

Do warning graphics deter smoker from buying cigarette packs? A case study in Vietnam

Phuong Duy Nguyen¹ & Yen Dan Tong²

College of Economics, Can Tho University, Vietnam¹

Abstract

Under a burden of non-communicable diseases associated with smoking, Vietnamese people are facing the socio-economic and health-related problems. In this context, many policy instruments have been studied and applied into the task of preventing and warning about the harm of tobacco use. In line with that, this study aims to identify which information is potential to smokers to quit smoking. By using choice experiment method, a survey was carried out on 120 adult smokers in Can Tho City, Vietnam. The findings from this study indicated that all included attributes were significant in exposing the risks of cigarette smoke. Specifically, health warning graphics (i.e., the image of lung damage and damaged teeth), risk information and smoking ban in public places, and price were the effective vehicles. Surprisingly, under the lens of economics, this research found that the inefficiency in controlling smuggled tobacco is a serious problem in Vietnam, especially in its southern area. Apart from the budget deficit, this could pose a threat to the ability to conduct tobacco control policies for long-term in Vietnam.

Keywords: *behaviour, choice experiment, tobacco use, Vietnam, warning information*

INTRODUCTION

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Nowadays, Vietnam is bearing a huge burden of non-communicable diseases (NCDs). In 2010, NCDs constituted 318,000 deaths and shared 72% of total deaths nationwide. Risk factors are unavoidable due to the increasing of NCD cases in a developing country such as Vietnam (Nguyen & Hoang, 2018), in which four major NCD groups comprise cardiovascular diseases, cancers, chronic obstructive pulmonary disease and diabete. Accordingly, tobacco remains one of the leading risk factors for NCDs both as the result of tobacco use and second-hand smoke (SHS) exposure (IFMSA, 2018). As stated by the Centers for Disease Control and Prevention (CDC), Vietnam is one of the countries that have the largest number of smokers in Asia. In detail, nearly half (45.3%) of Vietnamese adult male is using tobacco, while this rate

is very low (1.1%) among female. However, the proportion of SHS exposure is actually high, ranging from 55.3% to 67.6% population (CDC, 2015).

High smoking rates are responsible for a large number of early deaths, increasing in health care costs, and decreasing in labor productivity. Tobacco use may lead to poverty as smokers spend too much money on tobacco products instead of other essential needs. Vietnamese spent about VND 10.400 billion a year (about USD 77.5 billion) on tobacco products, twice as much as the costs of education and 1.5 times the costs of health care (Ross *et al.*, 2005). Besides, the Government of Vietnam must shoulder VND 1.100 billion a year (about USD 75 million) for three out of 25 diseases attributable to smoking (i.e., heart disease, lung cancer and other diseases caused by smoking). Particularly, two-fifth of Vietnam's population with the lowest income, spent large proportion of the household on tobacco compared to essential needs such as food, clothing and education. If the money spent on tobacco were diverted for food consumption, about 11 percent of those households could potentially raise their living standards above the poverty line (Guindon *et al.*, 2010).

Since 2010, Vietnam has implemented the number of tobacco control measures to ensure the right of non-smokers to live in a smoke-free environment. Accordingly, Vietnam has participated in the World Health Organisation (WHO) Framework Convention on Tobacco Control (FCTC) for the sixth times and negotiated the protocol to eliminate illicit trade on tobacco products (WHO, 2017). Similar to other governments around the world, Vietnam found it difficult and time-consuming to incorporate all the provisions of the FCTC into policies and programmes. Meanwhile, the tobacco industry continues to impede the government's efforts to implement interventions that minimise costs and save more lives. In such situation, the MPOWER package could be a feasible solution. Toolkit was introduced by WHO in 2008 to promote government action on six tobacco control strategies in line with the FCTC. As a significant turning-point, the MPOWER has saved millions of lives from early deaths, as well as hundred of billions of dollars over the last decade (WHO, 2017). The MPOWER package have been applied and gradually proven to be effective, in which policy groups include: Monitor tobacco use and prevention policies (M); Protect people from tobacco smoke (P); Offer help to quit tobacco use (O); Warn about the dangers of tobacco (W); Enforce bans on tobacco advertising, promotion, and sponsorship (E); Raise taxes on tobacco (R) (WHO, 2008).

The importance of tobacco control policies in Vietnam is really essential. Researching and developing the tools to orientate behaviour of smokers is an urgent matter, especially when smokers are not fully informed about risks of smoking (Hammond *et al.*, 2006). By evaluating the changes in behaviour of tobacco users in

Can Tho City (Vietnam), the study will approach the "W" policy in the MPOWER package.

STUDY DESIGN

The choice experiment (CE) method was used to capture the potential impacts of warning information on smoking control policies. The CE technique was first developed by Louviere and Hensher (1982), then applied widely in many fields such as marketing, transportation and tourism (Carson *et al.*, 1995; Morrison *et al.*, 1997). CE technique is based on Random Utility Theory of Lancaster, wherein individuals are asked to make a number of choices among products or services. Each product or service is defined by their attributes at different levels (Lancaster, 1996). From April 2018 to June 2018, a choice experiment (CE) was conducted in Can Tho city – the largest city in the Vietnamese Mekong Delta. We performed a choice experiment among 120 adult smokers surveyed using questionnaires. In this study, product attributes and their corresponding levels (see Table 1) were selected based on the basis of a literature review (Goto *et al.*, 2011; Czoli *et al.*, 2017; Regmi *et al.*, 2017).



Figure 1: Graphic images were used in choice experiment

Note: (1) Graphic image of damaged teeth; (2) Graphic image of sick neonate; (3) Graphic image of lung damage; and (4) Graphic image of abstract damage.

A full factorial design results in $(2 \times 2 \times 3 \times 4 \times 4)^2 = 36,864$ combinations of choice sets, making it impracticable to present all scenarios to respondents. Thus, we

conducted a fractional factorial design to get 24 choice sets using JMP 11.0 software. The purpose of a fractional factorial design are to avoid systematic deviation from the attributes considered while ensuring efficiency. In a choice experiment, respondents are presented with a series of choice sets that are framed with various attributes and its levels. Based on 24 choice sets from using a fractional factorial design, four versions of the choice experiment questionnaire was developed (i.e., each individual was asked to answer 6 choice sets and each choice set is composed of three alternatives). All data were estimated using conditional logit model through Nlogit software (version 5.0).

Table 1: *Attributes and Their Levels*

Product attributes	Abbreviation	Product attribute levels
Information about penalty with fine for smoking in public places	Penalty	In Practice
		Not in practice
Information about risk of lung cancer caused by passive smoking have a significant increased (30%)	Passive	In Practice
		Not in practice
Information about nicotine content	Nicotine	Low (6 – 8 mg)
		Medium (10 – 12 mg)
		High (16 mg)
Graphic health warning (see Figure 1)	Warning	(1) Graphic image of damaged teeth
		(2) Graphic image of sick neonate
		(3) Graphic image of lung damage
		(4) Graphic image of abstract damage
Price of tobacco (VND per a package)	Price	VND 10.000
		VND 20.000
		VND 40.000
		VND 80.000

Our choice experiments began with the following question: “*As a smoker, which following ‘option’ would drive you to not purchase tobacco?*”. Then individuals were presented with three options to choose, including option A and option B which offer a product with certain levels of attributes, whereas option C is an “opt-out” choice. Figure 2 shows an example of choice set in questionnaire. Furthermore, we selected four graphic health warning designs that have been used in Vietnam for this study, including

a graphic image of damaged teeth, sick neonate, lung damage, and abstract damage (see Figure 1).

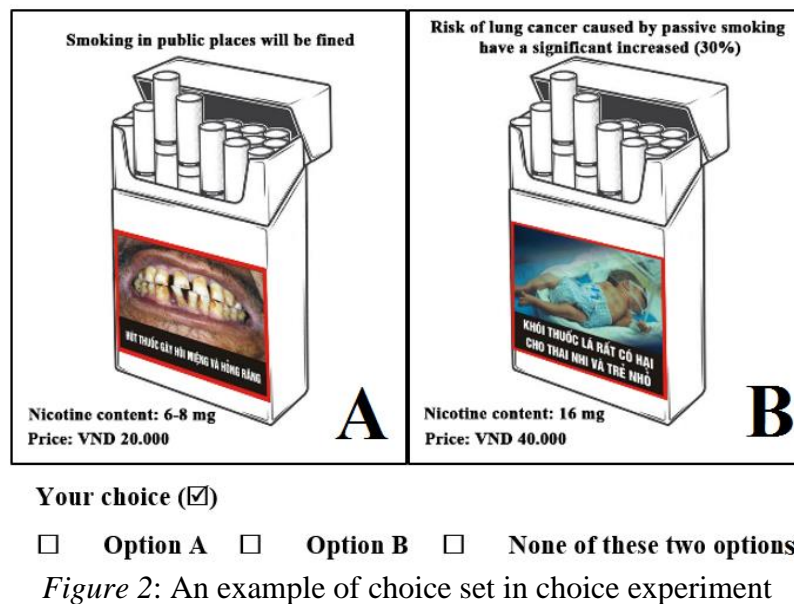


Figure 2: An example of choice set in choice experiment

RESULTS AND DISCUSSION

Demographics and Smoking Behaviour

Table 2 exhibits the descriptive statistics of the sample. Overall, the proportion of those who received high school education was 50.83% and those with an income more than VND 4,000,000 per month was 48.33%. Besides, almost all adult respondents (over 15 years-old) in this study are male (99.17%), which is suitable with the statistic of GATS Vietnam 2015 (CDC, 2015). The mean number of cigarettes smoked per day was 14.15 unit. Specifically, 58.33% people who smoked 10-20 unit per day, 39.17% people who smoked up to 10 unit per day, and just 2.50% respondents smoked more than 20 unit per day.

Table 2: Sample Characteristics (n=120 obs.)

		Percentage (%)	Mean	SD
Gender	Male	99.17	-	-
	Female	00.83		
Age	18-24	13.33	41.12	14.19
	25-39	37.50		

	40-54	28.34		
	55+	20.83		
Educational attainment	Primary school	25.00	8.87	3.25
	Secondary school	24.17		
	High school	50.83		
Income (VND)	≤ 2,000,000	12.50	-	-
	2,000,000 – 4,000,000	39.17		
	4,000,000 – 6,000,000	26.66		
	6,000,000 – 8,000,000	07.50		
	> 8,000,000	14.17		
Number of cigarettes smoked per day	≤ 10 units	39.17	14.15	6.17
	10 – 20 units	58.33		
	> 20 units	02.50		
Exposure to anti-smoking media	Yes	75.00	-	-
	No	25.00		
Perceptions of tobacco risk on health	1: No risk at all	00.00	-	-
	2: Low level of risk	18.33		
	3: Medium level of risk	30.83		
	4: Large level of risk	37.50		
	5: Extremely high level of risk	13.33		

When the respondents were asked to estimate the risk of tobacco use on their own health in terms of five proposed categories (see Table 2), 30.83 percent thought the risk to be medium, 37.50 percent believed the risk to be large, 18.33 percent believed a low level of risk, about 13.33 percent of the respondents reported an extremely high level of risk, and none of them believed that there was no risk at all when smoking. Besides, exposition to anti-smoking media was measured by asking them: “In the last one month, have you been exposed to advertising or information about the dangers of smoking, or on quitting smoking?”. According to the finding, three-quarters of respondents reported that they have been exposed to information about the dangers of smoking in the last one month. Apart from the warning information printed on tobacco package, respondents stated that they were also exposed to other sources of anti-smoking information including on public health posters (60%), through doctor's recommendation (47.5%), from TV and internet (75.83%), and public health services (24.17%).

Besides that, respondents were asked about labels of tobacco product that they are using, and then compared with the name of illicit tobacco brands that were provided in the report of Oxford Economics (2017). The results show that 77 percent of the respondents have used illicit tobacco products, in which “JET” and “HERO” were the primary illicit tobacco brands identified (see Figure 3 and 4). According to the Ministry of Industry and Trade of Vietnam (2014), because of taxes evasion (e.g., excise tax at

65%, value added tax (VAT) at 10% and so on), the smuggled tobacco can be sold at cheaper prices compared to domestic tobacco products. Thus, Vietnamese people with low or middle income will choose to buy smuggled products instead of legal one.

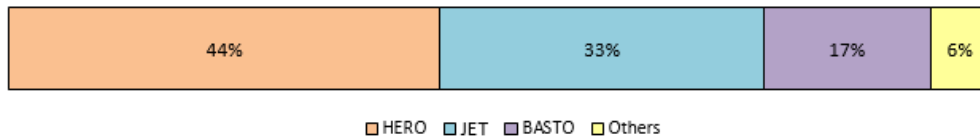


Figure 3: Brand name of the cigarettes product purchased



Figure 4: Images of top three most popular cigarette brands

The Conditional Logit Model

There are three utility functions, each representing the utility generated by one of the three options, where V_j is the utility function associated with alternative j . ASC is defined as the alternative specific constant of the model, and it captures the mean of unobserved factors in the error terms for each alternative:

$$Alt 1 : V_1 = (\beta_{ASC} \times ASC) + (\beta_{Price} \times Price) + (\beta_{Penalty} \times Penalty) + (\beta_{Passive} \times Passive) + (\beta_{Lung} \times Lung) + (\beta_{Teeth} \times Teeth) + (\beta_{Neonate} \times Neonate) + (\beta_{Hnic} \times Hnic)$$

$$Alt 2 : V_2 = (\beta_{ASC} \times ASC) + (\beta_{Price} \times Price) + (\beta_{Penalty} \times Penalty) + (\beta_{Passive} \times Passive) + (\beta_{Lung} \times Lung) + (\beta_{Teeth} \times Teeth) + (\beta_{Neonate} \times Neonate) + (\beta_{Hnic} \times Hnic)$$

$$Alt 3 : V_3 = (\beta_{Price} \times Price) + (\beta_{Penalty} \times Penalty) + (\beta_{Passive} \times Passive) + (\beta_{Lung} \times Lung) + (\beta_{Teeth} \times Teeth) + (\beta_{Neonate} \times Neonate) + (\beta_{Hnic} \times Hnic)$$

Table 3.

Results of Regression Model

Variable	Description	Coefficient	Standard Error
ASC	Alternative specific constant	0.1607ns	0.2000
Price	Price of a tobacco package	0.1004D-04***	0.2293D-04

Penalty	Information about penalty with fine for smoking in public places	0.3832***	0.1067
Passive	Information about risk of lung cancer caused by passive smoking have a significant increased (30%)	0.3588***	0.1013
Lung	Graphic image with lung damage	0.7864***	0.1526
Teeth	Graphic image with damaged teeth	0.8937***	0.1578
Neonate	Graphic image with sick neonate	0.3025*	0.1698
Hnic	Information about high nicotine content	0.2135*	0.1254
Log-likelihood		-631.0734	

Note: $n\text{nnnD-}xx \rightarrow$ multiply by 10 to $-xx$; ***, * \rightarrow Significance at 1%, 10% level; ns: Not statistically significant

Table 3 presents the results of the choice experiment data with the conditional logit model (CL) estimation. Results revealed that almost all coefficients (except for ASC variable) in this model are statistically significant, of which five variables (Price, Penalty, Passive, Lung, and Teeth) are significant at 1% level; and two variables (Neonate and Hnic) are significant at 10% level. A positive sign on coefficients indicates an increase in utility of smokers are deciding to quit smoking while negative indicates a decrease in utility. The results indicate that all the attributes are significant in identifying warning information on tobacco products which is potential to encourage smokers to quit smoking.

According to estimation results, graphic health warning, price of a tobacco package, information about penalty with fine for smoking in public places, and information about the risk of lung cancer caused by passive smoking were the four attributes with the largest influence on respondents' choice. Among the range of attributes and their levels in this study, the graphic health warning, especially with the image of lung damage and damaged teeth, has the strongest influence on smoker preferences to not purchase tobacco.

CONCLUSION

Tobacco smoking is a leading cause of death worldwide, and is becoming a serious public health problem. Despite the fact that analysis of smokers' behaviour has been the main topic of public health research in the world for many years (Goto *et al.*, 2011), there are very few studies on this theme was conducted in Vietnam. In this study, we conducted a choice experiment to investigate on the effects of various attributes on the decision to quit smoking. The main findings of this paper are as follows.

First, the results of Clogit model reveal that health warning graphic is an effective means to warn the risks of smoking as well as to create health awareness

among smokers. Specifically, if the image of lung damage or damaged teeth was displayed on the tobacco package, smokers are more likely to not purchase the product. Besides, the price of tobacco package, the information about penalty with fine for smoking in public places, and the health risk caused by passive smoking are three attributes that give positive impacts on smokers' decisions to quit smoking. Hence, when designing the tobacco control policies, local government should prioritise smoking ban and price increment of tobacco products, as well as labelling the health risk warning of tobacco usage by using macabre graphic images such as lung damage, damaged teeth.

Secondly, Vietnam's government must take more effective action in fighting against illicit tobacco trade as well as transnational smuggling. According to the Ministry of Industry and Trade of Vietnam (2014), almost all illicit tobacco products (i.e., JET and HERO) do not print the health warning label, and they do not contribute for Vietnam Tobacco Control Fund. This means that Vietnam's government will lose huge amounts of tax collection (e.g., excise tax, tobacco control fund, VAT) from these illicit products. By speeding up the fight against tobacco smuggling, Vietnam can reduce budget deficits and have better investment in health warning programmes, especially on the effective attributes mentioned in the previous point.

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