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Demographic and Socio-economic Determinants of Smoking Behavior: Evidence from Vietnam

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Abstract

Smoking is a leading cause for diseases and death. Information on factors affecting the smoking status is useful for policies on smoking reduction, especially in developing countries. This paper examines to what extent individuals' characteristics are correlated with the smoking status using a household survey in Vietnam. It is found that gender and age are the most crucial determinants of smoking. Middle-aged men is the main users of tobacco. Other important factors associated with the decision on smoking are education and employment. People with low education are more likely to smoke. Working people have a higher probability of smoking than non-working people. Marital status also matters to the smoking status. Being widowed increases the probability of smoking and reduces the probability of smoking cessation.

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1. Introduction

Smoking is one of the main causes for diseases and death. Around 5 million people died because of tobacco use (WHO, 2009a). Smoking have harmful effects on not only the users but also those exposed to second-hand smoke. It is estimated that around 600 thousand people are dead because of second-hand smoke every year (WHO, 2009a). In addition to the adverse effect on health, tobacco can lead to an increase in poverty, especially in developing countries (WHO, 2004). In developing countries, many poor households spend on tobacco more than food, shelter, healthcare and education.

Tobacco outputs have increase twice since the 1960s (*ASH, 2009*). There is a contrast trend in smoking between developed and developing countries. While tobacco consumption in most developed countries such as Britain, Canada, the United States, and Australia decreases, the tobacco consumption increases in developing countries (*ASH, 2009*). Smoking in developed countries and developing countries accounts for 29 percent and 71 percent of world tobacco, respectively (FAO, 2005). Men are much more likely to smoke than women. There are around one billion male smokers and 250 million female smokers (*ASH, 2009*). In developed countries, around 35 percent of men and 22 percent of women are smokers, while these figures in developing countries are 50 percent and 9 percent for male and female, respectively (Mackay and Eriksen, 2002). However, there is an increase in the smoking prevalence among women in some Asian countries such as Cambodia, Malaysia and Bangladesh (Mackay and Eriksen, 2002).

Understanding factors influencing the smoking status is of interest for policy makers as well as researchers. There are a large number of factors associated with smoking such as demographics, biology, intrapersonal characteristics and economic factors (Brannon and Feist, 1992; van Loon et al., 2005). Economic factors including the price of tobacco and taxation have a strong effect on cigarette demand (Chaloupka and Warner, 2000). The government plays an important role in reducing tobacco use through anti-smoking media campaigns and regulations on smoking restriction such as limitation of smoking in public places and restrictions on youth access to tobacco (Chaloupka and Warner, 2000).

There are a large number of empirical studies on determinants of smoking status and behaviors (e.g., Chaloupka and Wechsler, 1997; Smet et al., 1998; Chaloupka and Pacula, 1999; Gruber and Zinman, 2000; Bantle and Haisken-DeNew, 2002; Tauras, 2004; van Loon et al., 2005; Lim et al., 2010).¹ Most of studies use discrete choice models such as logit/probit models and multinomial logit models, and Hazard models to investigate the impact of different socioeconomic factors on individuals' choices on smoking status. Overall, most studies find that men are more likely to smoke than women, and people with lower education tend to smoke than those with higher education. However, there are not consistent findings on the sign as well as the

¹ For review of studies on economic determinants of smoking, see Chaloupka and Warner, 2000; Ross, 2002.

magnitude of the impact on smoking of several characteristics such as marital status, age and income (Göhlmann, 2007).

This paper aims to examine to what extent individuals' characteristics can affect or be associated with the decision on smoking status in Vietnam. The information can be helpful for policies on tobacco reduction. Vietnam is an interesting case for several reasons. Firstly, Vietnam is a developing country with the highest prevalence of smoking for men. Nearly half of men currently smoke (WHO, 2009b). Every year, smoking kills around 40 thousand people, three times higher than deaths from traffic (WHO, 2009b). Secondly, Vietnam has a very weak legal framework to reduce tobacco use and production. Smoking is not limited in public areas. People can smoke in office, home and almost any place with the presence of other people. Because of low taxation on tobacco, Vietnam is one of countries having the lowest price of tobacco (Nguyen Hung, 2010). Thirdly, there have been few studies on the effect of individuals' characteristics on individuals' smoking decisions in Vietnam. Two interesting studies focus on the effect of the tobacco price on smoking decisions in Vietnam are Laxminarayan and Deolalikar (2004) and Guindon (2009). Using Vietnam Living Standard Surveys in 1993 and 1998, Laxminarayan and Deolalikar (2004) found that increased prices of tobacco reduces the tobacco demand. However, an increase in cigarette prices does not lead to smoking cessation, but it can encourage smokers to use rustic tobacco. Using a survey of Vietnamese young people in 2003, Guindon (2009) found that higher tobacco prices can delay the smoking initiation among the teens and young adults.

The paper is structured into five sections. The second section presents the smoking prevalence in Vietnam. Next, the third and fourth sections present the method and results of the determinants of smoking status, respectively. Finally, the fifth section concludes.

2. Smoking prevalence in Vietnam

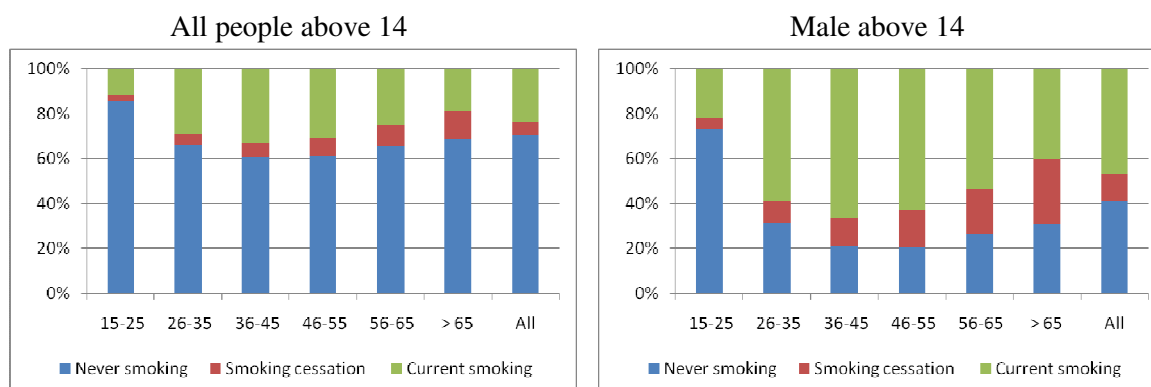
This study used data from Vietnam Household Living Standard Data in 2006. Vietnam Household Living Standard Surveys (VHLSS), which are conducted by the General Statistics Office of Vietnam (GSO) every two years with technical support from World Bank (WB). However, only the 2006 VHLSS contains some basic information on smoking behaviors of individuals including whether people are currently smoking or quit smoking. The 2006 VHLSS covered 9,189 households and 39,071. The sample is representative at the national, urban/rural and regional level. In this study, we will focus on the sample of individuals who are above 14 years old (29,373 sampled individuals in the 2006 VHLSS).

As mentioned, Vietnam is one of countries with the highest smoking prevalence. According to the Vietnam Household Living Standard Survey in 2006, 62 percent of households spent money on tobacco use. On average, the share of tobacco consumption in the total household consumption was around 1.3 percent. There were 6 percent and 1 percent of households who had the share of tobacco expenditure in total expenditure amounting to 5 percent

and 10 percent, respectively. 25 percent and 27 percent of households had tobacco spending higher than education spending and healthcare spending, respectively. For around 10 percent of households, tobacco spending was even higher than both education and healthcare spending.

Unlike developed countries, tobacco in Vietnam is mainly used by men. In 2006, 47 percent of men and only 1.5 percent of women above 14 years old used tobacco. Figure 1 shows the smoking status for the whole people and for men. For men, the percentage of current smoking was highest in those aged from 36 to 45 years, at 66 percent. Smoking cessation increases as people become older. It is interesting that young people from 15 to 25 years old have the smallest rate of current smoking.

Figure 1. The smoking rate by age groups (in percent)



Source: Estimation from the 2006 VHLSS

Table 1 presents the smoking rate by different individual characteristics. Ethnic minorities who are the poorest and living mainly in mountainous and highland areas have a higher rate of current smoking than Kinh people. The table also shows that people who have higher income and education are less likely to smoke than people with low income and low education. The proportion of people currently smoking is 27 percent and 21 percent for the poorest and richest, respectively.

Table 1: The smoking rate by demographic and economic variables (in percent)

Groups	Never smoke	Smoked, but stop smoking	Currently smoke	All
<i>Gender</i>				
Female	98.04 (0.14)	0.51 (0.06)	1.45 (0.12)	100
Male	40.81 (0.49)	12.19 (0.35)	47.01 (0.51)	100
<i>Ethnicity</i>				
Kinh/Hoa	70.79 (0.27)	6.29 (0.19)	22.91 (0.28)	100
Ethnic minorities	66.70 (0.73)	5.27 (0.38)	28.03 (0.75)	100
<i>Highest education degree</i>				

Groups	Never smoke	Smoked, but stop smoking	Currently smoke	All
Less than primary	70.50 (0.58)	4.95 (0.31)	24.55 (0.55)	100
Primary	66.29 (0.55)	5.40 (0.29)	28.30 (0.55)	100
Lower-secondary	73.07 (0.47)	5.82 (0.28)	21.11 (0.46)	100
Upper-secondary	70.89 (0.59)	7.83 (0.40)	21.28 (0.55)	100
Post secondary	70.12 (1.36)	10.57 (0.98)	19.31 (1.26)	100
<i>Expenditure quintiles</i>				
Poorest	68.26 (0.61)	5.26 (0.34)	26.48 (0.63)	100
Near poorest	69.56 (0.54)	5.62 (0.35)	24.82 (0.54)	100
Middle	70.15 (0.52)	6.48 (0.37)	23.38 (0.52)	100
Near richest	70.85 (0.51)	5.88 (0.32)	23.27 (0.53)	100
Richest	72.10 (0.56)	7.34 (0.42)	20.57 (0.56)	100
Total	70.30 (0.25)	6.17 (0.17)	23.54 (0.26)	100
<i>Standard errors in parentheses</i>				
<i>Source: Estimation from the 2006 VHLSS</i>				

3. Estimation method

To examine the individual determinants of smoking status, we will use a standard multinomial logit model. Multinomial logit models are presented in most econometrics textbooks such as Wooldridge (2001). In our study, individuals have three mutually exclusive choices: never smoke, cease smoking and currently smoke. Let y denote the smoking choice. y is equal to 1, 2 and 3 if an individual selects ‘never smoking’, ‘ceasing smoking’ and ‘currently smoking’, respectively. The multinomial logit model is assumed as follows:

$$P(y = 1 | X) = \frac{1}{1 + (e^{X\beta_2} + e^{X\beta_3})}, \quad (1)$$

$$P(y = 2 | X) = \frac{e^{X\beta_2}}{1 + (e^{X\beta_2} + e^{X\beta_3})}, \quad (2)$$

$$P(y = 3 | X) = \frac{e^{X\beta_3}}{1 + (e^{X\beta_2} + e^{X\beta_3})}, \quad (3)$$

in which, the first choice ‘never smoking’ is used as the reference category. X is a vector of individual characteristics, and β is a vector of coefficients to be estimated.

In addition to the multinomial logit model, we also use a logit model to investigate factors affecting smoking cessation among people who smoked or currently smoke. It means that we use a standard logit model to estimate the probability of smoking cessation among people who currently smoke or quite smoking:

$$P(y = 2 | y = 2 \text{ or } y = 3, X) = \frac{e^{X\beta}}{1 + e^{X\beta}} \quad (4)$$

In this paper, the X variables include: (i) demographic variables including age, gender, ethnicity, marital status; (ii) economic variables including education, employment and income; (iii) household variables including household size and household composition; (iv) urban and regional variables.

It should be noted that some explanatory variables such as education can be endogenous in the smoking education. Thus estimates of some explanatory variables can reflect association rather than the causal effect of the variables on smoking decisions.

4. Estimation results

Table A.1 in Appendix presents the results from the multinomial logit regression and logit regression. Since the coefficients in these regressions do not have clear economic meaning, we compute the partial effect of the explanatory variables. The partial effect is equal to the partial derivative of response probabilities with respect to the explanatory variables, calculated at the mean value of the explanatory variables. Table 2 presents the partial effects of the explanatory variables. Since the smoking is main among men in Vietnam, we limit the regression for the sample of men.

As expected, the probability of smoking first increases and then decreases when the age increases. This finding is consistent to Laxminarayan and Deolalikar (2004). Being ethnic minorities reduces the probability of smoking cessation by around 2.7 percentage points. Widowed people are more likely to smoke. Loss of spouse increases the probability of smoking by around 11.7 percentage points. Widowed people also have lower probability of quitting smoking. The effect of divorce and separation is not statistically significant.

Similar to other studies, we found a negative correlation between education and smoking even after other observed variables are controlled. People with high education are more likely to quit smoking. Having post-secondary degrees (university/college and above) increases the probability of smoking cessation among smokers by around 17 percentage points. However, this should not be interpreted as a causal effect, since education might be endogenous in the smoking equations.

People who are working tend to smoke than non-working people. Working for an enterprise or organization (private or public) increases the smoking probability by around 20 percentage points compared to the non-working people. Working people are also more persistent in smoking than non-working people. This might be evidence of the social effect of peers' smoking. People are more likely to smoke when communicating and working with smokers. In Vietnam, people have a habit to invite others to smoke together.

Table 2: Regressions of smoking: marginal effect

Explanatory variables	Multinomial logit regression			Logit regression
	Never smoking	Smoking cessation	Current smoking	Dependent variable is smoking cessation
Age	-0.04109*** (0.00221)	0.00353** (0.00138)	0.03756*** (0.00236)	-0.00558*** (0.00217)
Age squared	0.00038*** (0.00002)	-0.00001 (0.00001)	-0.00038*** (0.00003)	0.00009*** (0.00002)
Ethnic minorities (yes=1)	0.00626 (0.02191)	-0.02711*** (0.01041)	0.02085 (0.02121)	-0.04199*** (0.01604)
Married	Omitted			
Widowed	-0.11777*** (0.03998)	0.00041 (0.01753)	0.11736*** (0.04201)	-0.02854 (0.02484)
Divorces/separate	-0.04627 (0.05780)	-0.02415 (0.03188)	0.07042 (0.05584)	-0.04059 (0.04527)
Never married	0.11144*** (0.02027)	-0.02654** (0.01275)	-0.08490*** (0.02050)	0.00141 (0.01984)
Less than primary education	Omitted			
Primary education	0.04963*** (0.01846)	0.01366 (0.01138)	-0.06328*** (0.01688)	0.03511** (0.01743)
Lower-secondary education	0.12129*** (0.01960)	0.01923 (0.01222)	-0.14052*** (0.01769)	0.07411*** (0.01994)
Upper-secondary education	0.13375*** (0.02107)	0.03697*** (0.01373)	-0.17072*** (0.01845)	0.11155*** (0.02299)
Post secondary education	0.22437*** (0.03326)	0.03377 (0.02176)	-0.25814*** (0.02484)	0.17437*** (0.04168)
Not working	Omitted			
Working for households	-0.26649*** (0.01622)	0.00325 (0.00955)	0.26324*** (0.01600)	-0.08900*** (0.01889)
Working for State	-0.20517*** (0.01982)	-0.00733 (0.01320)	0.21250*** (0.02360)	-0.05415*** (0.01753)
Working for private firms	-0.20847*** (0.01848)	-0.00593 (0.01586)	0.21440*** (0.02393)	-0.05847*** (0.01984)
Logarithm of per capita income	0.00655 (0.01086)	0.00421 (0.00575)	-0.01076 (0.01061)	0.01097 (0.00909)
Household size	0.00167 (0.00438)	-0.00243 (0.00218)	0.00076 (0.00405)	-0.00302 (0.00335)
Proportion of children (below 15)	-0.08094** (0.03592)	0.04415** (0.01882)	0.03679 (0.03373)	0.04318 (0.02840)
Proportion of elderly (above 60)	-0.06680* (0.03508)	0.03409** (0.01670)	0.03270 (0.03411)	0.05442** (0.02651)

Explanatory variables	Multinomial logit regression			Logit regression
	Never smoking	Smoking cessation	Current smoking	Dependent variable is smoking cessation
Urban areas (yes=1)	-0.01719 (0.01565)	-0.00138 (0.00865)	0.01857 (0.01558)	-0.00634 (0.01333)
Red River Delta	Omitted			
North East	-0.00460 (0.02263)	0.01898 (0.01251)	-0.01438 (0.02169)	0.03030 (0.01920)
North West	-0.02734 (0.03680)	-0.01579 (0.01831)	0.04313 (0.03420)	-0.03448 (0.02520)
North Central Coast	0.00209 (0.02236)	0.00247 (0.01261)	-0.00456 (0.02148)	0.00708 (0.01914)
South Central Coast	-0.05819** (0.02341)	-0.03729*** (0.00971)	0.09548*** (0.02361)	-0.07172*** (0.01440)
Central Highlands	-0.09287*** (0.02935)	0.00245 (0.01498)	0.09043*** (0.02951)	-0.02301 (0.02035)
South East	-0.01625 (0.02290)	-0.02345** (0.01127)	0.03970* (0.02296)	-0.04491*** (0.01717)
Mekong River Delta	-0.03388* (0.01891)	-0.06347*** (0.00856)	0.09735*** (0.01912)	-0.11317*** (0.01314)
Observations	14,245	14,245	14,245	8,511

* significant at 10%; ** significant at 5%; *** significant at 1%
Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.
The data sample used for regression includes men, women are dropped from the sample.
Source: Estimation from the 2006 VHLSS.

Increased income can lead to a reduction in smoking. If income increases by around 1 percent, the probability of smoking decreases by about 1.1 percentage points. This findings are similar to several studies such as Townsend et al. (1994), Evans et al. (1996) and Laxminarayan and Deolalikar (2004). However, the effect of income on smoke cessation is not statistically significant.

Household size does not have a significant effect on the smoking status. The proportion of children as well as the proportion of elderly do not have a statistically significant effect on the current smoking, but have a positive and significant effect on the probability of smoking cessation. It implies that people might tend to quit smoking if there are children or old people in their households.

Urban does not have a significant effect on smoking decisions. Regions have some effects on smoking. More specifically, people living in Southern regions including South Central Coast, Central Highlands, South East, Mekong River Delta are more likely to smoke than people in Northern regions. Being located in Central Highlands have the highest effect on smoking, increasing the probability of current smoking by around 5 percentage points compared to the base region of Red River Delta. The Southern regions have negative effects on the probability of quitting smoking.

5. Conclusions

Vietnam is a developing country with a high prevalence of smoking. Around half of men were tobacco users in 2006. In Vietnam, smoking is the problem for men, since only nearly 2 percent of women smoke. In 2000, Vietnam has set up a very ambitious objective to reduce the smoking rate of men to 20 percent (Government of Vietnam, 2000). However, the objective cannot be achieved, since the smoking rate of men is still around 47 percent in 2010 (Nam Phuong, 2010). The government does not have a strong legal framework to reduce tobacco use. Smoking is allowed in public areas. People can smoke almost anywhere, in home, office, schools, etc. This can increase harms of the second-hand smoke on health.

Understanding the factors affecting smoking is helpful for policies on tobacco reduction in Vietnam. This paper examines how household and individual characteristics can affect individual smoking status using the 2006 VHLSS. Descriptive data analysis show that a typical people who is currently smoking in Vietnam is male, ethnic minority, in middle age, having low income and low education, and living in rural and mountainous areas.

Using the multinomial model and the logit model, the paper finds that gender and age are the most crucial determinants of smoking. Other important factors associated with the decision on smoking are education, employment and income. Income and education are negatively correlated with smoking, while employment is positively correlated with smoking. Marital status also matters to the smoking status. Being widowed increases the probability of smoking and reduce the probability of quitting smoking (conditional on those who have smoked and stopped smoking). Urban does not have a significant effect on smoking decisions. People in the Southern regions are more likely to smoke than people in Northern regions.

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Appendix

Table A.1: Regressions of smoking

Explanatory variables	Multinomial logit regression (base choice is 'Never smoking')		Logit regression
	Smoking cessation	Current smoking	Dependent variable is smoking cessation
Age	-0.17970*** (0.00996)	-0.04924*** (0.01461)	-0.03704*** (0.01435)
Age squared	0.00174*** (0.00011)	0.00075*** (0.00015)	0.00060*** (0.00015)
Ethnic minorities (yes=1)	-0.02817 (0.09348)	-0.29726** (0.12206)	-0.29917** (0.12301)
Married	Omitted		
Widowed	-0.55911*** (0.20248)	-0.21915 (0.18517)	-0.20139 (0.18706)
Divorces/separate	-0.25866 (0.25176)	-0.36910 (0.37713)	-0.29580 (0.36456)
Never married	0.44750*** (0.08773)	-0.05002 (0.13995)	0.00933 (0.13109)
Less than primary education	Omitted		
Primary education	0.25637*** (0.07670)	0.25195** (0.10612)	0.22563** (0.10877)
Lower-secondary education	0.59931*** (0.08188)	0.47789*** (0.11461)	0.45986*** (0.11680)
Upper-secondary education	0.70601*** (0.08799)	0.69630*** (0.11974)	0.66062*** (0.12384)
Post secondary education	1.20114*** (0.15039)	1.01129*** (0.18009)	0.92001*** (0.18610)
Not working	Omitted		
Working for households	-1.23109*** (0.07551)	-0.58603*** (0.10448)	-0.54599*** (0.10827)
Working for State	-1.03238*** (0.11476)	-0.44965*** (0.14344)	-0.39831*** (0.14373)
Working for private firms	-1.05841*** (0.11172)	-0.43589*** (0.16838)	-0.43983** (0.17140)
Logarithm of per capita income	0.03874 (0.04716)	0.05864 (0.05839)	0.07281 (0.06019)
Household size	0.00249 (0.01860)	-0.02230 (0.02134)	-0.02003 (0.02231)
Proportion of children (below 15 years old)	-0.27536* (0.15301)	0.29873 (0.18651)	0.28648 (0.18846)
Proportion of elderly (above 60 years old)	-0.23220 (0.15315)	0.22163 (0.17095)	0.36111** (0.17545)
Urban areas (yes=1)	-0.08128 (0.06856)	-0.05075 (0.08860)	-0.04229 (0.08961)
Red River Delta	Omitted		
North East	0.01947	0.18328	0.19204

Explanatory variables	Multinomial logit regression (base choice is 'Never smoking')		Logit regression
	Smoking cessation	Current smoking	Dependent variable is smoking cessation
	(0.09853)	(0.11452)	(0.11683)
North West	-0.15641 (0.15727)	-0.23147 (0.19791)	-0.24650 (0.19440)
North Central Coast	0.01476 (0.09593)	0.03055 (0.12427)	0.04646 (0.12419)
South Central Coast	-0.33815*** (0.10555)	-0.55600*** (0.12752)	-0.55225*** (0.12895)
Central Highlands	-0.43008*** (0.13900)	-0.15587 (0.14893)	-0.15972 (0.14764)
South East	-0.12189 (0.10031)	-0.29639** (0.13094)	-0.31951** (0.13201)
Mekong River Delta	-0.28020*** (0.08309)	-0.84279*** (0.11943)	-0.87895*** (0.12218)
Constant	3.82351*** (0.48772)	-0.97247 (0.64415)	-1.35043** (0.66823)
Pseudo – Rsquared		0.178	0.078
Observations	14,245	14,245	8,511

* significant at 10%; ** significant at 5%; *** significant at 1%
Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.
The data sample used for regression includes men, women are dropped from the sample.
Source: Estimation from the 2006 VHLSS