S-shaped long strip of land, stretching from 23°23' to 8°27' North latitude. The country's total length is 1,650 km from the Northernmost point to the Southernmost point. Its width, stretching from the Eastern coast to the Western border, is 500 km at the widest part and 50 km at the narrowest part.

1.1.2 Demography
According to the General Statistic Office, in 2008 (the most updated data), the total population of Vietnam is about 86.210 million people (General Statistics Office of Vietnam, 2008). Around half of the population is women (50.86%) and the other half men (49.14%); and more than one forth (26.4%) of the population consists of children under 15 years old. The population density is 251 people per one km square. The Population Growth Rate (PGR) in 2005 is 1.33% (Ministry of Health of Vietnam, 2007). Life expectancy at birth (estimation at 2010) for the whole population is 71.71 years, 69.48 for men and 74.69 for women (Central Intelligence Agency, 2010).

1.1.3 Socio-economic
After Doi Moi (reform) policy had been launched in 1986, the Vietnam's economy has changed dramatically. From 1993 to 2007, the general poverty rate decreased up to 75% (see graph 9 at the annex). However, poverty in Vietnam is highly concentrated in rural area. Up to 90% of the poor are living in the rural areas. Before Doi Moi, the gross domestic product (GDP) growth rate increased slowly at 3.9% annually. During 20 years of Doi Moi, GDP of Vietnam increased around 6.9%(2001) - 8.4% (2005). At the time when the study was carried out (2006), the GDP per capita in Vietnam is 711 US$ (The World Bank, 2010).

1.1.4 Policies related to tobacco

In 1997, up to 50% Vietnamese men and 3.4% Vietnamese women smoked (Government of Vietnam, 2000). Smoking was found as a risk factor for a lot of dangerous health problems such as: liver, laryngeal cancers (U.S Department on Human Health Services, 2004), bladder cancer (Quirk et al., 2004), oral cancers (Bunnell et al., 2010), stroke (Paul et al., 2004). Therefore, in 2000, the Government Resolution on "National Tobacco Control Policy" 2000 - 2010 was published. The overall objective is to reduce the demand for tobacco products so as to control and gradually reduce the supply of tobacco products in order to reduce the morbidity and mortality due to tobacco related-diseases. Five specific objectives are: reduce the proportion of male smokers from 50% to 20%; reduce the proportion of female smokers to a level below 2%; reduce the proportion of young smokers (15 – 24 years of age) from 26% to 7%; protect the rights of non-smokers to breath clean, smoke-free air; and reduce tobacco-related losses for individuals, families, and society as a whole (Government of Vietnam, 2000).

In 2004, Vietnam ratified the WHO Framework Convention on Tobacco Control (FCTC). The World FCTC's objective is to protect present and future generation from the devastating health, social, environmental and economic consequences of tobacco consumption and exposure to tobacco smoke by providing a framework for tobacco control measures to be implemented by the Parties at the national, regional and international levels in order to reduce continually and substantially the prevalence of tobacco use and exposure to tobacco

smoke. The Action Plan provided contents, time frame and delegation of responsibility to related agencies in the development and promulgations of domestic legislations to meet the requirements of the Framework Convention on Tobacco Control.

However, despite the efforts has been made by the Government, the prevalence of current smoking among adults (aged 15 years and older) of Vietnam still remained among one of the highest in the area. Up to 45.7% men and 2.5% women are current smokers in 2005 (Pfizer Facts, 2008).

After six year of implementation the "National Tobacco Control Policy" 2000 - 2010, Vietnam is still among countries with the highest tobacco use prevalence in the region (Pfizer Facts, 2008). According to WHO, about 40.000 people die each year due to tobacco (WHO, 2010a). A number of reasons for that forecasting could be listed such as: the low frequency and ineffectiveness of information, education and communication concerning tobacco control; the lack of multi-sector cooperation; the affordable of tobacco products to the majority of the population; health warning messages on tobacco's packs are still weak; etc. Therefore, in 2007, the Directive on strengthening tobacco control activities was ratified by the Prime Minister - Nguyen Tan Dung in order to strengthen tobacco control activities, to fulfill Vietnam's commitment when joining the WHO FCTC and to seek to achieve the stated objectives of the National Tobacco Control Policy 2000 – 2010 (The Prime Minister of Vietnam, 2007).

In 2009, the Action Plan - which provides contents, time frame as well as delegation of responsibility to related agencies in the development and promulgations of domestic legislation to meet the requirements of the Framework Convention and meeting Vietnam's obligation and rights as a Party to the Convention - for the Implementation of the Framework Convention on Tobacco Control in Vietnam has been approved by the Prime Minister Nguyen Tan Dung (The Prime Minister of Vietnam, 2009). No details of the Action Plan are available for Haiduong area.

1.2 Background information of Haiduong
1.2.1 Demography
Haiduong is located along the Thai Binh River in the Red River Delta, in between Hanoi and Haiphong. Haiduong is about 1652 km square (ranked 51st of the total area) which has a population of 1722.5 thousand. With the population-density of 1042 person/km^2, Haiduong is one of the top ten most density provinces of Vietnam (General Statistics Office of Vietnam, 2008).

1.2.2 Socio-economic
Nowadays, Haiduong is one of the most developed provinces of Vietnam. Due to the advantage of location as well as the availability of natural land and resources, Haiduong is one of the three most foreign investment-attracting provinces. Haiduong has an important role in the social economic development of Vietnam. It is estimated that in 2010, among 1.83 million populations, there would be 1.1 million labors that is a great advantage for the development of Haduong (Hai Duong People's Committee, 2010).

1.2.3 Longitudinal study about Adolescent Health
Besides the Demographic-Epidemiologic Surveillance System (DESS), there are also a lot of other research projects have been carried out. The longitudinal study about Adolescent Health is one of the biggest studies that have been carried out since July, 2006. This is a long-term project about adolescents' and youth's health at CHILILAB. The study consists 3 different

modules. Data will be collected through many rounds in at least 3 years. The first module is the basic evaluation about the health status and health behaviors of adolescent and youth at CHILILAB. Many health problems were studied such as: reproductive health, injury, drug abuse, violence, tobacco use and other mental heath issues. The second module focuses about analyzing risk and protective factors in five main domains: individual, family, peer, school, and social level. The last module's objective is to identify the connectedness between adolescent/ youth and their parents.

1.2.4 Objectives of the Adolescent Health Project

In the overall long term project of this longitudinal study about adolescent and youth health, the goal is to study on the real situation, follow the changes of adolescent/youth's health problems and evaluate the impacts of the changes in economic – society on these problems at 7 communes/towns of Chililab to provide appropriate intervention strategies.

1.2.5 Adolescent Health Module 1
1.2.5.1 Methodology

The target group of this research consisted of adolescents and youth aged 10-24 by July 2006 (including both male and female, married and single) at seven communes/towns of CHILILAB. Participants are limited in members of resident households only (no temporary visitors). Total 12447 adolescents and youth in the selected groups were interviewed using quantitative self-administered questionnaires.

The research was conducted in seven communes/towns in the area of CHILILAB. Data was collected from July 2006 to January 2007. After being collected, data was entered, cleaned and merged with existing data about household's information of adolescents / youth of the DESS.

1.2.5.2 Objectives of Module 1

- Determine the health status of adolescents and youth (including mental health, reproductive health)
- Study on the knowledge and attitudes about sexual behaviors, HIV/AIDS prevention as well as some other reproductive health issues among adolescents and youth at Chililab
- Determine some rates of sexuality related behaviors, drug using behaviors, violence and other mental health problems
- Preliminary investigate on the connectedness between adolescents / youth and parents, family
- Provide the initial evidence based to design, develop and implement other modules of the project as well as policymaking process and appropriate interventions.

This study - which is a part of the first module - round 1 of the Adolescent Health Project - only focuses on the current situation of tobacco use and related factors among adolescent and youth at CHILILAB. Therefore, only variables of tobacco use sections and some related variables such as: alcohol use variables, demographic variables are used in this paper.

CHAPTER 2: PROBLEM STATEMENT AND METHODOLOGY

2.1 Introduction to problem statement

2.1.1 Definition of smoking behavior
In this study, there are two variables indicating smoking behaviors: ever smoked (even just one puff), and currently smoking behaviors (identified by the smoking behavior in the previous month). Thus, adolescents / youth who are categorized as "ever smoked" can be current smokers or non-current smokers.

2.1.2 Problem statement
In Vietnam, there were not so many studies had been done about smoking among adolescents as well as risk and protective factors of smoking behaviors among adolescents / youth. Furthermore, in the near future, there should be interventions planned at CHILILAB based on the results/findings of the adolescent health survey. Smoking behaviors was identified as one of the health problem on which interventions should be focused. Therefore, the purpose of this thesis is to describe the current situations of smoking behaviors among adolescents / youth at CHILILAB and identify the risk factors related to smoking behaviors in order to suggest a set of recommendations for the future interventions at CHILILAB.

2.2 Role of researcher in the study
My main responsibility working in the research team for the Module 1 was to analysis the data and write report. However, in this study about smoking behavior among adolescents / youth at CHILILAB, all of the study questions, specific objectives, as well as hypotheses are done by me.

2.3 Study questions
2.2.1 What is the prevalence of cigarette smoking among adolescents / youth at CHILILAB?
2.2.2 What are the risk factors for smoking behaviors among adolescent / youth at CHILILAB?

2.3 Purpose and specific objectives of the study
2.3.1 Purpose of the study
The aim of the study is to find out the facts about smoking behaviors among adolescents / youth in Chilinh, Haiduong as well as related factors in order to provide accurate recommendations for tobacco-control interventions in these groups in the near future.

2.3.2 Specific objectives
- Provide a brief overview concerning smoking behaviors among adolescents / youth in Chilinh, Haiduong
- Identify factors that are related to the smoking behaviors among them
- Suggest factors which should be tackled in order to reduce the smoking prevalence at CHILILAB

2.4 Hypothesis
2.4.1 Adolescents / youth whose family members are smokers are more likely to be currently smokers than others
2.4.2 Adolescents / youth whose close-friends are smokers are more likely to be currently smokers than others
2.4.3 Adolescents / youth who are involved with other risk behaviors (alcohol use, premarital sex) are more likely to be current smokers than others

2.4.4 Among all of the factors, having close-friends who smoke is the strongest factor related to smoking behaviors among adolescents / youth

2.5 Methodology
2.5.1 Study type
The thesis consists of a secondary data analysis of data collected in 2006 and a literature review study. The data of 12.447 adolescents and youth from the first module of the Longitudinal study about adolescents / youth health was used.
A literature review was used to compare the findings of the study with other studies in the region as well as in the world.

2.5.2 Sample size
Sample of the study consists of 12.447 adolescents/youth in the age of 10 - 24 at the time of July, 2006 at seven towns/communes of CHILILAB (3 towns: Saodo, Bentam, Phalai and 4 communes: Anlac, Vanan, Leloi, and Hoangtien).

2.5.3 Analysis
Data was analyzed using SPSS 17.0 software. Chi-square was applied to measure the associations between smoking behaviors and other characteristics among adolescents / youth. Odd ratios (OR) were applied to measure the differences in the risk of smoking in different groups. Logistic regressions were applied to make a predict model for smoking behavior among adolescents and youth at CHILILAB. All the variables which have significant association with current smoking behavior of participants are chose to put in the logistic model. A backward stepwise procedure based on the likelihood ratio was used to select variables for the final model. The significance for variable removal and entry was set to 0.10 and 0.05 respectively. The Hosmer and Lemenshow test was used to check the goodness-of-fit of the model and standardized residuals were plotted against the predicted probabilities of being current smoker state to detect the presence of outliers. The variables remained from this step would be put in the final model (using enter method) to identify the risk and protective factors.

2.5.4 Literature review strategy
Criteria: Articles, project's reports, factsheets in English and Vietnamese in the related field are collected. Most of the articles are published after 2000.
Sources: Pub-med, library of KIT, electronic library of VU, Google website, website of Vietnam Steering Committee on Smoking and Health (VINACOSH) (www.vinacosh.gov.vn), website of Vietnam Public Health Association (www.vpha.org.vn), website of WHO/Regional office for Southeast Asia, website of Centers for Disease Control and Prevention, and website of CHILILAB.
Key words: tobacco, smoking, cigarette, smoker, current smoker, adolescent, youth, youngster, teenager, risk, protective, factor, school, policies, economic, gender, sociocultural.

2.5.5 Analytical framework
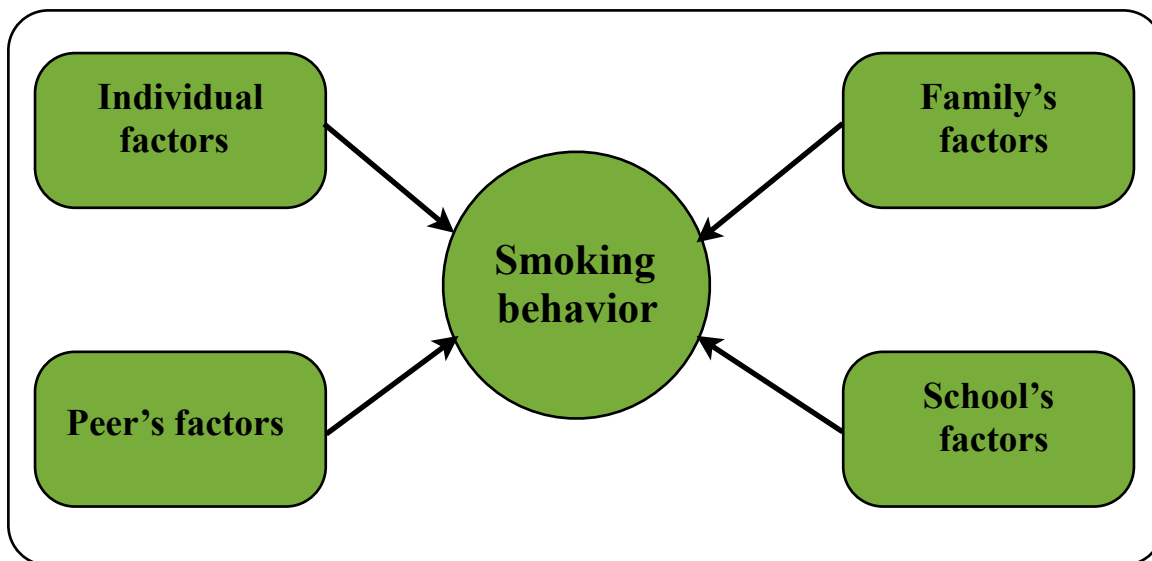
Graph 1: Analytical framework

Different studies in the world analyzed smoking behavior of adolescents / youth with different risk factors. However, it can be summarized into four main different domains: individual factors, family factors, peer factors, and school factors as in the graph above.

Individual factors:
Individual factors related to smoking behavior can be listed as: attitude towards smoking such as smoking helps to relax or smoking helps to reduce stress (Monroe, 2004, Zbikowski et al., 2002), alcohol use behavior (Ozer and Fernald, 2008, Holowaty et al., 2000, D'Amico and McCarthy, 2006), drug use behavior including injecting drug (Anteghini et al., 2001), gender and age (Ozer and Fernald, 2008), socioeconomic status (Mathur et al., 2008), awareness of the harmful of tobacco (Naing et al., 2004), self-esteem (Kaufman and Augustson, 2008), or popularity amongst peers at school (Alexander et al., 2001).

Family factors:
Family factors include not only the smoking status of family members such as parental smoking status (Ozer and Fernald, 2008, Holowaty et al., 2000, Ali and Dwyer, 2009, Wong et al., 2008), smoking status of siblings such as brothers, sisters (Dornelas et al., 2005, Hill et al., 2005, Rajan et al., 2003), but also the level of family monitoring (Hill et al., 2005), family relationship (Anteghini et al., 2001), parenting style (Koetting O'Byrne et al., 2002), level of tender loving care parents (Wen et al., 2005), education level of parents (Alikasifoglu et al., 2002, Holowaty et al., 2000, Pokorny et al., 2004), as well as the connectedness with parents (Wong et al., 2008).

Peer factors:
In many studies all over the world, the role of peer was found to be strongly associated with smoking behavior among adolescents and youth. Important peer risk factors can be named such as best friends smoke (Monroe, 2004, Chen et al., 2006, Davis et al., 2007), number of peer users (Pokorny et al., 2004, Alexander et al., 2001, Sun et al., 2006), perceived peer pressure to smoke (Griesler and Kandel, 1998), and boyfriend/girlfriend smoke (Holliday et al., 2009)

School factors:
Not so many studies analyzed the relationship between school's factors and smoking behavior of adolescents / youth. Some of the school factors could be: type of school – vocational school versus day school or boarding school (Naing et al., 2004), and teacher in school who smoke (Monroe, 2004, Chen et al., 2006).

In this study, the analytical framework was used to analyze the currently smoking behavior of adolescents and youth at CHILILAB in order to identify risk and protective factors.

2.6 Literature review
2.6.1 Effects of smoking on adolescents / youth's health
Tobacco is one of the main causes leading to cancer nowadays. According to WHO, tobacco use is a risk factor for six of eight leading causes of deaths in the whole world (WHO, 2010b). Smoking is the leading preventable cause of premature death and diseases in USA (Centers for Disease Control and Prevention, 2010, U.S Department on Human Health Services, 2004). Up till now, there are thousands of studies about how tobacco damages people's health had been done. Knowledge has been proved that smoking harms almost every part of human body. According to WHO, in the 20th century, about 100 million deaths were caused by tobacco and there will be up to one billion deaths in the 21st century if the trends do not change (WHO, 2010b).

In term of cancers, lung cancer and larynx cancer in men were the first ones which are identified to have a link with smoking (U.S Department on Human Health Services, 2004). However, up to now, the list of cancers that related to smoking behaviors has been spreading. Not only pancreatic, kidney, stomach, liver, laryngeal cancers (U.S Department on Human Health Services, 2004) but also bladder (Quirk et al., 2004), oral cancers (Bunnell et al., 2010) are found to have a significant association with tobacco use. Heart diseases and stroke are the most common cardiovascular diseases people might get due to tobacco use (U.S Department on Human Health Services, 2004). Smoking is a crucial determinant of stroke, even passive smoking might increase the risk of getting stroke (Paul et al., 2004) as well as coronary artery diseases (Inoue, 2004). It is well documented that tobacco use damages the entire of respiratory system and affects all aspects of lung structure and functions (U.S Department on Human Health Services, 2004). Smoking not only increase the risk of lung cancer but also has adverse effects on the pulmonary surfactant (Scott, 2004) whether it is direct smoking or passive smoking. Smoking has many adverse effects on reproductive system as well as early childhood (U.S Department on Human Health Services, 2004). Women's smoking during pregnancy increases the risk of getting pregnancy complication, premature delivery, premature rupture membranes (U.S. Department of Health and Human Services, 2001, U.S Department on Human Health Services, 2004). It is also documented that women's smoking during pregnancy has many adverse effects on the newborns. These newborns might get higher risk of getting obesity, cardiovascular disease, and non-insulin dependent diabetes mellitus (Bergen, 2006). Smoking also increases the risk of both primary and secondary infertility in both male and female (U.S Department on Human Health Services, 2004, U.S. Department of Health and Human Services, 2001). Besides, smoking was identified as the most preventable risk factor for periodontitis in young persons (Mullally, 2004); the most preventable risk factor for renal disease (Orth, 2003); and the primary risk factor for oral cancer (Bunnell et al., 2010). As the result, facing all of these health problems above, smokers will have a lower quality of life's score than non-smokers. Heikkinen et al has showed that daily-smokers have both health-related quality of life and overall quality of life lower than non-smokers (Heikkinen et al., 2008).

2.6.2 Current situation of smoking behavior in national level and international level

According to Survey Assessment of Vietnamese Youth (SAVY) 2003, only 1.2% young females aged 10 - 24 reporting to have ever smoked and one-third of them (0.4%) reported to be current smokers while up to 43.6% young males reported having ever smoked before and up to 71.7% of them reported to be current smokers (Minister of Health, 2005). Meanwhile, in India, the prevalence of current use of tobacco among males aged 10-24 is only 7.8% (Chaudhry, 2001). The prevalence of current smokers in Vietnam is also higher than in Indonesia – of which among males aged 20-24 in urban area is only 8.7% (Center for Health Research University of Indonesia, 2001) and Myanmar – of which the prevalence of current smokers among males aged 15-24 is only 7.4% (Minister of Health, 2004). The prevalence of current smokers among females in Vietnam is still very low (less than 1%) because of the eastern norm that females are not supposed to smoke. However, in Vietnam as well as in other Asian countries, the prevalence of tobacco use among females is increasing (Pfizer Facts, 2008).

2.6.3 Risk and protective factors related to tobacco use among adolescents / youth

The risk and protective factors related to tobacco use among adolescents / youth are divided into five main domains: individual level, peer level, family level, school level. There are a lot of studies had been done about how these factors related to tobacco use behaviors among adolescents/youth through out the world.

Individual level:

In term of individual factors, Brook et al tried to identify distinct trajectories of cigarette smoking from ages 14 to 32 among 975 participants since 1975. The results have revealed that externalizing behavior, lower education aspiration in early adolescents were associated with smoking at early age and with continuing to smoke into the thirties (Brook et al., 2008). In the study among 161 U.S. college students aged 18 – 26, Von Ah et al showed that self-efficacy was the most important risk factor of smoking behaviors. Students with lower score of self-efficacy were more likely to smoke as well as smoke more than student with higher score of self-efficacy (Von Ah et al., 2005). Perception that smoking is harmful for the health is seemed to be the protective factor (Naing et al., 2004). In the study to explore the development of smoking behavior in adolescents, Van Den Bree et al have indicated that using/abusing other substances and low religiosity are the risk factors for adolescents to have smoking behaviors (Van Den Bree et al., 2004).

Mathur et al examined the association between tobacco use and other risk factors such as: psychosocial risk factors, socioeconomic status and other characteristics. The results indicated that social susceptibility to smoking was strongly associated with the current smoking behaviors. Expose to tobacco advertising was also correlated with smoking behavior among government school students (Mathur et al., 2008).

Family level:

In the study among 757 adolescent smokers in three Florida high schools, Ditre et al have shown that: more parental smoking restrictions were significantly associated with less smoking among adolescents. They also indicated that parental smoking restrictions might help the adolescents to have more confidence to quit smoking and also associated with greater adolescent perception that smoking is harmful for their health (Ditre et al., 2008). In line with Ditre, Griesler et al also found that maternal smoking had a strong relation with the smoking behavior of adolescents. Positive parenting mother-child relatedness and monitoring were seem to have the potential to reduce the lifetime smoking among adolescents (Griesler and Kandel, 1998). In the study among 181 adolescents who had smoked at least 100 cigarettes in their lifetime, Dornelas et al had found that among Black teen, the role of family was crucial for them to start smoking. Half of them were influenced by the family members (Dornelas et

al., 2005). Having father who smoked increases the risk of smoking behaviors among male adolescents in Malaysia is one of the main finding of Naing et al in the study identifying factors related to smoking habit of male adolescents (Naing et al., 2004). Another study was carried out by Hill et al also proved that parent smoking history might also increase the risk of smoking behaviors among teenagers. Family protective factors were: less parental smoking, stricter family monitoring and less conflict inside the family (Hill et al., 2005, Wong et al., 2008, Shillington et al., 2005, Borawski et al., 2003, Tucker et al., 2003). Another interesting protective factor that was found is that the frequency of family meals was strongly positively associated with the smoking behaviors among adolescents (Eisenberg et al., 2008). However, the frequency of family meals is also an indicator to measure the connectedness or the bonding inside the family, which was found to be an important protective factor for smoking behaviors among adolescents (Anteghini et al., 2001, Wong et al., 2008, Hill et al., 2005).

Peer level:
Otten et al studied how environmental smoking affects the perception of lifetime smoking prevalence and the likelihood of subsequent regular smoking of 6769 Dutch adolescents. He found that parental smoking, best friend smoking, and proportion of smoking friends are the risk factors and increases the risks to start smoking of adolescents (Otten et al., 2009).
Ozer et al investigated the contribution of individual, family and community level factors for smoking behavior among Mexican adolescents. The study included of 3922 adolescents and their mothers from 333 poor, rural communities in seven Mexican states. The results have shown that: current smoking behavior associated with the current use of alcohol, to be a male (versus female), to be at older age (versus younger ones), and to have mother who smoked (Ozer and Fernald, 2008). Ali et al tried to identify the role of peer social networks in explaining the smoking behavior among adolescents. Data from the National Longitudinal Study of Adolescent Health (AddHealth) was used. The results have shown that the proportion of classmate who smoke as well as the increase in smoking rates among individual's close friends have a strong correlation with smoking behavior among adolescents (Ali and Dwyer, 2009). In The Line with this finding was the study among 2525 adolescents in grades 7-12 in U.S.A carried out by Alexander et al (Alexander et al., 2001). Olvera et al indicated that teenagers who have friends who smoke are more likely to have smoking behaviors (Olvera et al., 2006, Tucker et al., 2003).

2.6.4 Study about smoking and adolescents in Vietnam

In Vietnam, there are not so many studies about smoking and adolescents. The first one as well as the biggest one that have to be mentioned is the Survey Assessment of Vietnamese Youth. The first round of this survey was conducted in 2003 and the second round was conducted in 2009. However, in this survey, tobacco use is only one of a series of adolescent and youth health problems. The results of this survey only provide for us the prevalence of smoking behaviors of Vietnamese adolescents and youth (Minister of Health, 2005).
Other studies should be mentioned such as the study about the knowledge and attitude of Hanoi school of Public Health's students and staffs about cigarette smoking, the study about second hand smoke (passive smoke) of mothers and children in the family environment, the global health professional students survey at Vietnam, etc. However, none of the studies above analyzed smoking behavior of adolescents / youth in term of risk and protective factors in different domains (Pham and Le, 2004).
There are other studies about tobacco in Vietnam, however most of them focused on how tobacco effects people's health such as the study about the association between smoking and hypertension (Thuy et al., 2010), the study about association between environmental tobacco smoking expose and hospital admissions (Suzuki et al., 2009).

CHAPTER 3: FINDINGS

In this chapter, I am going to present four main parts. The first one would be the demographic information of the study's sample. The second one would be about "ever tried to smoke" behavior among male and female adolescents / youth at CHILILAB. The third one would be about the currently smoking behavior among male and female adolescents / youth in CHILILAB. General information would be presented in total sample as well as by gender. The last part would be about the risk and protective factors among male adolescents / youth. The results would be divided into three different group based on the age of participants: 10 – 14 years of age, 15 – 19 years of age, and 20 – 24 years of age. For the last part, only findings about male adolescents / youth were presented. The number of female current smokers is quite limited; hence no further analysis was done.

3.1 Demographic information of the sample
3.1.1 General information

The minimum age of the sample is 10 an the maximum age of the sample is 24. The avarage age of the sample is 16.5. The median as well as the mode of the sample is 16. The Std. Error of Mean is 0.035. In the total 12447 samples, only two cases are missing. The histogram graph showed that, the actual shape of the distribution appeared to be normal distributed. This is also supported by an inspection (with the reasonably straight line) of the normal probability plots (Normal Q-Q plot) (graphs were put in the annex).

Table 1: Demographic information of the study sample

Characteristics		Number	Percentage	Total
Gender	Male	6108	49.1%	12447
	Female	6339	50.9%	
Age-group	10 - 14	4245	34.1%	12445
	15 - 19	5061	40.7%	
	20 - 24	3139	25.2%	
Marital status	Married	1004	8.4%	11901
	Separated	6	0.1%	
	Divorced	12	0.1%	
	Widowed	4	0.0%	
	Unmarried	10862	91.3%	
	Live together	13	0.1%	
Area	Towns	5930	48.1%	12332
	Communes	6402	51.9%	

The demographic variables as listed above were not collected at AH1 but from the period surveys of CHILILAB. All these data were merged by the individual code (which is unique for everyone). About half of the sample are male (49.1%). The most prevalence is adolescents in the age of 15 - 19 (40.7%). Most of the adolescents/youth in the sample are unmarried (91.3%), 8.4% are married, and only a few cases are separated (6 cases), divorced (12 cases), widowed (4 cases) and live together but without marriage (13 cases). Up to 546 cases are missing in the marital status variable. In term of area, participants who living in towns and who living in communes are quite equally distributed. In order to assess the household economic status, 12 variables about 12 household features were designed. Those variables include the state of having or not having following things: stable roof, stable floor, stable bathroom, flush toile, wardrobe, fridge, telephone, mobile phone, motorbike, pump, and gas stove. The rating scale including these variable has been checked in term of reliability and has a high level of reliability (Cronbach's Alpha = 0.864). The household economic status has been divided by 5 quintiles which are equal to each other, every quintile accounts for 20% of the total population of CHILILAB. However, in this study, I regroup the household economic status into three groups: poor, middle, and better-off families by 3 quintiles to make the analysis more simple. The difference between the household economic status of the adolescents / youth in towns and communes was shown in the table below:

Table 2: Household economic status of the study sample

	Poor	Middle	Better-off
Towns*	734 12.5%	1831 31.2%	3304 56.3%
Communes**	2663 42.1%	2831 44.5%	852 13.5%
CHILILAB	3397 27.9%	4644 38.1%	4156 34.1%

*: towns are: Saodo, Phalai, and Bentam
**: communes are: Hoangtien, Vanan, Anlac, and Leloi

There is a significant difference in the household economic status between adolescents / youth from towns and those from communes (Chi-square = 2736.3; p<0.001). Among adolescents / youth living in towns, only 12.5% are in poor families while this rate among those who live in communes are 42.1% - about 3.5 times higher. Only 13.5% adolescents / youth living in communes are in rich family while in towns, this rate is up to 56.3% - about four times higher. The finding indicated that there is a big difference about the economic status between those living at towns and those living at communes.

Among 12447 adolescents/youth in CHILILAB, data about occupation of 192 participants were missing. In term of occupation, almost all (99.5%) of 10 - 14 years old teenagers are pupils. Only 14 participants reported that they are farmers. The distribution of participant's occupation of older participants were represented in the graph below. Among teenagers aged 15 - 19, 73.1% are pupils / students. The prevalence of farmer increased from 0.1% (among teenagers aged 10 - 14) to 9.6%. That means for a teenager to grow up from 10-14 years of age to 15-19 years of age, there is about 25% that this teenager would do some job rather than going to school. Among youth aged 20 - 24, only 17.8% remains to be students. The rest of participants are working such as farmers (28%), workers (13.8%), traders (13.1%), ect ... Only 2.5% of these are unemployment.

15 - 19 years old **20 - 24 years old**

| ● Farmer | ● Government officer | ● Worker | ● Artisan | ● Trader |
| ● Pupil/Student | ● Housewives | ● Unemployed | ● Vocational training | ● Other |
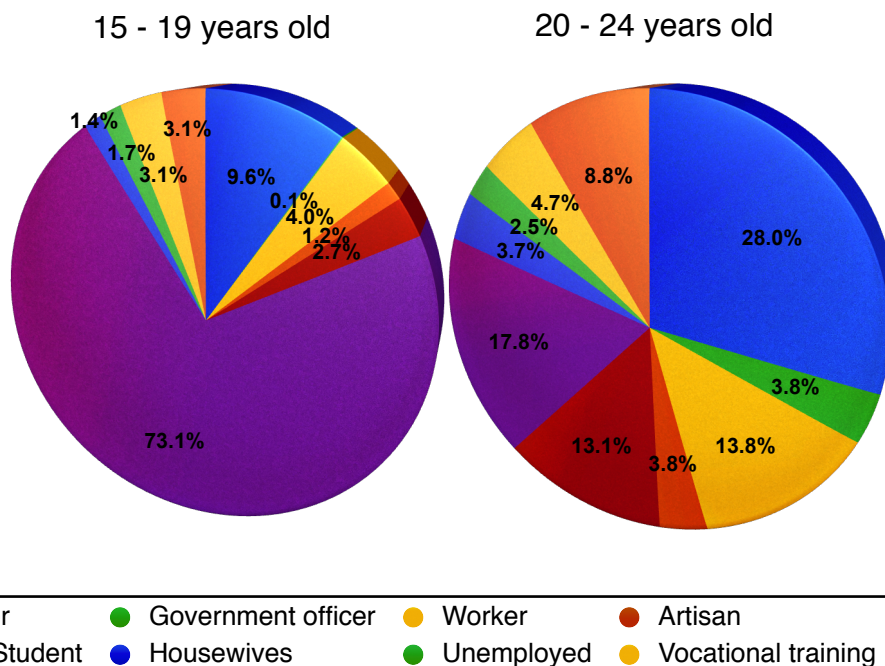
**Graph 2: Occupations of male and female adolescents aged 15 - 19
and young adults aged 20 - 24**

3.1.2 General information by gender

Table 3: Martial status of the participants by gender

	Male		**Female**	
	Single	Ever married	Single	Ever married
15 - 19	2508 99.8%	4 0.2%	2475 97.1%	74 2.9%
20 - 24	1188 86.1%	192 13.9%	957 54.4%	802 45.6%

In the sample of the study, there were about 8.6% who had married including those who had divorced, separated or those who are widows and widowers. The table above described the marital status of adolescents / youth at CHILILAB. It can be seen that in adolescents aged 15 - 19, there was no difference between males and females. However, among youth aged 20 - 24, there was a big difference among marital status between males and females. Only 13.9% males aged 20 - 24 had ever got married while among females, this rate was about 3 times higher. This figure is fit with the reality that females normally got married younger than males.
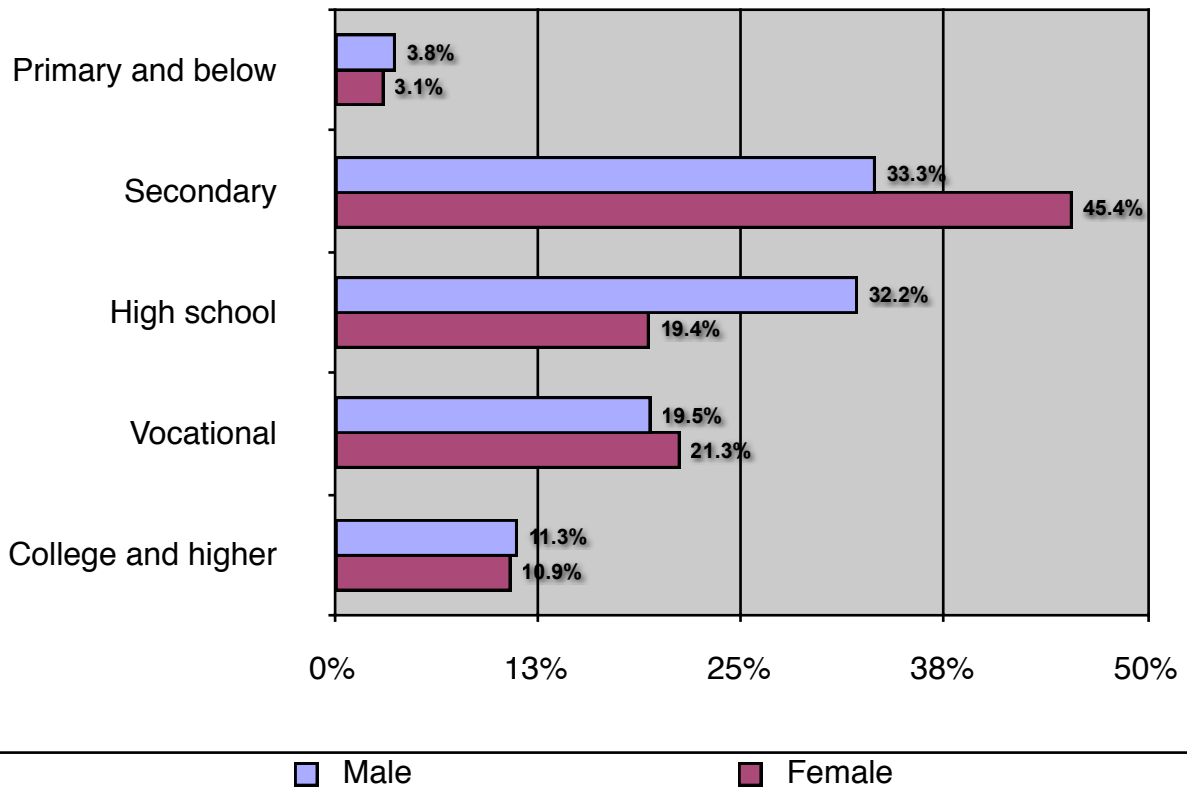
Graph 3: The distribution of educational level of male and female 20 - 24 years old

The graph has represented the distribution of educational level of male and female youth 20 - 24 years of age living at CHILILAB. It can be seen that there are more female at secondary group than male (45.4% versus 33.3%), and more male at high school than female (32.2% versus 19.4%). The prevalence of those who study in college in both groups are about the same (11.3% male and 10.9% female).

3.2 "Ever tried to smoke" behavior among adolescents and youth

Among adolescents aged 10 - 14, only 4.6% ever tried to smoke. While in adolescents aged 15 - 19, up to 19.3% had tried to smoke, and in youth aged 20 - 24, this rate reached up to 31.9%.

3.2.1 "Ever tried to smoke" behavior among adolescents aged 10 - 14:

Table 4: "Ever tried to smoke" behavior by demographic information for male and female adolescents aged 10 - 14

Demographic characteristics		Ever tried to smoke	OR	95% CI	p, χ^2
Gender (4148)	Female (1974)	46 2.3%	1	_	_
	Male (2174)	143 6.6%	2.9	2.1 - 4.1	p < 0.001, χ^2= 42
Area (4113)	Commune (2110)	93 4.4%	1	_	_
	Town (2003)	96 4.8%	1.1	0.82 - 1.46	p = 0.55, χ^2= 0.34
Household economic status (4068)	Poor (1217)	56 4.6%	1	_	_
	Middle (1520)	74 4.9%	1.06	0.74 - 1.52	p = 0.74, χ^2= 0.11
	Better-off (1331)	57 4.3%	0.92	0.64 - 1.35	p = 0.70, χ^2= 0.15
Total (4148)		189 4.6%	_	_	_

The results represented in the table indicated that, among adolescents aged 10 - 14, males are about 2.9 times more likely to ever try to smoke than females. There is a slightly difference between adolescents living in communes and adolescents living in towns (4.4% versus 4.8%). However, this difference is not statistically significant. We can also found the same result in term of household economic status of the participants. There is no difference in the prevalence of ever try to smoke in different groups of household economic status. The general prevalence of ever try to smoke in male and female adolescents aged 10 - 14 at CHILILAB is 4.6%.

3.2.2 "Ever tried to smoke" behavior among adolescents aged 15 - 19:

Table 5: "Ever tried to smoke" behavior by demographic information for male and female adolescents aged 15 - 19

Demographic characteristics		Ever tried to smoke	OR	95% CI	p, χ²
Gender (4897)	Female (2461)	119 4.8%	1	_	_
	Male (2436)	825 33.9%	10.0	8.2 - 12.3	p < 0.001, χ²= 663
Area (4863)	Commune (2489)	470 18.9%	1	_	_
	Town (2374)	468 19.7%	1.1	0.92 - 1.22	p = 0.46, χ²= 0.54
Household economic status (4821)	Poor (1146)	229 20%	1	_	_
	Middle (1868)	371 19.9%	0.99	0.83 - 1.19	p = 0.94, χ²= 0.007
	Better-off (1807)	331 18.3%	0.90	0.74 - 1.08	p = 0.26, χ²= 1.27
Total (4897)		944 19.3%	_	_	_

Among adolescents aged 15 - 19, 19.3% ever tried to smoke, up to 33.9% males ever tried to smoke while this rate for females was just 4.8%. Males are about 10 times more likely to try to smoke than females. The prevalence of ever tried to smoke among adolescents living in towns is slightly higher than among those living in communes (19.7% versus 18.9%). Adolescents come from poor family have the highest prevalence of ever tried to smoke. However, these differences are not statistically significant.

3.2.3 "Ever tried to smoke" behavior among young adults aged 20 - 24:

Table 6: "Ever tried to smoke" behavior by demographic information for young male and female adults aged 20 - 24

Demographic characteristics		Ever tried to smoke	OR	95% CI	p, χ²
Gender (3012)	Female (1677)	82 4.9%	1	_	_
	Male (1335)	879 65.8%	37.5	29.2 - 48.1	p < 0.001, χ²= 1271

Demographic characteristics		Ever tried to smoke	OR	95% CI	p, χ²
Area (2968)	Commune (1573)	490 31.2%	1	_	_
	Town (1395)	459 32.9%	1.1	0.93 - 1.26	p = 0.31, χ²= 1.04
Household economic status (2925)	Poor (907)	282 31.1%	1	_	_
	Middle (1097)	351 32%	1.04	0.86 - 1.26	p = 0.66, χ²= 0.19
	Better-off (921)	303 32.9%	1.08	0.89 - 1.32	p = 0.41, χ²= 0.69
Total (2925)		936 32%	_	_	_

Among youth aged 20 - 24, up to 32% reported that they have ever tried to smoke even one puff, this prevalence among male youth is 65.8% and among female youth is only 4.9%. There is also no statistical differences between those living at towns and those living at communes as well as those come from differences household economic status.
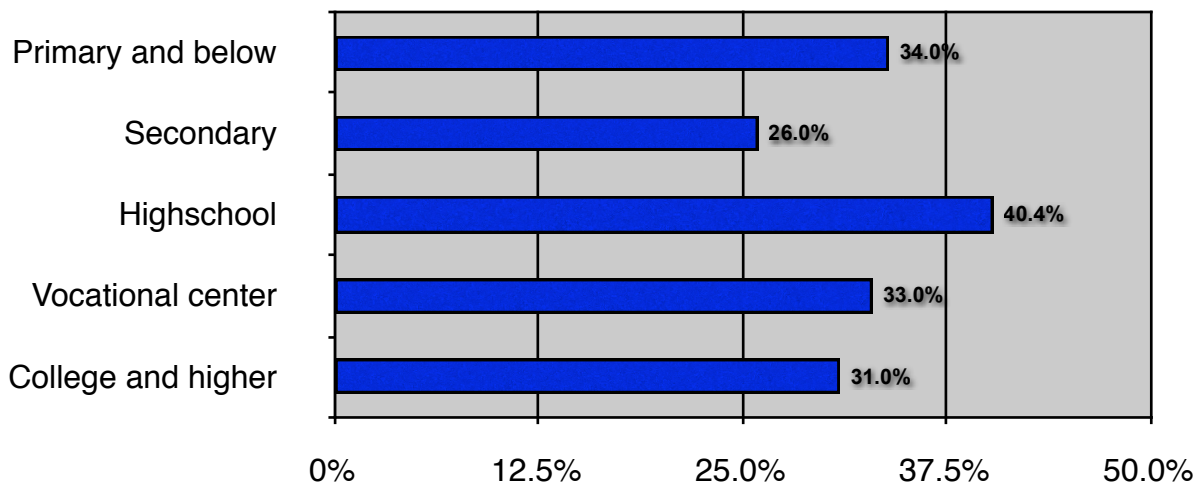
Graph 4: "Ever try to smoked" behavior and education level of youth aged 20 - 24

The graph represented the prevalence of ever try to smoke behavior in youth aged 20 - 24 with different education level. The results showed that the most prevalence is in youth 20 - 24 with the education level high school. Among all youth aged 20 - 24 who had ever tried to smoke (even one puff), the average age for them to start the first smoke is 18.4 years old which is later in comparison with SAVY. However, one third of the youth who had ever tried to smoke did not remember when was the first time they tried.
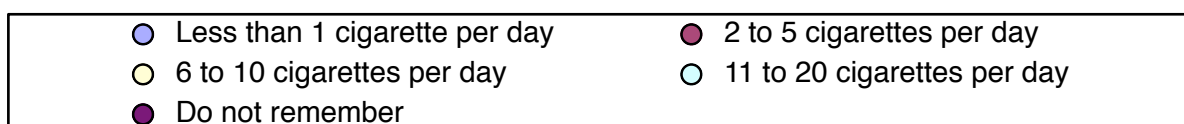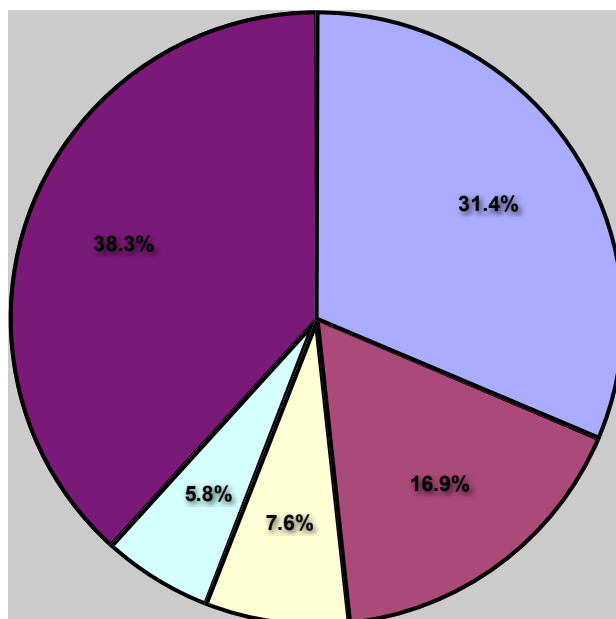
Graph 5: Number of cigarettes current smokers aged 20 - 24 smoke per day

Among those who are current smokers, question about how many cigarettes they smoke per day was asked. Up to 38.3% reported that they do not remember which is very large. However, it is very difficult for us to double check the data since the sample size is quite big. The most prevalence is those who smoked less than one cigarette per day (31.4%), following by those who smoke 2 - 5 cigarettes per day (16.9%). There is still 7.6% who reported that they smoked 6 to 10 cigarettes per day, and 5.8% reported that they even smoke 11 to 20 cigarettes per day.

3.3 Currently smoking behavior:

Table 7: Currently smoking behavior of male and female by demographic characteristics

Demographic characteristics		Currently smoking	OR	95% CI	p, χ²
Age group (12057)	10 - 14 (4148)	77 1.9%	1	–	–
	15 - 19 (4897)	463 9.5%	5.52	4.3 - 7.1	p < 0.001, χ²= 230
	20 - 24 (3012)	668 22.2%	15.07	11.8 - 19.2	p < 0.001, χ²= 773
Gender (12059)	Female (6114)	70 1.1%	1	–	–

Demographic characteristics		Currently smoking	OR	95% CI	p, χ²
	Male (5945)	1138 19.1%	20.4	16.1 - 26.3	p < 0.001, χ²= 1083
Youth aged 20 - 24					
Marital status	Married (957)	116 12.1%	1	_	_
	Single (2055)	552 26.9%	2.7	2.1 - 3.3	p < 0.001, χ²= 82.2
Educational level	College and higher (329)	53 16.1%	1	_	_
	Vocational (613)	129 21%	1.4	1.0 - 2.0	p = 0.07, χ²= 3.3
	High school (760)	218 28.7%	2.1	1.5 - 2.9	p < 0.001, χ²= 19.4
	Secondary (1166)	227 19.5%	1.3	0.9 - 1.7	p = 0.17, χ²= 1.9
	Primary and below (103)	30 29.1%	2.1	1.3 - 3.6	p < 0.05, χ²= 8.56

In the sample study, 10% is adolescents and youth who are currently smokers. However, there is a huge difference between different age group. Among adolescents aged 10 - 14, 4.6% had tried to smoke but only 1.9% are currently smokers. Among adolescents aged 15 - 19, 19.3% had ever tried to smoke and about half of those(9.5%) are currently smoker. Among youth aged 20 - 24, 31.9% had ever tried to smoke and more than two third (22.2%) of those are currently smoker. As can be seen in the table, older age seemed to be a risk factor for currently smoking behaviors among adolescents / youth. Adolescents aged 15 - 19 are 5.5 times (95% CI = 4.3 - 7.1) more likely to be a currently smoker than adolescents aged 10 - 14 and youth aged 20 - 24 are 15.07 times (95% CI = 11.8 - 19.2) more likely to be a current smoker than adolescents aged 10 - 14.

Among young adults aged 20 - 24, 12.1% of married participants are currently smokers while this rate in single participants is 26.9%. The table showed that single young adults are 2.7 times more likely to be currently smokers than married young adults. In term of educational level, the most prevalent of currently smokers is in the lowest educational level - primary and below (29.1%) and the least prevalent is among youth aged 20 - 24 with the highest educational level - college and higher (only 16.1%).
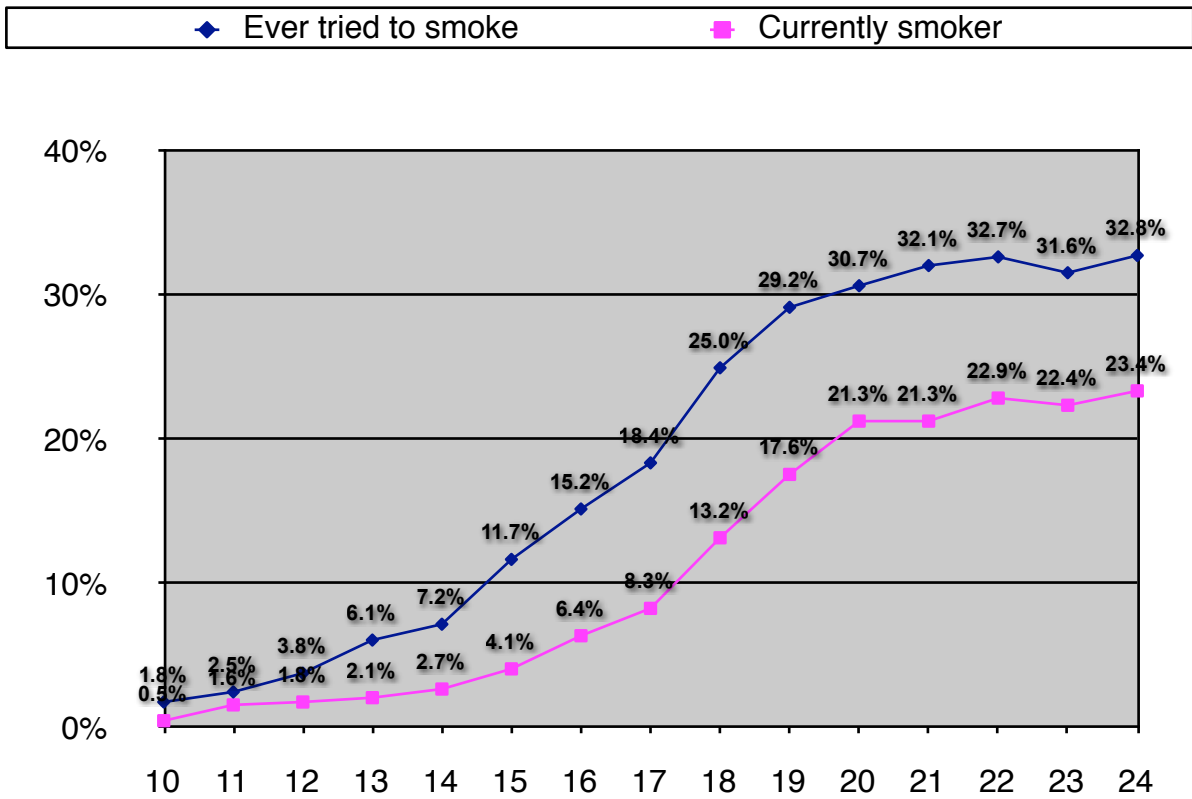
Graph 6: Prevalence of "ever tried to smoke" behavior and current smoker by age

The graph above showed that, during the period 10 - 14, the prevalences of ever tried to smoke behavior as well as currently smokers do increase over ages, but the trends are slowly. The same finding was found among period 20 - 24 years of age, the prevalence of ever tried to smoke varies from 30.7% to 32.8% and the prevalence of currently smokers varies from 21.3% to 23.4%. However, in the period 15 - 19, the trend increases at a very fast pace. From the age of 15 to the age of 19, the prevalence of ever tried to smoke has increased 2.5 times and the prevalence of currently smokers has increased 4.3 times. The results indicated that adolescents are most vulnerable during the age of 15 - 19. Policy makers should keep in mind that and interventions should be focused on this group.

In term of quit smoking behavior, among those who had tried to smoke, up to 41.1% tried to quit smoking during the last 12 months.

Among 6339 female adolescents and youth at CHILILAB, only 1.1% are current smoker (70 participants). Among these, 21.4% are adolescents aged 10 - 14, 34.3% are adolescents aged 15 - 19, and 44.3% are youth aged 20 - 24. Due to the limited sample size, no more analysis was done.

3.4 Risk factors for smoking behavior of male adolescents / youth at CHILILAB

In this part, the analysis are divided for three different groups: male adolescents aged 10 - 14; male adolescents aged 15 - 19; and young male adults aged 20 - 24. For each group, the analytical framework was applied to identify the risk and protective factors for smoking behavior.

3.4.1 Male adolescents aged 10 - 14
3.4.1.1 Individual factors

Table 8: Currently smoking behavior and individual factors for male adolescents aged 10 - 14

Characteristics		Currently smoking	OR	95% CI	p, χ^2
Area (2163)	Towns (1049)	24 2.3%	1	_	_
	Communes (1114)	38 3.4%	1.2	1.01 - 1.32	p = 0.12, $\chi^2 = 2.4$
Economic status (2133)	Rich (693)	12 1.7%	1	_	_
	Middle (817)	20 2.4%	1.4	0.7 - 2.9	p = 0.34, $\chi^2 = 0.93$
	Poor (623)	29 4.7%	2.8	1.4 - 5.5	p < 0.05, $\chi^2 = 9.3$
Do not knows the effect of tobacco in health (2174)	No* (1651)	45 2.7%			
	Yes (523)	17 3.3%	1.2	0.7 - 2.1	p = 0.53, $\chi^2 = 0.39$
Ever finish a glass of beer (2140)	No (1558)	24 1.5%	1	_	_
	Yes (588)	31 5.3%	3.5	2.1 - 6.1	p < 0.001, $\chi^2 = 23.6$
Ever been drunk (2074)	No (1814)	32 1.8%	1	_	_
	Yes (260)	16 6.2%	3.6	2.0 - 6.8	p < 0.001, $\chi^2 = 19.4$

The results presented in the table 8 showed that, among adolescents aged 10 - 14, the prevalence of currently smokers among those living in communes is a little bit higher than those living in towns (3.4% versus 2.3%). However, this difference is not statistically significant (p = 0.12). Adolescents who live in poor family is 2.8 times more likely to be

currently smokers than those living in rich family. The difference between adolescents living in middle family and rich family is not statistically significant (p = 0.34). In The Line with many research through out the world, the results presented in the table above showed that there is a strong association between drinking and using tobacco. Adolescents who had ever finished a glass of beer are 3.5 times more likely to be currently smokers and adolescents who had ever been drunk are 3.6 times more likely to be currently smokers than others (those who had never finished a glass of beer and those who had never been drunk). The result from binary analysis showed that there is no significant difference of prevalence of current smokers in adolescents who know about the effects of tobacco in health and those who do not know about that.

3.4.1.2 Family and peer factors

Table 9: Currently smoking behavior and family and peer factors for male adolescents aged 10 - 14

Characteristics		Currently smoking	OR	95% CI	p, χ^2
Anyone in the family smoke (2174)	No (827)	23 2.8%	1	_	_
	Yes (1347)	39 2.9%	1.04	0.62 - 1.76	p = 0.88, χ^2 = 0.024
Father smoke (2163)	No (1011)	33 3.3%	1	_	_
	Yes (1163)	29 2.5%	0.76	0.46 - 1.26	p = 0.28, χ^2 = 1.6
Brother smoke (2174)	No (2094)	58 2.8%	1	_	_
	Yes (80)	4 5.0%	1.8	0.65 - 5.2	p = 0.24, χ^2 = 1.4
Cigarettes available in the house (2109)	No (1603)	38 2.4%	1	_	_
	Yes (506)	18 3.6%	1.5	0.86 - 2.7	p = 0.15, χ^2 = 2.1
Close friends smoke (2074)	No (1626)	28 1.7%	1	_	_
	Yes (448)	27 6.0%	3.7	2.1 - 6.3	p < 0.001, χ^2 = 25.2

The table 9 showed the crude association between currently smoking behavior and family/ peer factors. The results indicated that, among adolescents aged 10 - 14, the family's factors are not important to the currently smoking behavior. As we can see in the table, the differences of currently smoker's prevalences in groups differ from each other by family's member' smoking status are not statistically significant. In other words, whether adolescents

aged 10 - 14 living with a smoker in the family or not, the risk of becoming currently smokers is about the same. However, adolescents aged 10 - 14 who have close friends smoke are 3.7 times more likely to be currently smokers than those who do not have close friends smoke.

3.4.1.3 Logistic regression model

Logistic regression was applied in order to assess the effects of multiple explanatory variables on the currently smoking behavior of male adolescents / youth. In the regression model, all variables had significant associations with currently smoking behavior were put on the model (Close friends smoke, economic status, ever finish a glass of beer, ever been drunk). A backward stepwise procedure based on the likelihood ratio was used to select variables for the final model. The significance for variable removal and entry was set to 0.10 and 0.05 respectively. The Hosmer and Lemenshow test was used to check the goodness-of-fit of the model and standardized residuals were plotted against the predicted probabilities of being current smoker state to detect the presence of outliers. From the 4 initially variables, two variables were excluded from the model (economic status and ever been drunk). The final model consists of two variables were presented in the table.

Table 10: Logistic model to predict smoking behavior among male adolescents aged 10 - 14

Characteristics		Crude OR	OR	95% CI	p
Close friends smoke	No*	1	1	_	_
	Yes	3.7	3.1	1.7 - 5.6	<0.001
Ever finished a glass of beer	No*	1	1	_	_
	Yes	3.5	2.8	1.5 - 5.0	<0.005
*: Refference					
Hosmer and Lemenshow Test: p = 0.991					

The results indicated that, among adolescents aged 10 - 14, the model to predict smoking behavior was built based on two variables which are close friends smoke and ever finished a glass of beer. After taking into account other variables in the model, the results showed that adolescents who have close friends smoke are 3.1 times (crude OR is 3.7) more likely to be current smokers than those who do not have close friends smoke; and those who ever finished a glass of beer are 2.8 times (crude OR is 3.5) more likely to be current smokers than those who have never finished a glass of beer.

3.4.2 Male adolescents aged 15 - 19
3.4.2.1 Individual factors

Table 11: Currently smoking behavior and individual factors for male adolescents aged 15 - 19

Characteristics		Currently smoking	OR	95% CI	p, χ^2
Area (2419)	Towns (1153)	193 16.7%	1	_	_
	Communes (1266)	246 19.4%	1.2	0.97 - 1.5	p = 0.09, χ^2 = 2.9
Economic status (2398)	Rich (901)	126 14%	1	_	_
	Middle (918)	171 18.6%	1.4	1.1 - 1.8	p < 0.05, χ^2 = 7.2
	Poor (579)	139 24.0%	1.9	1.5 - 2.5	p < 0.001, χ^2 = 24
Ever finish a glass of beer (2415)	No (770)	66 8.6%	1	_	_
	Yes (1645)	367 22.3%	3.1	2.3 - 4.0	p < 0.001, χ^2 = 67.3
Ever been drunk (2342)	No (1496)	138 9.2%	1	_	_
	Yes (846)	274 32.4%	4.7	3.8 - 5.9	p < 0.001, χ^2 = 200
Ever had premarital sex (2436)	No (2224)	374 16.8%	1	_	_
	Yes (72)	40 55.6%	6.2	3.8 - 10.0	p < 0.001, χ^2 = 70.8
	Refuse (140)	25 17.9%	1.1	0.7 - 1.7	p = 0.75, χ^2 = 0.1
Do not know the effect of tobacco in health (2436)	No (2001)	340 17.0%	1	_	_
	Yes (435)	99 22.8%	1.4	1.1 - 1.9	p < 0.05, χ^2 = 8.04

The table 11 represented the crude associations between individual factors and smoking behavior of adolescents aged 15 - 19. The results showed that, there is statistically difference

of prevalence of current smokers in towns and communes. Economic status was found to be statistically associated with smoking behavior among adolescents aged 15 - 19. In compare with adolescents from rich families, adolescents from middle families are 1.4 times more likely to be current smokers; and those from poor families are even 1.9 times more likely to be current smokers. Alcohol use was also found to be associated with smoking behavior. Adolescents who have ever finished a glass of beer are 3.1 times more likely to be current smokers; and those who have ever been drunk are even 4.7 times more likely to be current smokers than others. Premarital sex was found to have a strong association with smoking behavior. Adolescents aged 15 - 19 who had premarital sex are 6.2 times more likely to be current smokers than those who had not had premarital sex. Although, there is no statistical difference between those who had not had premarital sex and those who refuse to answer about their premarital sex behavior. Adolescents who do not know the effects of tobacco are 1.4 times more likely to be current smokers than those who know about the effects of tobacco in health.

3.4.2.2 Family and peer factors

Table 12: Currently smoking behavior and family and peer factors for male adolescents aged 15 - 19

Characteristics		Currently smoking	OR	95% CI	p, χ^2
Anyone in the family smoke (2436)	No (952)	104 10.9%	1	_	_
	Yes (1484)	335 22.6%	2.4	1.9 - 3.0	p < 0.001, χ^2 = 53.2
Father smoke (2436)	No (1208)	186 15.4%	1	_	_
	Yes (1228)	253 20.6%	1.4	1.2 - 1.8	p = 0.001, χ^2 = 11.2
Brother smoke (2436)	No (2193)	340 15.5%	1	_	_
	Yes (243)	99 40.7%	3.7	2.8 - 5.0	p < 0.001, χ^2 = 94.3
Mother smoke (2436)	No (2421)	434 17.9%	1	_	_
	Yes (15)	5 33.3%	2.3	0.78 - 6.7	p = 0.12, χ^2 = 2.4
Sister smoke (2436)	No (2427)	436 18.0%	1	_	_
	Yes (9)	3 33.3%	2.3	0.60 - 9.2	p = 0.45, χ^2 = 0.58

Characteristics		Currently smoking	OR	95% CI	p, χ²
Cigarettes available in the house (2363)	No (1724)	320 18.6%	1	_	_
	Yes (639)	113 17.7%	0.94	0.74 - 1.2	p = 0.62, $\chi^2 = 0.24$
Close friends smoke (2339)	No (896)	52 5.8%	1	_	_
	Yes (1443)	369 25.6%	5.6	4.1 - 7.6	p < 0.001, $\chi^2 = 146$

The table 12 represented the crude associations between family's; peer's factors and smoking behavior of male adolescents aged 15 - 19 at CHILILAB. The results for male adolescents aged 10 - 14 showed that there are no relations between family's factors and their smoking behavior. However, in this group, couple of statistically associations were found. Adolescents aged 15 - 19 living with at least one smoker in the family are 2.4 times more likely to be current smokers than those living with non-smokers. Living with fathers who smoke is also increase the chance for adolescents to be current smokers at 1.4 times. Living with brothers who smoke affects the adolescent's smoking behavior more than living with father who smoke. The results indicated that living with brothers who smoke increases the chance of an adolescent to be current smoker up to 3.7 times higher than those who live with non-smokers brothers. The prevalences of current smokers in group living with mother who smoke and sister who smoke are higher than group living with mother and sister who do not smoke. However, these differences are not statistically significant. This fact can be explained that the number of adolescents whose mothers smoke and sisters smoke are limited (5 and 3 respectively). Similar with the group aged 10 - 14, the availability of tobacco at home do not associate with the smoking behavior of adolescents aged 15 - 19. Having close-friends who smoke was found to have a strong association with smoking behavior of male adolescents aged 15 - 19. Adolescents whose close-friends smoke are up to 5.6 times more likely to be current smokers than those whose close-friends do not smoke, this association is evens stronger than the association between having brothers who smoke and smoking behavior of adolescents.

3.4.2.3 Logistic regression model

All the variables were found statistically associated with smoking behavior of adolescents were put in the logistic regression model in order to build a model to predict the smoking behavior of male adolescents aged 15 - 19. Nine variables meet the requirement are economic status, ever finished a glass of beer, ever been drunk, ever had premarital sex, do not know the effect of tobacco in health, anyone in the family smoke, father smoke, brother smoke, and close friends smoke. However, only eight variables were put in the analysis process. Anyone in the family smoke is a sum of variables: father smoke, mother smoke, sister smoke, brother smoke, therefore was removed. Backward stepwise was used, only one variable was excluded which is "ever finished a glass of beer" variable. The final model was presented in the table below, the OR were calculated taken into account other variables in the model. The Hosmer and Lemenshow test was carried out to evaluate the goodness of fit of the model.

Table 13: Logistic model to predict smoking behavior among male adolescents aged 15 - 19

Characteristics		Crude OR	OR	95% CI	p
Economic status	Better-off*	1	1	_	_
	Middle	1.4	1.4	1.0 - 1.8	<0.05
	Poor	1.9	1.8	1.3 - 2.5	<0.05
Ever been drunk	No*	1	1	_	_
	Yes	4.7	3.6	2.8 - 4.6	<0.001
Ever had premarital sex	No*	1	1	_	_
	Yes	6.2	2.8	1.6 - 5.0	<0.001
	Refuse	1.1	1.3	0.8 - 2.2	0.26
Do now know the effect of tobacco in health	No*	1	1	_	_
	Yes	1.4	1.5	1.1 - 2.0	<0.05
Father smoke	No*	1	1	_	_
	Yes	1.4	1.3	1.1 - 1.7	<0.05
Brother smoke	No*	1	1	_	_
	Yes	3.7	3.0	2.2 - 4.2	<0.001
Close friends smoke	No*	1	1	_	_
		5.6	3.8	2.7 - 5.2	<0.001
*: Refference					
Hosmer and Lemenshow Test: p = 0.753					

The results from the table above showed that, living in a better-off families seemed to be a protective factor for adolescents aged 15 - 19. Adolescents living in middle families are 1.4 times more likely to be current smokers and adolescents living in poor families are 1.8 times more likely to be current smokers than those living in rich families. In the logistic model, using alcohol was still found to have a strong relationship with smoking behavior. Adolescents who have ever been drunk was found to be a risk factor. Adolescents who have ever been drunk are 3.6 times more likely to be current smokers than those who have never been drunk. In the crude association, adolescents who have had premarital sex are 6.2 times more likely to be current smokers than those who had not. However, in the logistic model, this OR reduce to 2.8 means that adolescents who have had premarital sex are only 2.8 times more likely to be current smokers than those who had not. Meanwhile, those who refuse to answer about their premarital sex behavior still do not have any difference with those who had not had premarital sex in term of smoking behavior. The findings showed that, not so much difference with the crude association presented above, adolescents aged 15 - 19 who do not know the

effects of tobacco on health are 1.5 times more likely to be current smokers than others. Interestingly, among three family's variables were put in the model (anyone in the family smoke, father smoke, and brother smoke - which have statistically association with smoking behavior of adolescents), only two variables remain statistically associated with smoking behavior of adolescents (anyone in the family smoke, and brother smoke). Adolescents whose fathers smoke are 1.3 times more likely to be current smokers than those whose fathers do not smoke. Living with a brother who smoke increases the risk of becoming current smokers up to 3.0 times for male adolescents aged 15 - 19. The strongest factor was found to have associated with smoking behavior of male adolescents aged 15 - 19 is having close-friends who smoke. Those who have close-friends who smoke are 3.8 times more likely to be current smokers than those whose close-friends do not smoke.

3.4.3 Young male adults aged 20 - 24
3.4.3.1 Individual factors

Table 14: Currently smoking behavior and individual factors for young male adults aged 20 - 24

Demographic characteristics		Currently smoking	OR	95% CI	p, χ²
Area (1323)	Towns (616)	289 46.9%	1	_	_
	Communes (707)	339 47.9%	1.04	0.84 - 1.3	p = 0.71, χ² = 0.14
Marital status (1335)	Single (1156)	536 46.4%	1	_	_
	Ever married (179)	101 56.4%	1.5	1.1 - 2.0	p < 0.05, χ² = 6.3
Educational level (1323)	College and higher (149)	50 33.6%	1	_	
	Vocational (261)	120 46.0%%	1.7	1.1 - 2.6	p < 0.05, χ² = 6.0
	High school (432)	214 49.5%	1.9	1.3 - 2.9	p < 0.05, χ² = 11.4
	Secondary (429)	214 49.9%	2.0	1.3 - 2.9	p < 0.05, χ² = 11.9
	Primary and below (52)	30 57.7%	2.7	1.4 - 5.2	p < 0.05, χ² = 9.4
Economic status (1305)	Rich (420)	188 44.8%	1	_	_
	Middle (510)	228 44.7%	1.0	0.77 - 1.3	p = 0.99, χ² = 0.0
	Poor (375)	204 54.4%	1.5	1.1 - 1.9	p < 0.05, χ² = 7.3
Do not know the effect of tobacco in health (1335)	No (1121)	516 46.0%	1	_	_
	Yes (214)	121 56.5%	1.5	1.1 - 2.0	p < 0.05, χ² = 8.0

Demographic characteristics		Currently smoking	OR	95% CI	p, χ^2
Ever finish a glass of beer (1317)	No (183)	44 24.0%	1	_	_
	Yes (1134)	583 51.4%	3.3	2.3 - 4.8	p < 0.001, $\chi^2 = 47.3$
Ever been drunk (1244)	No (460)	145 31.5%	1	_	_
	Yes (784)	449 57.3%	2.9	2.3 - 3.7	p < 0.001, $\chi^2 = 77$
Ever had premarital sex (1335)	No (1048)	460 43.9%	1	_	_
	Yes (218)	147 67.4%	2.6	1.9 - 3.6	p < 0.001, $\chi^2 = 40.0$
	Refuse (69)	30 43.5%	0.98	0.60 - 1.6	p = 0.95, $\chi^2 = 0.005$

The table 14 presented the crude associations between individual factors and smoking behavior among young male adults aged 20 - 24 at CHILILAB. The findings showed that, in the line with group adolescents aged 10 - 14 and group adolescents aged 15 - 19, there is no significant difference of smoking behavior among young adults living in towns and those living in communes. Young male adults aged 20 - 24 who have ever been married are 1.5 times more likely to be current smokers than single young male adults. The binary analysis showed that, having a higher education (college or higher) is a protective factor for young male adults. In compare with young male who are in college or higher, young adults who are in vocational centers are 1.7 times; those whose educational level are high school are 1.9 times; those whose educational level are secondary are 2.0 times; and those whose educational level are primary or lower are even 2.7 times more likely to be current smokers. While there is no significant difference in prevalence of current smokers between those living in rich families and those living in middle families, it was found that young male adults aged 20 - 24 living in poor families are 1.5 times more likely to be current smokers than those living in rich families. Similar with the finding in adolescents aged 15 - 19, young male adults who do not know the effects of tobacco on health are 1.5 times more likely to be current smokers than others. In this binary analysis, using alcohol behaviors were found to have strong associations with smoking behavior. Young male adults who have ever finished a glass of beer are 3.3 times; and those who have ever been drunk are 2.9 times more likely to be current smokers than those who have never finished a glass of beer and those who have never been drunk. Having premarital sex was also found to have a strong association with smoking behavior. The finding showed that young male adults who have had premarital sex are 2.6 times more likely to be current smokers than those who have not. In term of smoking behavior, no significant association was found between those who refuse to answer about their premarital sex behavior and those who have not had premarital sex.

3.4.3.2 Friend and family level

Table 15: Currently smoking behavior and family and peer factors for young male adults aged 20 - 24

Characteristics		Currently smoking	OR	95% CI	p, χ²
Anyone in the family smoke (1335)	No (533)	204 38.3%	1	–	–
	Yes (802)	433 54%	1.9	1.5 - 2.4	p < 0.001, χ² = 31.7
Father smoke (1335)	No (775)	360 46.5%	1	–	–
	Yes (560)	277 49.5%	1.1	0.9 - 1.4	p = 0.28, χ² = 1.18
Brother smoke (1335)	No (1079)	461 42.7%	1	–	–
	Yes (256)	176 68.8%	2.9	2.2 - 3.9	p < 0.001, χ² = 56.2
Mother smoke (1335)	No (1330)	634 47.7%	1	–	–
	Yes (5)	3 60.0%	1.6	0.3 - 9.9	p = 0.92, χ² = 0.01
Sister smoke (1335)	No (1331)	634 47.6%	1	–	–
	Yes (4)	3 75.0%%	3.3	0.3 - 31.8	p = 0.27, χ² = 1.2
Wife smoke (179) (only used for married males)	No (159)	83 52.2%	1	–	–
	Yes (20)	18 90%	8.2	1.8 - 36.7	p < 0.05, χ² = 8.8
Cigarettes available in the house (1287)	No (955)	436 45.7%	1	–	–
	Yes (332)	186 56.0%	1.5	1.2 - 1.9	p = 0.001, χ² = 10.6
Close friends smoke (1259)	No (240)	64 26.7%	1	–	–
	Yes (1019)	549 53.9%	3.2	2.3 - 4.4	p < 0.001, χ² = 57.6

The table above presented the crude associations between family's and peer's factors and smoking behavior of young male aged 20 - 24 at CHILILAB. The findings showed that, young male adults aged 20 - 24 living with smokers in the family are 1.9 times more likely to be current smokers than those living with non-smokers. However, the findings also indicated that, living with father who smoke, mother who smoke, or sister who smoke was not significant associated with the smoking behavior of young male adults. Young male adults living with brothers who smoke are 2.9 times more likely to be current smokers than those whose brothers are non-smokers. Interestingly, among those who are married, up to 90% of young male adults whose wives smoke are current smokers. While in those whose wives do not smoke, the prevalence of current smoker is only 52.2%. Young male adults whose wives smoke are 8.2 times more likely to be current smoker than those whose wives do not smoke. According to the binary analysis, the availability of tobacco at home would increase the chance of an young male adults to be current smoker up to 1.5 times. Last but not the least, young male adults whose close-friends smoke are 3.2 times more likely to be current smokers than those whose close-friends do not smoke.

3.4.3.3 Logistic regression model

All the variables were found statistically significant associated with smoking behavior of young male adults aged 20 - 24 were put into the logistic regression in order to build a model to predict the smoking behavior in young male adults. Twelve variables met the requirement are: Ever finished a glass of beer, ever been drunk, ever had premarital sex, do not know the effect of tobacco in health, anyone in the family smoke, brother smoke, wife smoke, close friends smoke, educational level, marital status, household economic status, and the availability of tobacco at home. However, only ten variables were put into the logistic regression model. Two variables were excluded are wife smoke, and anyone in the family smoke. The reason is among 1380 young male adults aged 20 - 24, only 192 have wives, so if the variable "wife smoke" was put in the model, it might effect the result. The variable "anyone in the family smoke" was a sum of the following variables: father smoke, mother smoke, sister smoke, brother smoke, wife smoke. Moreover, the finding from the binary analysis indicated that among young male adults, having brother smoke is the only variable among those had significant association with their smoking behavior. Backward step wise was used, three variables from the ten initial variables were excluded which are: marital status, household economic status, and the availability of tobacco at home. The final model was presented in the table below, the OR were calculated taken into account other variables in the model. The Hosmer and Lemenshow test was carried out to evaluate the goodness of fit of the model.

Table 16: Logistic model to predict smoking behavior among young male adults aged 20 - 24

Characteristics		Crude OR	OR	95% CI	p
Ever finished a glass of beer	No*	1	1	_	_
	Yes	3.3	1.7	1.1 - 2.7	<0.05
Ever been drunk	No*	1	1	_	_
	Yes	2.9	1.9	1.4 - 2.6	<0.001

Characteristics		Crude OR	OR	95% CI	p
Ever had premarital sex	No*	1	1	_	_
	Yes	2.6	2.2	1.6 - 3.2	<0.001
	Refuse	0.98	1.0	0.5 - 1.9	0.99
Do not know the effect of tobacco in health	No*	1	1	_	_
	Yes	1.5	1.5	1.1 - 2.2	<0.05
Brother smoke	No*	1	1	_	_
	Yes	2.9	2.3	1.7 - 3.2	<0.001
Close friends smoke	No*	1	1	_	_
	Yes	3.2	2.5	1.7 - 3.5	<0.001
Educational level	College and higher	1	1	_	_
	Vocational	1.7	1.8	1.1 - 2.8	<0.05
	High school	1.9	1.8	1.1 - 2.7	<0.05
	Secondary	2.0	2.1	1.4 - 3.4	<0.05
	Primary and below	2.7	4.1	1.9 - 8.6	<0.05
*: Refference					
Hosmer and Lemenshow Test: p = 0.721					

The table above was the model to predict smoking behavior among young male adults aged 20 - 24 at CHILILAB. The results showed that, alcohol use is a risk factor toward smoking behavior. Young adults who have ever finished a glass of beer are 1.7 times more likely to be current smokers than those who have not. Plus, young male adults who have ever been drunk are even 1.9 times more likely to be current smokers than those who have never been drunk. Having premarital sex was also found to be a risk for young male adults in term of smoking behavior. Young male adults who have had premarital sex are 2.2 times more likely to be current smoker than those who have not. Meanwhile, those who refuse to answer about their premarital sex behavior still do not have any difference with those who had not had premarital sex in term of smoking behavior. The findings showed that, young male adults aged 20 - 24 who do not know the effects of tobacco on health are 1.5 times more likely to be current smokers than others. The only family's variable remains in the final model is brother smoke. Young male adults aged 20 - 24 having a brother who smoke are 2.3 times more likely to be current smokers than those whose brother do not smoke. Having close-friends who smoke also increases the chance to be current smoker of a young male adult up to 2.5 times. Education was found to be strongly associated with smoking behavior among young male adults aged 20 - 24. Young males adults whose educational level is primary or below are 4.1

times more likely to be current smokers than young males adults whose educational level is college or higher. Compare to young male adults whose educational level is college or higher, those whose educational level are secondary are 2.1 times, those whose educational level are high school and vocational centers are 1.8 times more likely to be current smokers. Thus, having a high educational level was found to be a protective factor for young male adults aged 20 - 24.

CHAPTER 4: DISCUSSIONS AND LIMITATIONS

4.1 General

Representativeness of the sample
Chilinh, Haiduong is an urbanizing area in the north of Vietnam. The sample of CHILILAB is not be representative for the whole country but for areas where economy has been growing at a rapid speed. However, due to its characteristics, it is an interesting place to do research in order to find the protective and risk factors for health problems in the context of sharp economic increase. Although, this study was only one module of the whole adolescent health's longitudinal study. Therefore, it presents as a cross-sectional study.

Comparison with the national level
According to SAVY (Minister of Health, 2005), only 1.2% young women aged 14 – 24 in the whole sample ever tried to smoke. Meanwhile, this study indicates that, in CHILILAB, more women reported that they ever tried to smoke than the national prevalence. The prevalences of female adolescents aged 10 – 14, aged 15 – 19, and young female adults aged 20 – 24 reported that they tried to smoke is 2.3%, 4.8%, and 4.9% respectively. However, the prevalence of current smokers among female adolescents and youth at CHILILAB remains at 1% (70 participants). This fact indicates that smoking is not yet an issue for female adolescents / youth in CHILILAB as well as in Vietnam. This issue is totally different from the developed countries in which the smoking behavior among males and females are quite similar, or the prevalence of current smokers among males is just slightly higher than among females (Pokorny et al., 2004, Epstein et al., 1998, Valente et al., 2005). Because of the small sample size in this study, no further analysis of female smoking behavior was done.

Age at first cigarette
The findings from the study show that, among young male adults aged 20 – 24, the average age for the first cigarette was 18.4 years old, higher than SAVY found (Minister of Health, 2005) which was 16.9 years old. However,   the sample of SAVY is adolescents and young adults aged 14 – 25 while in this study, the sample covers all adolescents and young adults aged 10 – 24. Also, the SAVY report did not specify clearly how the average age for the first cigarette was calculated (whether they only calculate for the older group or they calculate for the whole sample – which would reduce the average age for the first cigarette). Although the average age of first cigarette is 18.4 (for group male youth aged 20 – 24), the graph 3.6 shows that, during the period 15 – 19, the prevalence of adolescents who tried to smoke sharply increased (18.3% among 15 years old to 52.2% among 19 years old). The prevalence of current smokers also sharply increased during that period – from 6.6% among 15 years old to 33.8% among 19 years old. One possibility to explain this fact is that it might due to the difference of generations. As the older generation (20 - 24 years of age) might started to smoke later than the younger generation (15 - 19). However, with the available variables, no firm conclusion can be made.

Difference between urban and rural area
In CHILILAB, four communes have the characteristics of rural area while three towns have the characteristics of urban area. It is because of the urbanization process in Chilinh at the moment. However, it was found that there was no significant difference in the prevalence of current smokers between towns and communes. This finding is similar to SAVY (Minister of Health, 2005) in which the rate and patterns of smoking behavior are quite similar between rural and urban males. Moreover, in a study measuring the associations between "metropolitan status" and adolescents' substance use behaviors, Levine and Coupey

concluded that "urban" is not an independent risk factor and we should use other characteristics to predict adolescents' substances use behavior (Levine and Coupey, 2003).

Household economic status
Household economic status was measured based on 12 features which were already presented in chapter III. As was presented in chapter 3, the economic status did not appear to be a significant factor.

"Try to quit" behavior
Among current smokers, the prevalence of participants reported that they had tried to quit smoking is quite high - 40.3%, 54.5%, and 56.6% for male adolescents aged 10 - 14, male adolescents aged 15 - 19, and young males aged 20 - 24 respectively. This finding indicates that intervention's activities are necessary and meet the needs of the local adolescents / youth.

4.2 Risk factors for smoking behavior among male adolescents aged 10 - 14

Individual factors:
The logistic model to predict smoking behavior for male adolescents aged 10 – 14 consisted two variables which are close-friends smoke and ever finish a glass of beer. P-value for Hosmer and Lemeshows test of 0.991 suggested that this is a model with good predictive value. Male adolescents aged 10 – 14 who have ever finished a glass of beer are 2.8 times more likely to be current smokers than those who have not. This finding was supported by the study of D'Amico among 974 adolescents aged 10 – 15 in America, which indicated that there was a strong relationship between alcohol consumption behavior and smoking behavior(D'Amico and McCarthy, 2006). However, the relationship between smoking and drinking might be bi-directional: smoker adolescents tend to drink more than non-smoker adolescents as well as drinker adolescents tend to smoke more than non-drinker adolescents. From the bivariate analysis, significant association between ever been drunk and smoking behavior of male adolescents aged 10 – 14 was found. However, this variable was excluded from the final logistic model. The reason for this fact might be the ever been drunk cases was not enough.

Family and peer factors:
Literature shows that for young adolescents, parental smoking – especially mother smoking is a risk factor for smoking behavior (Otten et al., 2009, Griesler and Kandel, 1998, Rosendahl et al., 2003). However, in this study parental smoking was found non-significantly associated with currently smoking behavior among male adolescents aged 10 – 14. The explanation of this difference could be: first of all, number of male adolescents whose mothers smoke is very low therefore there no significant difference was found. Secondly, at Chilinh, based on my experience working there as the supervisor with the task is to go to local house to double check the questionnaires, quite a large number of the husbands (adolescents' fathers) are working in big cities such as in Hanoi, Hochiminh city, or Hai Phong, and Quang Ninh and only visit home once or twice a year. Therefore, the smoking status of fathers might not affect the smoking behavior of sons. The finding in this study was also supported by the results of Olvera et al. The study was conducted in 170 Latino parents and 85 index children aged 9 – 13 with the result indicated that parental smoking was not significant related to children's smoking behavior (Olvera et al., 2006). Having a sibling who smokes was also found as a risk factor for smoking behavior of adolescents (Olvera et al., 2006). However, findings from my study revealed that there was a non-significant association between having a brother who smoke s and smoking behavior of male adolescents aged 10 – 14. The number of male adolescents whose brother smoke was only 4, which means the sample for the subgroup is quite small to make a difference.

In line with other studies in the world (Otten et al., 2009, Pokorny et al., 2004, Griesler and Kandel, 1998, Olvera et al., 2006) which indicated that having close-friends who smoke or having friends who smoke would increase the chance of using tobacco among young adolescents, the findings in this study showed that having close-friends who smoke would make male adolescents aged 10 – 14 up to 3.1 times more likely to be current smokers than others. This makes having close-friends who smoke the strongest factor affecting the smoking behavior of male adolescents aged 10 – 14.

Other risk factors which were not mentioned in this study for smoking behavior among young adolescents aged 10 – 14, but were found in literature might be life stress(Liu, 2003), popularity among peers (Valente et al., 2005), perceived peer pressure to smoke(Griesler and Kandel, 1998).

4.3 Risk factors for smoking behavior among male adolescents aged 15 - 19

From the bivariate analysis, nine variables were found to be significant associated with smoking behavior of male adolescents aged 15 – 19 at CHILILAB. Among those, eight variables were put in the logistic regression procedure (one variable was excluded with the explanation was presented in chapter 3). Seven were retained after the analysis. Hosmer and Lemeshow test was carried out to test the goodness of fit of the model. The p-value of 0.753 suggests that it is a model with good predictive value.

Individual factors:
Two protective factors were found. The first protective factor is coming from the rich family. In other words, adolescents coming from poor family are more likely to be current smokers than others. In literature, only two studies were found to have analysis of the association between household economic status and adolescent's smoking behavior which are the study of Hill et al and the study of Ozer and Fernald. The study of Ozer and Fernald was conducted with 3922 adolescents aged 15 – 19 and their mothers in Mexico about the adolescent's alcohol and tobacco use (Ozer and Fernald, 2008). They found that there is no significant association between family income and adolescents' smoking behavior. However, the sample of Ozer and Fernald study was participants from poor, rural communities in seven Mexican states. Therefore, the family incomes of participant might not vary much. My findings were supported by the study of Hill et al which indicated that poverty has a significant association with smoking behavior of adolescents (Hill et al., 2005).
The second protective factor found in my study is the awareness of the effect of tobacco in health. Male adolescents aged 15 – 19 who do not know about the effect of tobacco in health are 1.5 times more likely to be current smokers than others. This finding was supported by Muilenburg and Legge, who pointed out that when youth are aware of the danger of tobacco, they tend to avoid cigarette smoking (Muilenburg and Legge Jr, 2008). The same result was also documented in studies in other parts of the world (Naing et al., 2004, Mathur et al., 2008). Ever been drunk was found to have a strong relation with smoking behavior among male adolescents aged 15 – 19 in CHILILAB. Male adolescents who have ever been drunk are 3.6 times more likely to be current smokers than others. This finding was supported by other studies in different settings (Ritchey et al., 2001, Taylor et al., 2004). In line with Holowaty whom pointed out that adolescents who are sexually active are 4.1 times more likely to be current smoker than others (Holowaty et al., 2000), in my study "ever had premarital sex" also was found to be significantly associated with smoking behavior. However, the relationship between these risk behaviors seemed to be bi-directional.

Family and peer factors:
Among family factors, two were identified as risk factors for male adolescents aged 15 – 19 to be current smokers are having fathers smoke and having brother smoke. Although, having a father who smoke only increases the risk of becoming current smokers among adolescents to 1.3 times while having a brother who smoke increases the risk of becoming current smokers up to 3.0 times. This fact can be explained as the time fathers stay at home with their kids is limited; most of them working in big cities. At the same time, brothers are tend to stay with them the whole time. Therefore, the smoking status of brothers might affect adolescents' behavior more than the smoking status of fathers who most of the time are not at home. Results from many other studies indicated parental smoking behavior as a risk factor for adolescents (Holowaty et al., 2000, Wong et al., 2008, Hill et al., 2005, Rajan et al., 2003, Wen et al., 2005). However, all of the studies mentioned above do not separate the role of father's smoking and the role of mother's smoking but put them together as parental smoking behavior. Keeping in mind that, these studies were carried out in Canada, New Zealand, American, and Taiwan respectively where the smoking behavior among males and females are not as difference as in Vietnam. The same issue applies for sibling's smoking behavior (merging brother's smoking behavior and sister's smoking behavior)(Rajan et al., 2003, Hill et al., 2005).

From the logistic model, having close-friend who smoke was found to be the strongest risk factor for smoking behavior among male adolescents aged 15 – 19. The role of friend and close-friend (in specifically) in smoking behavior was well documented, and the effect of friends on male adolescents is stronger than on female adolescents (Wen et al., 2005, Taylor et al., 2004, Alexander et al., 2001, Koetting O'Byrne et al., 2002, Ali and Dwyer, 2009). However, what have not been mentioned in peer's factors in my study that I wanted to measure was how the friends' pressure(Ritchey et al., 2001), how adolescents perceived smoking norm (Chen et al., 2006), and how percentage of friends who smoke(Koetting O'Byrne et al., 2002, Alexander et al., 2001) affect the smoking behavior among male adolescents.

4.4 Risk factors for smoking behavior among young male aged 20 – 24

Ten among twelve variables which had significant association with smoking behavior among young male adults aged 20 – 24 were put into the logistic regression process (chapter 3). Only seven variables retained which are: Ever finished a glass of beer, ever been drunk, ever had premarital sex, do not know the effect of tobacco in health, brother smoke, close friends smoke, and educational level of participants. Hosmer and Lemeshow test was carried out to test the goodness of fit of the model. With the p-value of 0.721 suggesting that it is a model with good predictive value.

Individual factors:
The same results as for adolescents male aged 15 – 19 were found in this group. Alcohol use behaviors (ever finished a glass of beer and ever been drunk); premarital sex behavior, and do not aware of the effect of tobacco in health were found to be risk factors for smoking behaviors among young male adults aged 20 – 24. Moreover, in the line with Turker et al, the study's results indicated that young male adults who are low educational level are at more risk of becoming current smokers than young male adults who are in college or higher (Tucker et al., 2003).

Family and peer factors:
The results from the study showed that, among young male adults aged 20 – 24, having brother who smoke is the only family risk factor. Literature about risk factors related to

smoking behavior among young male adults especially for the age group 20 – 24 are quite limited.

Having close-friends who smoke was still found as an important risk factor even for young male adults. Those whose close-friends smoke are 2.5 times more likely to be current smokers than others. This finding was consistent with study of Turker et al about predictors of regular smoking behavior among young adults (Tucker et al., 2003).

4.5 Analyses of hypotheses

Hypothesis 1: Adolescents / youth whose family members are smokers are more likely to be currently smokers than others.

It was well documented that living with smokers in a family increases the risk for adolescents to be current smokers (Ali and Dwyer, 2009, Dornelas et al., 2005, Rajan et al., 2003). However, in my study, the associations between family member smoking status and adolescents' smoking behavior were found not so strong. Among male adolescents aged 10 - 14, the relationships between smoking status of brother; father and adolescents' smoking behavior were tested but no significant association was found. Although, keep in mind that in this setting most of the fathers have to work far from home. Thus the influence of fathers' smoking behavior might not affect the behavior of their sons. The same finding was found in the group young male adults aged 20 - 24. Only in male adolescents aged 15 - 19, the association between having father who smoke and adolescent's smoking behavior was found significantly. However, the odd ratio was not as strong as other factors (table 3.14). Living with brother who smoke was found to be a stronger risk factor for male adolescents / youth. It increases the risk of becoming current smokers among male adolescents aged 15 - 19 up to 3 times and among young male adults aged 20 - 24 up to 2.3 times. This findings make sense, since in this setting, brothers are supposed to live together in the same house. Therefore they have more time to be together and the brothers' smoking behavior might encourage adolescents to be involved in cigarrette smoking (Hill et al., 2005, Rajan et al., 2003). Findings of the study also pointed out that among male adolescents aged 10 - 14, there was non-significant association between having brothers who smoke and their smoking behaviors. However, in the total sample, only 4 male adolescents aged 10 - 14 reported that their brothers smoke.

There are aslo quite a few studies mentioned about the risk of having a smoker mother (Taylor et al., 2004, Ozer and Fernald, 2008). Regardless of the non significant association between living with mothers who smoked and adolescents' smoking behaviors, (the result might due to the limited number of adolescents whose mothers smoke), it can not conclude that mothers do not have any affect in their children's smoking behavior at all because in CHILILAB's setting, mothers are supposed to be the one who are closer to their children and spend more time with them than fathers.

Interestingly, findings from my study indicated that among married young male aged 20 - 24, living with wife who smoke has a very strong association with smoking behavior. In Vietnam, the prevalence of women who smoke is low, and in my opinion, most of women do not like to smoke or to breath the smoke. Thus, living with a non-smoker wife is seemed to be a protective factor to reduce the amount of cigarettes men smoke, or in other words it is a barrier for men to smoke (at least at home). Therefore, when a wife smoke, this "barrier" is no longer exist. However, this association was not mentioned in all the literature I had. Additional studies should be carried out to confirm this relationship.

Hypothesis 2: Adolescents / youth whose close-friends are smokers are more likely to be currently smokers than others; and hypothesis 4: having close-friends who smoke is the strongest risk factor related to smoking behavior among adolescents / youth.

As hypothesized, male adolescents / youth whose close-friends are smokers are more likely to be current smokers than others. This finding was confirmed in the whole three groups. Having close-friends who smoke increase the risk to be current smokers up to 3.1 times for male adolescents aged 10 - 14, up to 3.8 times for male adolescents aged 15 - 19, and up to 2.5 times for male adults aged 20 - 24. I hypothesized that having close-friends who smoke would be the strongest risk factor because for younger age-groups, most of the time they spend is with peers (studying at school, hanging around after school). Fathers of the participants are supposed to work far from home, and their mothers have to take care of all the domestic work as well as their jobs. Therefore, the connectedness among them is supposed to be low. Moreover, it is well documented that adolescence period is the "vulnerable" period for them to be affected by peer (Ferreira and Torgal, 2010).

Hypothesis 3: Adolescents / youth who are involved with other risk behaviors (alcohol use, premarital sex) are more likely to be current smokers than others
The hypothesis was based on two main facts. First, there is a was well documented relationship among risk behaviors (smoking, alcohol use, premarital sex) (Lee et al., 2006, Roberts and Tanner, 2000, Htay et al., 2010, Minister of Health, 2005); and second, based on my observation, CHILILAB is a place where for adolescents and youth, there is a lack of places and things to entertain. So most of the time adolescents / youth hang out, they often go to bars or coffee shops where tobacco and alcohol can be easily accessed. From these places, risk behaviors could be discussed and peer's pressure was received. The findings from my study once again confirmed the hypothesis, except for male adolescents aged 10 - 14 (among whom the prevalence of premarital sex was very low), premarital sex was found to have a very strong association with smoking behavior and in all three groups, and alcohol use was found to have a strong association with smoking behavior as well.

4.6 Limitations

The study has a number of limitations. First of all, the data used for the analysis only come from one module of the longitudinal study. Thus, it can be seen as a cross-sectional study in which causal – relationship is not possible to be revealed. Second, this study was a secondary analysis. There were interesting variables which were not included in the questionnaire, therefore interesting factors could not be measured. For examples, I wanted to investigate more about how peer's factors such as pressure from peer, percentage of friends who smoke, or the smoking norm the participant perceived affect their smoking behavior. Or in family's factors, there were factors that I wanted to take into account in the analysis such as the connectedness between parents and children, or parenting style but I could not because of the unavailability of the variables. Third, literature about smoking behavior among young male adolescents aged 10 – 14 and among young male adults aged 20 – 24 are quite rare to find. Therefore, comparison in this group was quite limited. Also, studies with the exact sample are limited, so comparisons I made based on the similarity of the study's sample. For example, the results from a study among male adolescents aged 15 – 20 was used to compared with the group male adolescents aged 14 – 19 in this study.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions:

At CHILILAB, smoking behavior is more common among males than for females. Among females adolescents aged 10 - 14; females adolescents aged 15 - 19; and females youth aged 20 - 14, the prevalence of "ever tried to smoke" behavior is 2.3%, 4.8%, and 4.9% respectively. However, the prevalence of current smokers among female participants is just only 1.1%.

In general, the prevalence of current smoker is totally different by age groups and by gender. The prevalence of current smoker for three groups (by age) is 1.9%; 9.5%; and 22.2% respectively. Only 1.1% of female are current smokers while among males, this rate is up to 19.1%. Smoking is seemed not to be an urgent problem for female adolescents / youth at CHILILAB.

The average age of the first cigarette is 18.4 (only analyzed for the group 20 - 24 years of age), which is higher than the national level. However, graph 6 indicates that during the period 15 - 19 years of age, the prevalence of "ever tried to smoke" behavior as well as the prevalence of current smokers sharply increases. This fact might due to the difference between generations (male 20 - 24 years of age versus male adolescents aged 15 - 19). However, in order to confirm this fact, additional studies should be carried out.

The prevalence of "ever tried to smoke" behavior among male adolescents aged 10 - 14, male adolescents aged 15 - 19, and male youth aged 20 - 24 is 6.6%, 33.9%, and 65.8% respectively. The prevalence of current smoker among these groups is 2.9%, 18.0%, and 47.7% respectively. So the prevalence of current smokers among male youth aged 20 - 24 alone is as equal to the prevalence of current smoker of Vietnamese male adults in 2005 (Pfizer Facts, 2008). Therefore, nescessary activities should be implemented in order to deal with the smoking problem among male adolescents / youth at CHILILAB.

For male adolescents aged 10 - 14, it was found that risk factors for smoking behavior is alcohol use and having close-friends who smoke. Some family's variables were tested but none of them have significant association with smoking behavior of these participants. Having close-friends who smoke was found to be the strongest risk factor related to the smoking behavior of male adolescents aged 10 - 14. Thus, "vulnerable" group among male adolescents aged 10 - 14 is adolescents who use alcohol as well as who have close-friends smoke. These two factors should be concerned for designing intervention's activities for this group.

For male adolescents aged 15 - 19, family's factors that affect their smoking behavior are having father who smoke and having brother who smoke. In these two associations, the association between having brother who smoke and adolescents' smoking behavior was found to be stronger than the association between having father who smoke and adolescents' smoking behavior (OR = 3.0 versus OR = 1.3). This finding can be explained as in general, most of the fathers have to work far from home and therefore have less time spending with their children than adolescents' brothers. Individual risk factors for this group are alcohol use ("ever been drunk"), ever had premarital sex, do not know about the effects of tobacco on health, and living in poor families. Among all of the risk factors, having close-friends who smoke was found to be the strongest factor that affects the smoking behavior of male adolescents aged 15 - 19 (OR = 3.8). Besides, this group was found to be the most "vulnerable" group since the prevalence of "ever tried to smoke" behavior as well as the prevalence of current smoker is sharply increasing - from 18.3% ever tried to smoke at the age of 15 to 52.2% at the age of 19 and from 6.6% current smoker at the age of 15 to 33.8% at the age of

19. To sum up, factors that should be tackled to reduce smoking prevalence in this group are: peer's factor which is having close-friends who smoke, family's factor which is having a brother who smokes, and individual factors which are: alcohol use, premarital sex, do not aware of the harmfulness of tobacco, and living in poor family. Therefore, not only tobacco but also other individual risk factors (alcohol us, premarital sex) as well as peer network and IEC (information, education, communication) should be concerned in the intervention's activities.

For young male adults aged 20 - 24, it was found that among family's factors, having brother who smoke is the only risk factor that increase the chance to be current smokers. Among individual factors, alcohol use ("ever finish a glass of beer" and "ever been drunk"), premarital sex, do not know about the effects of tobacco on health, and educational level were found to be the risk factors. Young male adults with low educational level, especially those whose educational level is primary or below are up to 4.1 times more likely to be current smokers than those whose educational level is college or higher. Having close-friends who smoke was also found to be one of the strongest factor (only weaker than educational level - compare whose educational level is primary or lower and those whose educational level is college or higher). Interestingly, among male youth aged 20 - 24 who are already married, living with wife who smoke was found to be a very strong risk factor. The crude odd ratio was found to be 8.2, means that those living with wife who smoke are 8.2 times more likely to be current smokers than others. However, the sample of this group is small (only 20 male youth aged 20 - 24 have wives who smoke). Additional studies should be carried out to confirm this relationship. To conclude, among male adults aged 20 - 24, smoking behavior is quite common. Risk factors should be concerned in this group are: peer's factor which is having close-friends who smoke; family's factor which is having a brother who smoke; and individual factors which are: alcohol use ("ever finished a glass of beer" and "ever been drunk"), premarital sex, do not aware the harmfulness of tobacco, and educational level. Once again, this fact suggests intervention's activities should concerned not only tobacco but also other risk behaviors (alcohol use and premarital sex) as well. IEC should be concerned as one of the activities since about 20% of male adolescents / youth still do not aware of the effects of tobacco in health.

The difference of current smoker's prevalence was found none significant between those living in communes and those living at towns. The same finding was found in SAVY report (Minister of Health, 2005) and the study of Levine and Coupey (Levine and Coupey, 2003). However, this fact might due to the variation between towns and communes at CHILILAB is not so much since they are located near each others and sharing a lot of common characteristics. Therefore, in other context, this relationship should be concerned.

Let's go back to the "National Tobacco Control Policy", of which objectives are: 1. Reduce the proportion of male smokers from 50% to 20%; 2. Reduce the proportion of female smokers to a level below 2%; 3. Reduce the proportion of young smokers (15 – 24 years of age) from 26% to 7%; 4. Protect the rights of non-smokers to breath clean, smoke-free air; and 5. Reduce tobacco-related losses for individuals, families, and society as a whole. Four among these (number 1, 3, 4, and 5) could not be discussed here due to the lack of information. At the time the study was carried out, the prevalence of current smokers among youth aged 15 - 24 at CHILILAB is 14.3%, which is as double as the policy's target. Further more, since 2006 till now, no anti-tobacco intervention was implemented in CHILILAB. Therefore, it is most likely that objective number 2 of the "National Tobacco Control Policy" was not accomplished at the end of 2010. Appropriate strategy should be developed to solve the smoking problem of adolescents / youth at CHILILAB in order to catch up with the objectives of the "National Tobacco Control Policy" for the next period.

5.2 Recommendations:

Based on my observations, tobacco products are sold openly in Chi Linh in specifically and in Viet Nam in general. Adolescents and youth can access to tobacco products easily. However, tobacco was known for the long term effects to people's health especially for adolescents and youth. Moreover, among adolescents and youth who are current smokers at CHILILAB, the prevalence of "ever try to quit smoking" is quite high: 40.3%; 54.5%; and 56.6% for male adolescents aged 10 - 14; male adolescents aged 15 - 19; and male youth aged 20 - 24 respectively. Therefore, appropriate interventions to control tobacco are in need and very important as well as necessary at CHILILAB at the moment.

The main target group of the intervention should be male adolescents aged 15 - 19 since in the period of 15 - 19 years of age, the prevalence of "ever try to smoke" behavior and the prevalence of current smokers increases rapidly. However, male adolescents aged 10 - 14 and young male adults aged 20 - 24 should not be ignored from the intervention.

Smoking behavior among male adolescents and youth at CHILILAB was found to be strongly associated with other risk behaviors such as alcohol use behavior and premarital sex. Therefore, in the intervention, it is very important to concern about these risk behaviors as well.

School staff should be involved in the intervention's activities since for the male adolescents aged 10 - 19, they spend quite an amount of time at school. Besides, school based tobacco-control activities would have the impact not only on adolescents but also their peer as well. Since peer was found to be a very important role in effecting smoking behavior among male adolescents / youth, activities such as publishing anti-tobacco club or making a peer support network should be implemented.

IEC should be used as the intervention's activity since the prevalence of participants who do not aware of the harmfulness of tobacco is still high (24.1% of male adolescents aged 10 - 14, 18% of male adolescents aged 15 - 19, and 15.9% of male aged 20 - 24). IEC should be implemented not only in school but also in the whole population since it was found that smoking behavior among male adolescents / youth is significantly associated with having anyone in the family who smoke. Therefore, IEC should be accessible not only for students but also their families as well.

One interesting association, which is the association between having a wife who smoke and smoking behavior among male adolescents aged 20 - 24, was found in the study. However in order to be confirmed, additional studies are needed. Additional study about the smoking behavior among female adolescents and youth is also needed since the prevalence of "ever tried to smoke" among female participants is higher than the national level, and it not yet be analyzed in my study due to the small sample size.

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ANNEXES

CHILILAB and Demographic-Epidemiology Surveillance System:
CHILILAB is a member of INDEPTH Network (the International Network for the continuos Demographic Evaluation of Population and their Health), functions as a community-based periodic Demographic-Epidemiology Surveillance System. CHILILAB was formally established in 2003 by Hanoi School of Public Health. The CHILILAB located at Chilinh (one district of Haiduong). Chilinh is located in the rapidly developed area within Hainoi - Haiphong - Quangning triangle, spreads out in an area of 300.54 square kilometers.
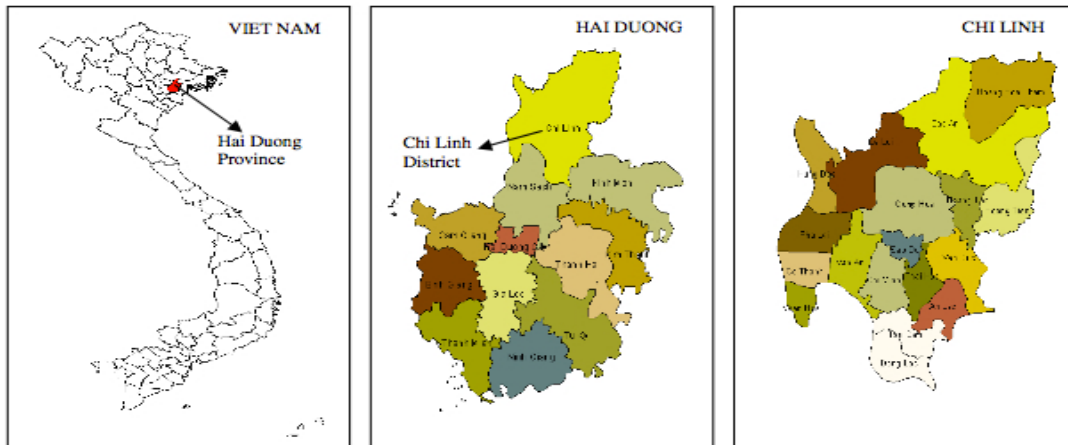
Graph 7: Maps of Viet Nam, Hai Duong Province, and Chi Linh District

Chilinh district contains contains 17 communes and 3 townships, of which 13 communes are in rural areas. However, CHILILAB covers only 3 townships and 4 communes which are under rapid process of urbanization. (More information about population)

The general objective of CHILILAB is to conduct demographic and health surveillance, research, and specialized public health training, which can serve as a basis for policy making in order to enhance the health status of the community and to build an international reputation for public health Vietnam by building and sustaining a demographic and epidemiological surveillance system. The Demographic-Epidemiologic Surveillance System (DESS) in 7 communes/towns has been implemented since July 2004 with the aim of providing a baseline dataset on population and community health. This dataset will be used for the evaluation of interventions. Data was collected using a household questionnaire for baseline and quarterly surveys until December 2005, and every 4 months since 2006.

**Organization structure of CHILILAB**
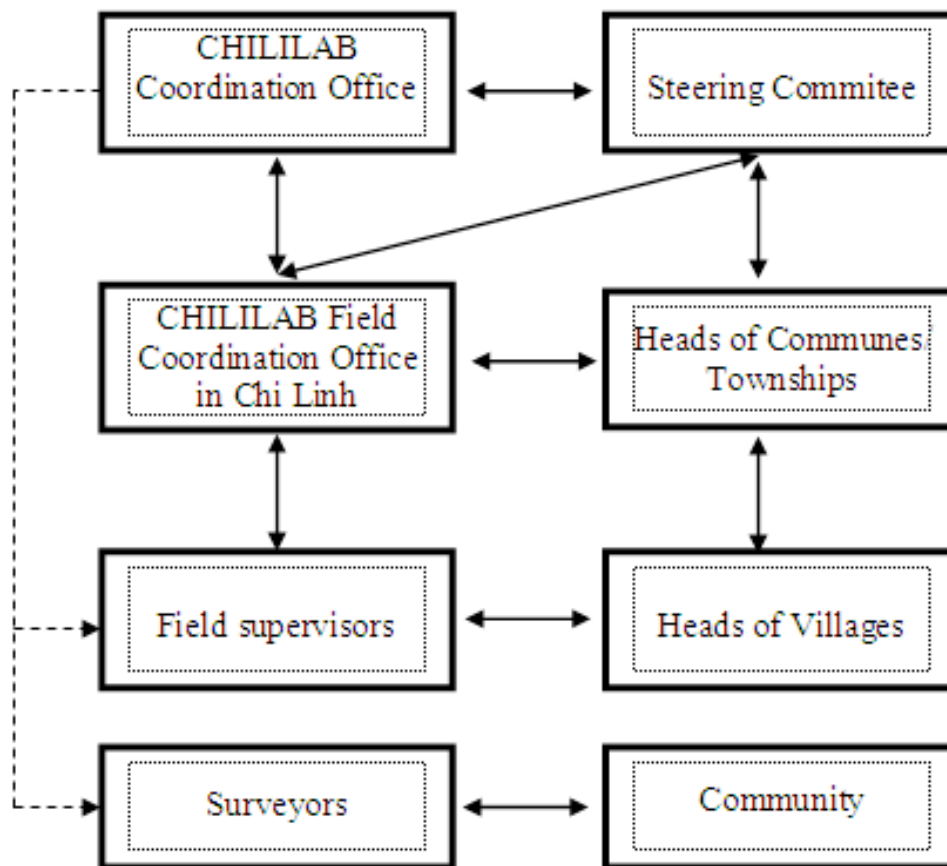
Graph 8: Organization structure of CHILILAB

CHILILAB is administered and implemented through collaboration between the HSPH and the District Health Center System of Chi Linh. In order to ensure the effectiveness and sustainability of the system, community involvement has been taken into serious consideration for establishing and running the field lab as well as applying outcomes generated from the field lab. Under the HSPH, the leadership and structure of CHILILAB include a Management Board, the Project Coordinating Office at HSPH, and the Project Coordinating Office in CHILILAB. Field supervisors and field surveyors work under the Project Office in CHILILAB. The Management Board, Project Office and CHILILAB field office are responsible for the management aspects of CHILILAB and the field supervisors and surveyors in collaboration with village heads are in charge of execution of the research. In addition, experts at HSPH make up a technical group responsible for assisting in research design, data analysis and dissemination of findings. In cooperation with the staff under the HSPH, the district authority (Vice District Chairperson in charge of social and cultural affairs, the District health center's management board), commune/township authority (vice chairperson), and village authority are involved in CHILILAB. There are about 30 surveyors, 10 field supervisors, and 4 data entry staffs working at the field.
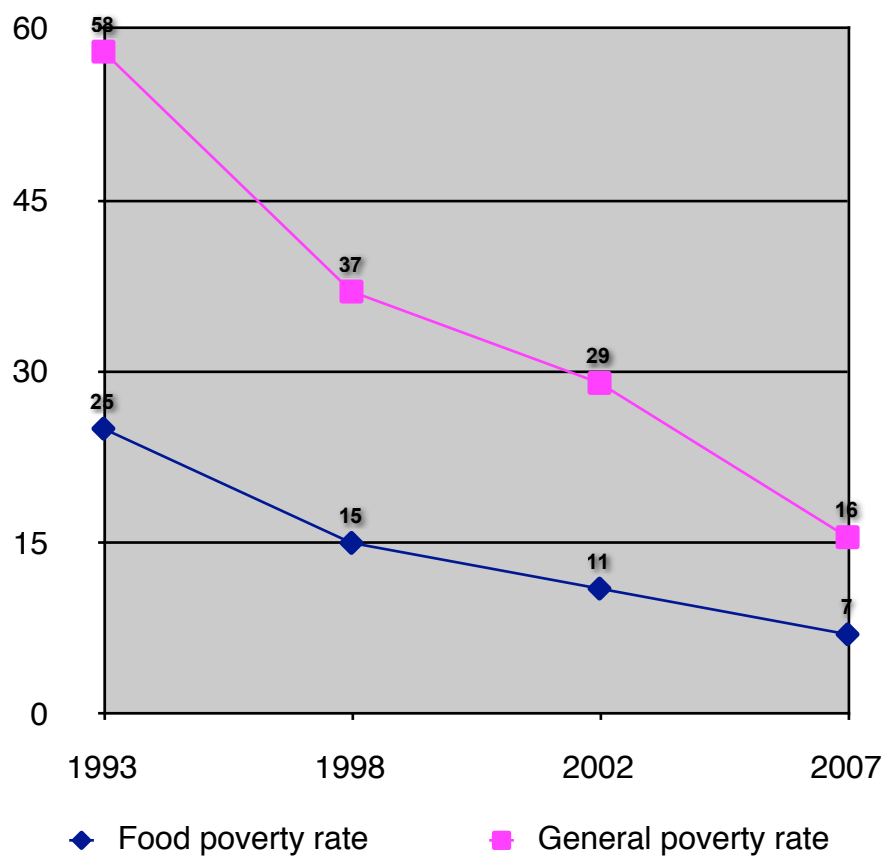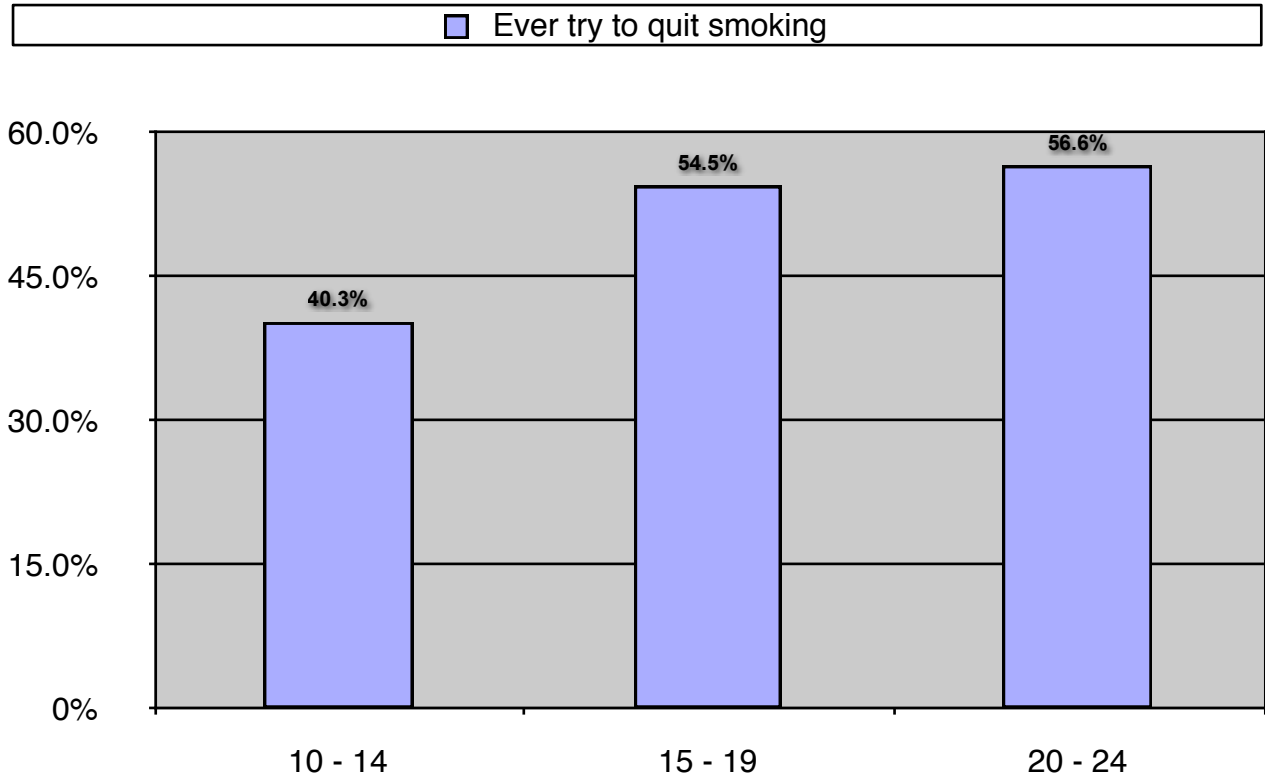
Graph 9: Food poverty rate and general poverty rate of Vietnam from 1993 - 2007
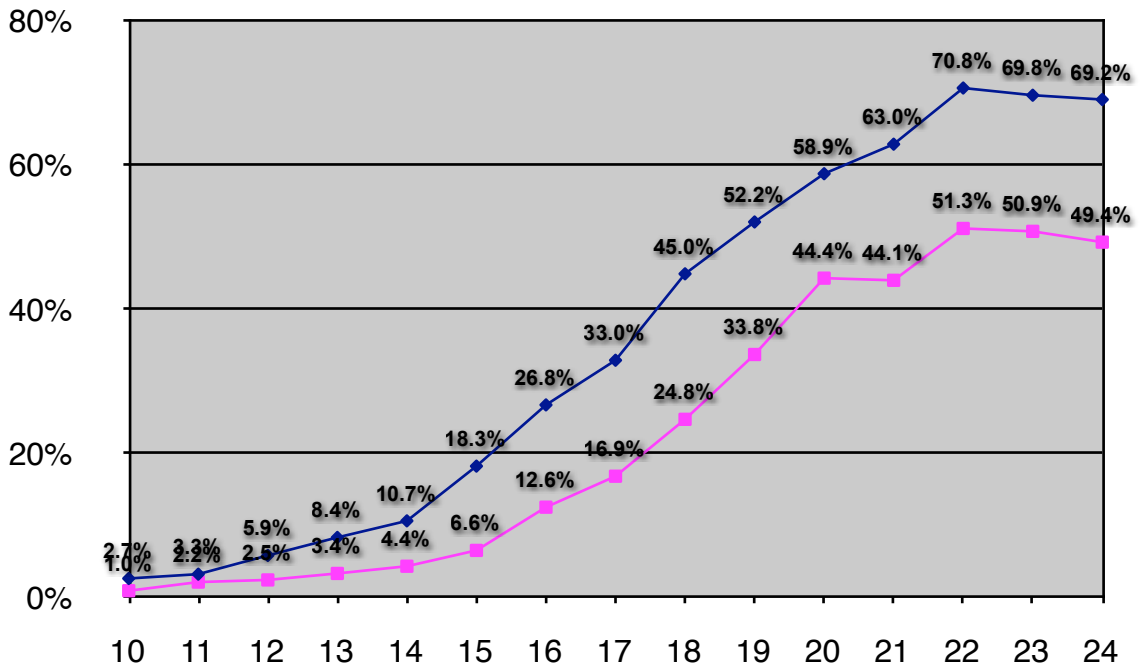
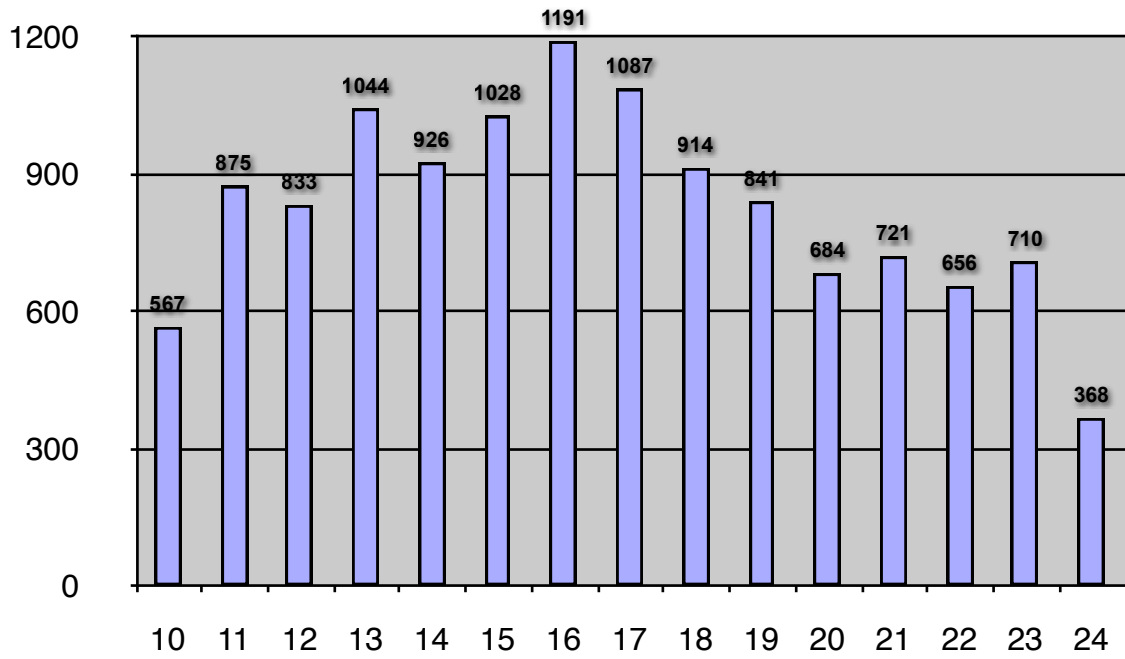**Graph 10: Prevalence of ever tried to smoke and currently smoker by age among males**

Legend: □ Ever try to quit smoking

Chart data:
- 10 - 14: 40.3%
- 15 - 19: 54.5%
- 20 - 24: 56.6%

Graph 11: Prevalence of "Ever try to quit smoking" behavior among male adolescents and youth

Distribution of the age of adolescents and youths at CHILILAB

Graph 12: Distribution of age