

The Impact of Cigarette Tax increase on Smoking Behavior of Daily Smokers

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Objective: To assess the impact of excise tax increase on smoking behavior of daily smokers aged 15 years and over and to explore the association between smokers' characteristics and smoking behavior prior and after excise tax increase

Material and Method: This cross-sectional survey was performed in 504 daily smokers, who were selected from data records of Global Adult Tobacco Survey (GATS) between February and April, 2009. The data were collected by telephone interview in the first and second weeks of July, 2009. Data were analyzed by frequency distribution and binary logistic regression.

Results: After the cigarette tax increase, 9.7% of daily smokers quit smoking and 48.0% reduced the amount of cigarettes and/or changed the brands and types of tobacco, from manufactured cigarettes to hand-rolled cigarettes. After other covariance being adjusted, the analysis revealed that the amount of cigarettes per day, the types of cigarettes (manufactured and hand-rolled cigarettes), and the smokers' reaction towards the increased price after the excise tax increase were respectively associated with the fact that the smokers quit smoking or reduced the amount of cigarettes ($p < 0.05$).

Conclusion: Cigarette tax increase is beneficial for government revenue and it also affects smoking behavior change of daily smokers. However, Ministry of Public Health should co-operate with Ministry of Finance to raise the tax rate on both cigarettes and hand-rolled cigarettes continuously and provide sufficient cessation service to respond to the need to quit smoking.

Keywords: Cigarette tax increase, Smoking behavior, Daily smokers

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The price of cigarettes in Thailand is relatively high in comparison with that in other countries in South East Asia. One factor affecting the higher price of cigarettes was that excise tax on cigarettes was increased for 9 times: from 55% in 1992 to 80% in 2006 and 85% in 2009, equivalent to about 67-70% of retail price to consumers. Though the main purpose of excise tax increase was for the benefit of government income, it had also affected the cigarette retail price and cigarette consumption⁽¹⁾. Therefore, taxation is a very important measure in low income and middle income countries

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for increasing government's income⁽²⁾ and helps reduce health-related expenditure in the future⁽³⁾. However, it has been noticed that tax increase measures are the most effective intervention to decrease the demand for tobacco, particularly among under-privileged and youths who are price-sensitive, to increase the need to stop smoking, to reduce smoking relapsed behavior, to reduce tobacco consumption and to prevent the new smokers⁽⁴⁾.

Thailand, one of the leading developing countries, was successful in tobacco control and tax increase was used as an effective measure by Tobacco Control Network when it was seriously aware of such effect. This could be seen from a gradual decrease of smoking rate in Thai population, from 35.20% in 1981

to 18.54% in 2007⁽⁵⁾. The simulation model in the evaluation of tobacco control measures in Thailand during 1991-2006 has revealed that tax increase measure is the most important factor, contributing to 61.94% in smoking reduction rates⁽⁶⁾. Moreover, there was only one study, conducted in 2006, which focused on the effect of excise tax increase from 75% to 79%, which resulted in 15% increase in price. Action on Smoking and Health foundation (ASH Thailand), together with ABAC poll, conducted a survey on the impact of such measure. It was found that 58% of the sample reduced the amount and frequency of smoking, and 10% quitted smoking⁽⁷⁾. Nevertheless, many studies from other countries have shown that the higher the cigarette prices decrease the more smokers as well as the more number of cigarettes consumed by smokers⁽²⁾.

Concerning family expenditure, in 2007, families in the poorest group have spent 8.04% of the total income buying cigarettes, while the families in the richest group have spent 1.18% of the total income buying cigarettes. Therefore, cigarette expenditure in the poor family is more heavy⁽⁵⁾. The World Bank suggested that the government use tax increase measure as a part of poverty-attack policy because this could reduce family expenditure on cigarettes and this sum of money could be used in a more fruitful manner⁽⁸⁾. Generally, in Thailand, the purpose of excise tax increase is for solving the government budget shortage, except in 2006 when the tax increase was used solely for smoking reduction. The last excise tax increase was caused by global economic crisis in 2009. Thai government decided to increase excise tax on tobacco and alcoholic beverages in order to get more money to cope with various governmental project expenditure. This was expected to have less effect on household economy than an increase on other types of tax. Therefore, the Royal Thai government declared the increase of excise tax on cigarettes from 80% to 85% of ex-factory price, effective on 15 May 2009. This resulted in an increased price of cigarettes: 5-12 Baht/pack for local manufactured cigarettes and 10-12 Baht/pack for imported cigarettes. According to the Executive Secretary of Action on Smoking and Health foundation (ASH Thailand), Prof. Prakrit Vathesatogkit, this increase would be beneficial to smokers because some of them might reduce the amount of cigarettes and others might quit smoking, particularly those with lower income^(5,9).

There were some concern that an increase in excise tax might alter the types of smoking, from factory cigarettes to hand-rolled cigarettes and/or illegal cigarettes⁽⁹⁾. Tobacco control activists and health

economic believe that the tax increase would have positive effect on country tobacco control and on reduction of morbidity and mortality due to smoking in the long run. This measure would also propose positive effect on household economy, especially those under economic crisis. Therefore the study on smoking behavior change among daily smokers after the excise tax increase and related factors are very important not only to the evaluation of tobacco control measure but also to health policy makers, tobacco control advocates, and concerned organizations which could implement this measure in policy decision in the future.

Material and Method

This cross-sectional survey was performed approximately 40 days after the excise tax increase was put into effect (as of 15 May 2009). Out of the total number of 3,868 daily smokers 15 years of age being interviewed in Global Adult Tobacco Survey (GATS) conducted in 2009, 2,180 samples could be contacted through telephone interview and were included as the population under study. The sample size was calculated by Daniel's formula on proportion⁽¹⁰⁾. The expected proportion was 0.62, based on 61.9% reduction of smoking rate due to excise tax increase⁽⁶⁾. The calculated sample size was 450. The sample size was equally selected from each region (500 each in the north, northeast, central, south and Bangkok Metropolis). 25% of the sample size increased was included in order to replace the intended people being missed. The systematic random sampling was used.

The data were collected by structured questionnaire designed to get required information. The first part consisted of demographic and socio-economic characteristics and the second part consisted of smoking behavior before May 2009 (the amount of smoking, types of cigarettes, brands, buying places, types of purchase, reaction towards price, reaction towards warning pictures on cigarette package, cigarette filter and the starting age of smoking). The first and second part was retrieved from the GATS. The third part consisted of smoking behavior at the time of the interview (frequency and the amount of smoking, types of cigarettes, brands, changing behaviour, types of purchase and money spent on cigarettes) and the last part consisted of the smokers' reaction towards cigarette tax increase. The third and fourth parts of the structured questionnaire were constructed on the concept of the excise tax increase and the reviewed content of validity by three tobacco control experts. The questionnaire was pre-tested with five daily smokers, who were not

included in the samples and then the questions were adjusted before practical implementation.

The five interviewers were trained to practice interview techniques. The interview was performed via telephone and if the target person could not be contacted on the third call, another sample will be searched and interviewed. Data before and after excise tax increase would be analyzed using descriptive statistics (frequency, percentage, means and standard deviation). Binary logistic regression was used to examine the relationship between involved factors such as cigarette price after the tax increase, types of cigarettes, and the amount of cigarettes/per day and behavior change of daily smokers after the excise tax increase. Data collection was operated after ethical permission (Proof number is MUPH2009-150).

Results

Characteristics of daily smokers

The total of 504 daily smokers were enrolled in this survey: 94.2% were male and 5.8% were female; 62.9% lived in municipal or urban areas whereas 37.1% lived outside municipal area or in rural area. 52.4% of the respondents were 25-44 years and 31.4% were 45-59 years with the average age of 40.53 years (minimum 16 years and maximum 73 years). 46.9% of daily smokers completed secondary school and over, and 23.5% were those of lower than primary level. Income was categorized into quintile which found that 41.6% were in the fourth and fifth quintile (high income). The average income was 11,211.69 Baht/month (Table 1).

Smoking behavior prior to excise tax increase

All of the samples were daily smokers. Prior to cigarette tax increase, 72.0% smoked manufactured cigarettes and 28.0% smoked both manufactured and hand-roll cigarettes. It was found that within the amount of cigarettes including manufactured and hand-rolled cigarettes, 38.1% smoked 6-10 cigarettes/day, 36.3% smoked 11-20 cigarettes/day and the average number of cigarettes per day was 12.95. Among those who smoked manufactured cigarettes, 39.7% smoked 6-10 cigarettes/day and 29.3% smoked 11-20 cigarettes/day. The average was 10.65 cigarettes/day. The average duration of daily smoking was 21.33 years, of which 30.4% of the smokers smoked 11-20 years, 25.8% smoked 21-30 years and 21.2% smoked 1-10 years. For the smokers who got the habit of smoking immediately after waking up were considered nicotine dependence. It was found that 36.4% smoked the first cigarette

within 6-30 minutes and 25.6% more than 60 minutes. It also found that 53.4% of these smokers had sometimes tried to quit smoking.

The reaction towards cigarette tax increase among daily smokers was that 48.4% showed agreement whereas disagreement was 37.9%. Moreover, 49.7% claimed that cigarette price was expensive and very expensive by 41.3% respectively (Table 2).

Changes in smoking behavior after cigarette tax increase

In this survey which was carried out 40 days after the law of cigarette tax took effect, it was found that the behavior change associated to health aspect is 57.7% , of which 9.7% quitted smoking, and 48.0% reduced the amount of cigarettes per day (some also changed brand and types of cigarettes). 7.5% totally changed from manufactured cigarettes to hand-roll cigarettes; 5.0% changed the brands but kept the same amount of cigarettes; 26.0% used the same brands and smoked the same amount of cigarettes (Table 3).

Table 1. Number and percentage of characteristics of daily smokers prior to cigarette tax increase (n = 504)

Characteristics of daily smokers prior to cigarette tax increase	n (%)
Gender	
Male	475 (94.2)
Female	29 (5.8)
Administrative area	
In municipal area	317 (62.9)
Outside municipal area	187 (37.1)
Age (Years)	
15-24	47 (9.3)
25-44	264 (52.4)
45-59	158 (31.4)
60 +	35 (6.9)
\bar{x} , SD, Min, Max	40.53, 12.07, 16, 73
Education	
Lower than primary level	118 (23.5)
Lower than secondary level	109 (21.7)
Secondary and certificate level	236 (46.9)
Bachelor degree and higher	40 (7.9)
Income group	
Quintile 1 + 2	199 (39.5)
Quintile 3	95 (18.9)
Quintile 4 + 5	210 (41.6)
\bar{x} , SD, Min, Max (Baht)	11,211.69, 11,698.02, 0, 100,000

Table 2. Number and percentage of smoking behavior of daily smokers prior to cigarette tax increase (n = 504)

Smoking behavior of daily smokers prior to cigarette tax increase	n (%)
Types of cigarettes	
Manufactured cigarettes	363 (72.0)
Manufactured and hand-roll cigarettes	141 (28.0)
Amount of cigarette (cigarette /day/person)	
Manufactured and hand-roll cigarettes (cigarette)	
1-5	84 (16.7)
6-10	192 (38.1)
11-20	183 (36.3)
21-30	29 (5.7)
> 30	16 (3.2)
\bar{x} , SD, Min, Max	12.95, 8.04, 1, 60
Manufactured cigarettes (cigarette)	
1-5	143 (28.4)
6-10	200 (39.7)
11-20	148 (29.3)
> 20	13 (2.6)
\bar{x} , SD, Min, Max	10.65, 6.87, 1, 40
Duration of daily smoking (Years)	
1-5	45 (8.9)
6-10	62 (12.3)
11-20	153 (30.4)
21-30	130 (25.8)
> 30	114 (22.6)
\bar{x} , SD, Min, Max	21.33, 12.11, 1, 60
First smoking after waking up (minutes)	
1-5	122 (24.3)
6-30	183 (36.4)
31-60	69 (13.7)
> 60	129 (25.6)
Try to quit smoking	
Yes	269 (53.4)
Never	235 (46.6)
Agree with cigarette tax increase	
Agree	244 (48.4)
Disagree	191 (37.9)
No response	69 (13.7)
Reaction to cigarette price	
Very expensive	198 (41.3)
Expensive	238 (49.7)
Reasonable	43 (9.0)

Factors associated with behavior change after tax increase among daily smokers

This study examined behavior change according to the health economic concept and found

Table 3. Number and percentage of behavior change after the cigarette tax increase (n = 504)

Behavior change	n (%)
Reduce the amount of cigarettes	242 (48.0)
Smoke as many cigarettes and keep the same brands	131 (26.0)
Change cigarette brand	25 (5.0)
Smoke only hand-rolled cigarettes	38 (7.5)
Quit smoking**	49 (9.7)
Increase the amount of cigarettes	19 (3.8)

** Quit smoking refers to daily smokers who are in the period of quitting and do not smoke any cigarettes when they are having an interview (40 days after cigarette tax increase). Quit period on average is 25.3 days (min=3 and max = 40 days)

Smoking behavior change according to health aspect combines the items of quit smoking and reduction amount of cigarettes per day

that it combined the group of the smokers who reduced the amount of cigarettes and quit smoking after the excise tax increase. The cigarette reduction and cessation is caused by health risk. This excluded the smokers who changed from the current cigarettes to other cheaper brands or to hand-rolled cigarettes. Still they smoked the same amount of cigarettes. The analysis after other covariance being adjusted revealed that the amount of cigarettes per day was associated respectively with quit smoking or reduction amount ($p < 0.05$). The comparison between the daily smokers who smoked 1-5 cigarettes/day and more showed that the odds ratio was 7.14 for the daily smokers who smoked more than 20 cigarettes/day ($p = 0.046$), 2.56 times among the one who smoked 11-20 cigarettes/day ($p = 0.008$) and 1.84 times among smokers who smoked 6-10 cigarettes day (0.048) respectively. Moreover, the odds ratio for the types of cigarettes was 1.90 ($p = 0.026$), which indicated that the number of daily smokers who smoked only manufactured cigarettes changed smoking behavior was approximately 2 times when compared to the one who smoked both manufactured cigarettes and hand-rolled cigarettes significantly. Moreover, the perception on the cigarette price has also effected to behavior change respectively; the smokers who found the price of cigarettes very expensive was 5.28 time odds for behavior change when compared to the group which found the price reasonable ($p < 0.001$).

However, there was no significant association between the characteristics of daily smokers and

behavior change after tax increase such as gender, age, educational level, and the smoker's economic status ($p > 0.05$). Meanwhile, there was no association between particular smoking behavior of daily smokers and behavior change as follows; the first cigarette after waking up, the duration of regular smoking, the agreement with the excise tax increase, and the attempt to quit smoking during the last 12 months ($p > 0.05$) (Table 4).

Discussion

It is obvious that excise tax increase is the most effective measure in national tobacco control

intervention; therefore, many studies indicated the possibility of behavior change. The results of this study also clearly stated that cigarette tax increase in Thailand from 80% to 85% results in an increase in retail price. Also smoking behavior among daily smokers changed: 17.3%, 9.7% quitted smoking, and 7.6% reduced the number of smoking days and the number of cigarettes per day. The proportion of smoking change resulting from tax increase is similar to that in the prior study in 2006 when the Royal Thai Government increased excise tax from 75% to 79%. Anti-smoking foundation (Ash Thailand), in cooperation with ABAC poll, stated that smoking reduced by 10% and 6 in 10 of the smokers

Table 4. Adjusted odds ratio of factors associated with smoking behavior change after tax increase

Variable	OR	95% CI		p-value
		Lower	Upper	
Gender (Female)				
Male	0.96	0.30	3.04	0.947
Age (60 + years)				
15-24	0.91	0.18	4.66	0.910
25-44	1.07	0.35	3.29	0.902
45-59	0.85	0.32	2.24	0.743
Education (lower than primary level)				
Lower than secondary level	1.69	0.58	4.99	0.339
Secondary and certificate level	0.91	0.33	2.55	0.863
Bachelor degree and higher	1.36	0.54	3.41	0.519
Income group (Quintile 1 + 2)				
Quintile 3	0.93	0.52	1.64	0.793
Quintile 4 + 5	1.19	0.60	2.38	0.621
Amount of cigarettes per day (1-5 cigarettes)				
6-10	1.84	1.01	3.38	0.048
11-20	2.56	1.28	5.11	0.008
> 20	7.14	1.03	49.39	0.046
First cigarette after waking up (1-5 minutes)				
6-30	1.17	0.63	2.19	0.621
31-60	2.15	0.93	4.96	0.072
> 60	1.23	0.61	2.48	0.556
Duration of daily smoking (21-60 years)				
1-5	1.48	0.40	5.45	0.559
6-10	2.01	0.72	5.62	0.185
11-20	1.05	0.51	2.17	0.899
Types of cigarettes (Manufactured & hand-rolled cigarettes)				
Manufactured cigarettes	1.90	1.08	3.34	0.026
Trying to quit smoking during the last 12 months (Never)				
Yes	1.20	0.74	1.94	0.459
Agree with the excise tax increase (Disagree)				
Agree	1.50	0.92	2.45	0.105
Reaction to cigarette price after the excise tax increase (reasonable)				
Very expensive	5.28	2.13	13.08	<0.001
Expensive	0.47	0.20	1.11	0.086

reduced the number of cigarettes after tax increase⁽⁷⁾. The finding in Thailand was similar to that in various countries such as the study by Tauras & Chaloupka⁽¹²⁾ whose information was collected from many countries and revealed that 10% increase in cigarette price would result in 6-9% increase in quit attempt among young adults and the effect was much prevalent among older smokers. The result of the case study in Thailand was also similar to that reported by CEO of Vichealth, Australia, in the 6th National Conference on Smoking and Health in Thailand 2008, who stated that the 10% increase in cigarette price in Australia had resulted in the increase of 7-14% of those who wanted to quit⁽¹²⁾.

However, the impact of increase cigarette tax was different among the different amount of smoking, which found that the more amounts they smoke, the more smoking change they are. Moreover, the current cigarette smokers who were affected by the very expensive price of cigarettes tended to change smoking behavior more than the other group did. These factors were related to the higher expenditure of the high amount smokers and the high impact to economic expenditures. The impact on the smokers' economic status was relevant to what was found in other studies which claimed that people put a much higher weight on the present than on the future. The present making decision trading off immediate with short-run desires are almost obvious to economy. Which was always concretely weighted pleasures with benefit and loss of money⁽¹³⁾. Sarntisar's study⁽³⁾ and the World Bank⁽²⁾ also stated that the range of excise tax increase should be between two-third and three-fourth (66-80%) of retail price, and the price would reduce the cigarette amount, which indicated that smokers could save their expenditures immediately, and the smokers' health was much improved and they would definitely live a healthier life. The study of Yang T⁽¹⁴⁾ found that the cigarette price was a statistically significant determinant which directly affect the smokers' decision to smoke or not and how many cigarettes to smoke.

Moreover, the result revealed that the behavior of the current smokers who smoked only manufactured cigarettes changed more than smokers who smoked both manufactured cigarettes and hand-rolled cigarettes. The smokers who smoked both types of cigarettes decided to stop smoking high-price cigarette and turned to low-price cigarettes, hand-rolled cigarettes, but they did not reduce the amount of cigarettes or quit smoking⁽¹⁵⁾. Thus, it can be confirmed that the economic reason was the main cause of the smokers' decision to change the type of

cigarettes. However, this change did not satisfy tobacco control network and the government because the smokers' health was still affected by the same amount of cigarettes and the government lost some tax revenue. In fact, smoking hand-rolled cigarettes was an obstacle to smoking control because it was an alternative for smokers who didn't want to quit.

This study, as well as the study by Townsend J⁽¹⁵⁾ indicated the possibility of various groups of smokers such as the male, the young, the high educated, and the lower socio-economic which could change the smoking behavior. Nevertheless, it was not found that these groups were sensitive towards the behavior change when tax increased. However, there are reports^(16,17) which stated that the smokers in different socio-economic groups are not affected by the increased price of cigarettes or the difference in price responsiveness.

It is recommended that the Department of Excise Tax, Ministry of Finance, which is responsible for cigarette taxation and determining excise tax rates, propose cigarette taxation to be relevant to the following aspects: tax rate should be increased continuously; the calculation should be based on retail price; tax on hand-rolled cigarettes should be increased so as to narrow the big gap between tax classes; tax rate of imported cigarettes should be equivalent to the local manufactured cigarette tax; the Ministry of Public Health should co-operate with Ministry of Finance to raise the cigarettes tax continuously and provide sufficient cessation service to respond to the need to quit smoking. Moreover, it should have a survey to monitor an impact of tax increase after 6 months and 1 year.

After 40 days when excise tax increase was in effect, the smokers' behavior change was a temporary change because theoretically the behavior change should take at least 6 months to be maintainable. This is the limitation of this study since the study period may have been too short to measure the addiction behavior change. Moreover, the selected samples were based on the telephone numbers of these current smokers, which were likely to have high non-response rate, especially among the cell phone users. Because the simcard in cell phones and the phone numbers can be easily changed; consequently, 20% of the sample size had to randomly be added.

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ผลกระทบของการขึ้นภาษีสรรพสามิตบุหรี่ซิกาแรตต่อพฤติกรรมการสูบบุหรี่ของผู้สูบบุหรี่เป็นประจำ

มณฑา เก่งการพานิช, ลักษณะ เต็มศิริกุลชัย, ศรีณญา เบญจกุล

วัตถุประสงค์: เพื่อศึกษาผลกระทบของการขึ้นภาษีสรรพสามิตบุหรี่ซิกาแรตต่อพฤติกรรมการสูบบุหรี่ของผู้สูบบุหรี่เป็นประจำอายุ 15 ปีขึ้นไป และศึกษาความสัมพันธ์ระหว่างลักษณะทางประชากรและพฤติกรรมการสูบบุหรี่ก่อนขึ้นภาษีกับการเปลี่ยนแปลงพฤติกรรมการสูบบุหรี่หลังขึ้นภาษีสรรพสามิตบุหรี่ซิกาแรต

วัสดุและวิธีการ: การสำรวจแบบภาคตัดขวาง ดำเนินการศึกษาในผู้สูบบุหรี่เป็นประจำจำนวน 504 คน ทำการสุ่มคัดเลือกมาจากฐานข้อมูลการสำรวจการบริโภคยาสูบในผู้ใหญ่ระดับโลก (GATS) ซึ่งได้เก็บรวบรวมข้อมูลในช่วงเดือนกุมภาพันธ์ถึงเมษายน 2552 การรวบรวมข้อมูลนี้ใช้การสัมภาษณ์ทางโทรศัพท์ในช่วงสัปดาห์ที่ 1-2 ของเดือนกรกฎาคม 2552 วิเคราะห์ข้อมูลด้วยสถิติแจกแจงความถี่ ร้อยละ และการวิเคราะห์ความถดถอยโลจิสติก

ผลการศึกษา: หลังการขึ้นภาษีสรรพสามิตบุหรี่ซิกาแรต ผู้สูบบุหรี่เป็นประจำร้อยละ 9.7 เลิกสูบบุหรี่ และร้อยละ 48.0 ลดจำนวนมวนและเปลี่ยนยี่ห้อหรือประเภทของบุหรี่จากบุหรี่ซิกาแรตเป็นบุหรี่มวนเอง ภายหลังจากควบคุมอิทธิพลของตัวแปรอิสระ พบว่า จำนวนบุหรี่ที่สูบต่อวันก่อนขึ้นภาษี ประเภทของบุหรี่ที่สูบ (บุหรี่โรงงานและ/หรือบุหรี่มวนเอง) และความคิดเห็นต่อราคาบุหรี่หลังขึ้นภาษีบุหรี่ซิกาแรต มีความสัมพันธ์กับการเปลี่ยนแปลงพฤติกรรมการสูบบุหรี่ไปสู่การลดปริมาณและเลิกบุหรี่อย่างมีนัยสำคัญทางสถิติ ($p < 0.05$)

สรุป: การขึ้นภาษีสรรพสามิตบุหรี่ซิกาแรตไม่เพียงแต่จะทำให้รัฐมีรายได้เพิ่มขึ้น หากแต่มีผลต่อการเปลี่ยนแปลงพฤติกรรมการสูบบุหรี่ของผู้สูบบุหรี่เป็นประจำ อย่างไรก็ตามกระทรวงสาธารณสุขควรผลักดันให้กระทรวงการคลังมีการขึ้นภาษีหรืออย่างต่อเนื่องทั้งบุหรี่ซิกาแรตและบุหรี่มวนเอง รวมทั้งการจัดบริการช่วยเหลือบุหรี่ให้เพียงพอต่อความต้องการเลิกบุหรี่ และให้มีการติดตามระยะยาวเพื่ออธิบายผลกระทบต่อพฤติกรรมที่ถาวร
