



Smoking Behaviour and Associated Factors of
Illicit Cigarette Consumption in a Border Province
of Southern Thailand

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Thesis Title **Smoking Behaviour and associated factors
of illicit cigarette consumption in
a border province of southern Thailand**

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Abstract

Background: Consumption of illicit cigarettes poses a serious threat to public health as well as being a source of huge losses in government revenues. It brings tobacco onto the market cheaply, making cigarettes more affordable and thus stimulating consumption, especially among the youth group, consequently increasing the burden of ill-health. Illicit cigarette sabotages national tobacco taxation and tobacco control strategies and has become a major concern for governments and international organizations. Therefore, it is important to understand this problem thoroughly in order to reduce it. The high magnitude of illicit cigarette trade in southern Thailand offers an opportunity to examine the situation of illicit cigarette consumption.

Objectives: To investigate behaviours and factors associated with illicit cigarette consumption in southern Thailand.

Methodology: A survey and qualitative study were conducted in a border province in southern Thailand next to Malaysia. A modified snowballing technique was used to recruit 300 illicit and 150 non-illicit cigarette smokers. A structured questionnaire

was used to interview subjects. Smoking behaviours and associated factors with illicit cigarette consumption were analysed by complex survey regression adjusted for a cluster of samples identified by each recruiter. Qualitative results by content analysis are presented to reveal the situation of illicit cigarette consumption in southern Thailand.

Results: Smoking of illicit cigarettes has spread from border areas and the trade centres to rural areas in southern Thailand. It has become accepted in the communities, and the availability and accessibility of illicit cigarettes in supermarkets has made them easy to purchase. Friends and other illicit smokers were the key component for access and source of information. The main factors associated with smoking illicit cigarettes, compared to smoking non-illicit cigarettes, were younger age, higher education, higher average monthly expenditure on cigarettes, and number of other illicit cigarette smokers known. The low price of illicit cigarettes was the main reason for illicit cigarette use. Selling strategies included low price, sale in individual sticks, sale in shops, and direct sale through social networking.

Conclusions: Illicit cigarette consumption is still a hidden public health risk problem, especially among youth and young adults. The challenge will be to find ways to control it.

Keywords: Smoking behaviour, illicit cigarette, cigarette consumption, border province

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Contents

Acknowledgement.....	vii
Contents.....	viii
Tables.....	xii
Figures.....	xiii
Boxes.....	xiv
Chapter 1: Introduction.....	1
1. Background	1
1.1 Study background	1
1.2 Background of the study site	3
2. Literature review	6
2.1 Tobacco epidemic and its significant effect on health ..	6
2.2 Burden of tobacco use in Thailand	9
2.3 Illicit cigarette problem	12
2.4 Price elasticity of demand for cigarettes	16
2.5 Smoking behaviours and factors associated with illicit cigarette consumption	20
2.6 Snowballing technique	23
3. Knowledge gap	25
4. Conceptual framework	25
5. Rationale of the study	27
6. Research questions	28

7.	Objectives	28
7.1	General objective	28
7.2	Subsidiary objectives	28
Chapter 2: Methodology.....		29
1.	Research methodology	29
1.1	Study design	29
1.2	Study setting	29
1.3	Study sample recruitment	30
1.4	Study sample	31
1.5	Sample size	32
1.6	Operational definitions	33
1.7	Study variables	34
1.8	Data collection	37
1.9	Data management and statistical analysis	40
2.	Ethical consideration	41
3.	Budget	42
Chapter 3: Results.....		43
1.	Recruitment of study subjects	43
2.	Magnitude of cigarette consumption in the study areas.....	43
3.	Characteristics of illicit and non-illicit cigarette smokers	47
4.	Pattern and types of cigarette used among illicit and non-illicit cigarette smokers	50

5.	Price and demand of illicit cigarettes	51
6.	Smoking behaviours of illicit cigarette smokers by district	54
7.	Factors associated with illicit cigarette consumption	59
8.	Characteristics of illicit cigarettes and their packets	60
9.	Qualitative results from in-depth interview	62
9.1	Marketing and price strategies of illicit cigarettes ..	62
9.2	Attitudes towards cigarette prices and tobacco taxation ...	64
9.3	Attitude towards quality and use of illicit cigarettes	65
Chapter 4	Discussion and conclusion.....	67
1.	Discussion	67
1.1	Findings of the study	67
1.2	Implications	73
1.3	Strengths of the study	74
1.4	Limitations of the study	75
2.	Conclusion and recommendation	75
2.1	Conclusions	75
2.2	Recommendations	75
References	76
Appendices	86
Appendix I:	Invitation to participate form	86
Appendix II:	Consent form	88

Appendix III: Ethical approval letter	89
Appendix IV: Questionnaire	90
Appendix V: Manuscript	109

Tables

Table 1: Smoking prevalence in Thailand by region.....	10
Table 2: Estimates of the illicit tobacco trade by the World Bank	14
Table 3: Price elasticity of demand for cigarettes in selected countries	19
Table 4: Independent and outcome variables.....	34
Table 5: Distribution of study subjects.....	44
Table 6: Comparison of baseline characteristics between illicit and non-illicit cigarette smokers.....	48
Table 7: Pattern of smoking among illicit and non-illicit cigarette smokers.....	50
Table 8: Smoking behaviour of illicit cigarette smokers by district.....	56
Table 9: Factors associated with illicit cigarette smoking.....	59
Table 10: Characteristics of illicit cigarettes identified by illicit cigarette smokers (n=300).....	60
Table 11: Characteristics of illicit cigarette packets identified by interviewer (n=263)*	61

Figures

Figure 1: Map of Songkhla province and its 16 districts.....	5
Figure 2: Six of the eight leading causes of death in the world by tobacco use.....	7
Figure 3: Cumulative tobacco-related deaths, 2005-2030.....	9
Figure 4: Smoking prevalence in Thailand by age groups.....	11
Figure 5: Illicit cigarette seized in southern Thailand.....	16
Figure 6: Conceptual framework of the study.....	26
Figure 7: The recruitment of the subjects in one of the three study districts.....	31
Figure 8: Process of data collection in the study.....	39
Figure 9: Total sticks of cigarettes smoked per day among illicit cigarette smokers by area.....	45
Figure 10: Total sticks of cigarettes smoked per day among non-illicit cigarette smokers by area.....	46
Figure 11: Number of cigarettes smoked per day by price of illicit cigarette.....	52
Figure 12: Number of cigarettes smoked per day by price of non-illicit cigarette.....	53

Boxes

Box 1: Quotations of marketing and price strategies of illicit cigarettes.....	63
Box 2: Quotations of attitude towards cigarette prices and tobacco taxation.....	64
Box 3: Quotations of attitude toward quality and use of illicit tobacco products.....	66

Chapter 1: Introduction

1. Background

1.1 Study background

Tobacco use is the leading cause of preventable deaths, and kills more than 5 million people each year worldwide.¹ Tobacco use is growing the fastest in low-income countries, due to steady population growth coupled with tobacco industry targeting, ensuring that millions of people become fatally addicted each year. More than 80% of the world's tobacco related deaths will be in low-and middle-income countries by 2030. By the end of this century, tobacco may kill more than a billion people unless urgent action is taken.²

This trend is a concern not only because of the millions of deaths and related suffering that it involves, but also due to the substantial health care costs, lost productivity and other social costs. Therefore, regulating tobacco consumption can be viewed as a component of economic policy.³

Tobacco excise tax increases are an extremely effective way of reducing tobacco consumption as revealed by tobacco control economists.⁴⁻⁶ The effects of cigarette price increases on cigarette consumption have been studied extensively and provide

clear evidence that increases in cigarette taxes and prices lead to significant reductions in cigarette consumption.⁷⁻¹³ There are concerns, however, that increases in cigarette prices and other tobacco taxes may lead to increased cigarette smuggling.¹⁴⁻¹⁶

Consumption of illicit cigarettes poses a serious threat to public health as well as being the source of huge losses in government revenues. It brings tobacco products onto the market cheaply, making cigarettes more affordable and thus stimulating consumption, especially among the youth, consequently increasing the burden of ill-health.^{17,18} The illicit cigarette trade sabotages national tobacco taxation and tobacco control strategies and has become a major concern for governments and international organizations.¹⁹ The WHO Framework Convention on Tobacco control (FCTC) stated that elimination of the illicit trade in tobacco was an essential component of tobacco control.²⁰

Global illicit cigarette trade represents approximately 10.7% of global sales, or 600 million cigarettes annually.²¹ It is mainly distributed in low- (16.8%), middle- (11.8%), and low- to middle- income (12.1%) countries whereas 9.8% has been reported in high-income countries.²² However, such problems have rarely been examined in developing countries where the problem is highly prevalent.

1.2 Background of the study site

Songkhla province is one of 14 provinces of southern Thailand. It occupies an area of 7,394 km² with a total population of 1,335,768. The province is subdivided into 16 districts. Neighboring provinces include Satun to the west, Phatthalung and Nakhon Si Thammarat to the north, and Pattani and Yala to the south-east. Moreover, in the south-west of Songkhla province lies the Malaysian border as shown in **Figure 1**. Buddhists make up about three-quarters of the population, most of who are of Thai or Chinese ethnicity. About a quarter of the population are Muslim, of whom most are of mixed Thai and Malay ancestry.²³

Hat Yai is the biggest district of Songkhla province with a population of 157,359. It is subdivided into 13 sub-districts, and Hat Yaicity is the largest metropolitan area in southern Thailand and the second largest metropolitan area of Thailand after Bangkok (the capital). Hat Yai is the business center and the economic center of lower southern Thailand and is the major transportation hub of southern Thailand. An international railway station is located in Hat Yai and Hat Yai International Airport is the important airport in southern Thailand.²⁴

Sadao is a small district on the border of Malaysia in Songkhla province. The district is subdivided into 9 sub-districts which are further subdivided into 67 villages. There are 2 main border

crossings with Malaysia in Sadao district, namely Ban Dan Nok, which is close to Bukit Kayu Hitam on the Malaysian side and Padang Besar, which borders the Malaysian town of Perlis. The main railway crossing between Malaysia and Thailand is at Padang Besar.²³ Two out of nine customs offices in southern Thailand are located in Sadao district, namely Padangbesa Customs Office and Sadao Customs Office.²⁵

Ranot is the northernmost district of Songkhla province. It has 73 villages and 12 sub-districts with a population of 67,551. Neighboring districts from the south (clockwise) are Sathing Pra, Krasae Sin of Songkhla Province, Muang Phatthalung, Khuan Kganun of Phatthalung Province, Cha-uat and Hua Sai of Nakhon Si Thammarat Province. To the east is the Gulf of Thailand and the western part of the district is at the shore of Thale Noi, the northern part of Songkhla Lake.²³



- | | | |
|--------------------|--------------------|----------------------|
| 1. Mueang Songkhla | 7. Ranot | 13. Khuan Niang |
| 2. Sathing Phra | 8. Krasae Sin | 14. Bang Klam |
| 3. Chana | 9. Rattaphum | 15. Singhanakhon |
| 4. Na Thawi | 10. Sadao | 16. Khlong Hoi Khong |
| 5. Thepha | 11. Hat Yai | |
| 6. Saba Yoi | 12. Na Mom | |

Figure 1: Map of Songkhla province and its 16 districts

Source: http://en.wikipedia.org/wiki/Songkhla_Province

2. Literature review

A review of the literature includes 6 main parts: 1) Tobacco epidemic and its significant effect on health, 2) Burden of tobacco use in Thailand, 3) Illicit cigarette problem, 4) Price elasticity of demand for cigarettes, 5) Smoking behaviours and determinants of illicit cigarette consumption, and 6) Snowballing technique.

2.1 Tobacco epidemic and its significant effect on health

More than one billion people worldwide currently smoke tobacco, with about one quarter being adults. Tobacco use continues to grow in developing countries due to steady population growth along with aggressive tobacco industry marketing efforts.²⁶ In high-income countries, smoking has been in overall decline for decades, although it continues to rise in some groups. By contrast, in low-income and middle-income countries, by contrast, cigarette consumption has been increasing. Free trade in cigarettes has contributed to a rising consumption in these countries in recent years.¹⁴

Cigarette smoking continues to be the leading preventable cause of death and disability among adults in the world today. Tobacco use causes 1 in 10 deaths among adults worldwide and more than five million people a year. By 2030, unless urgent action is taken, tobacco's annual death toll will rise to more than eight million per year.^{27,28}

Figure 2 shows a graph of the leading causes of death globally in 2005. Six of the eight causes of death were tobacco related. The bar on the far right combines all deaths related to tobacco use.²⁹

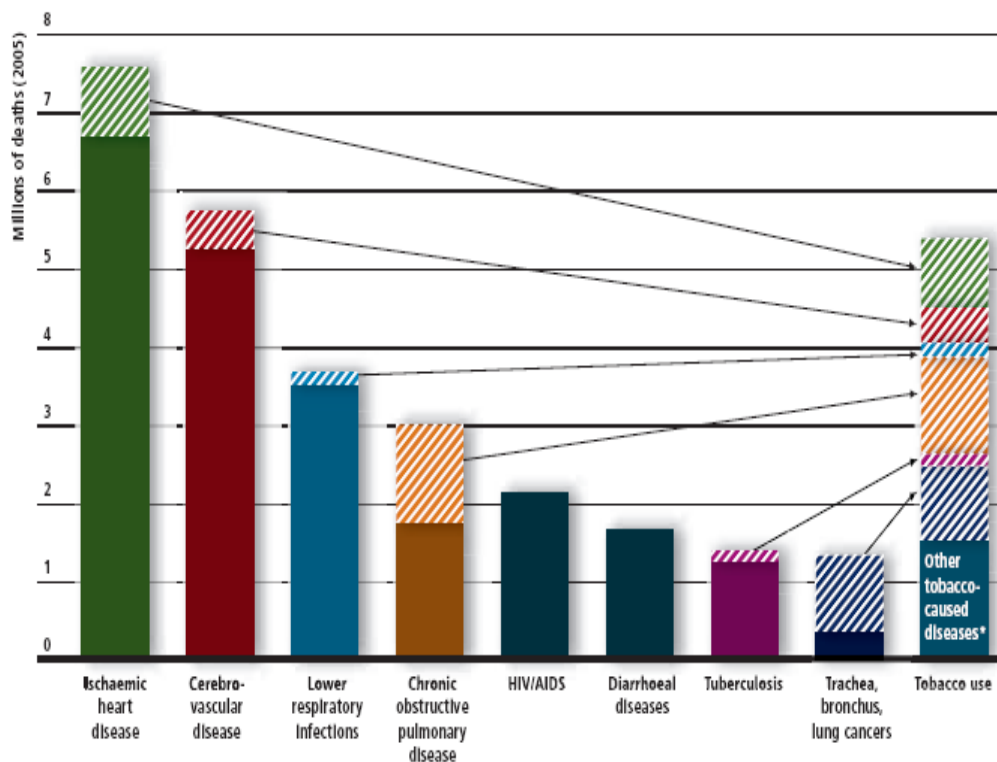


Figure 2: Leading causes of death globally in 2005. Six of the eight causes of death are tobacco related.

Source: World Health Organization, 2008.

(Other tobacco caused diseases* includes mouth and oropharyngeal cancers, oesophageal cancer, stomach cancer, liver cancer, other cancers, as well as cardiovascular diseases other than IHD and cerebrovascular disease.)

Smoked tobacco in any form causes up to 90% of all lung cancers and is a significant risk factor for strokes and fatal heart attacks.³⁰ Smokers have a three-fold higher risk of oral cancer compared with non-smokers and are also at increased risk of lung, stomach, oesophageal and pancreas cancer, as well as many oral diseases.^{31,32} Some forms of smokeless tobacco may also increase the risk of heart disease and low-birth-weight babies.³³ Moreover, second-hand smoke also has serious and often fatal health consequences because it can also cause lung cancer and heart disease.¹⁴

It is estimated that more than three quarters of these deaths will be in low- and middle-income countries. As shown in **Figure 3**, shows that tobacco will kill over 175 million people worldwide between 2005 and the year 2030.²⁷

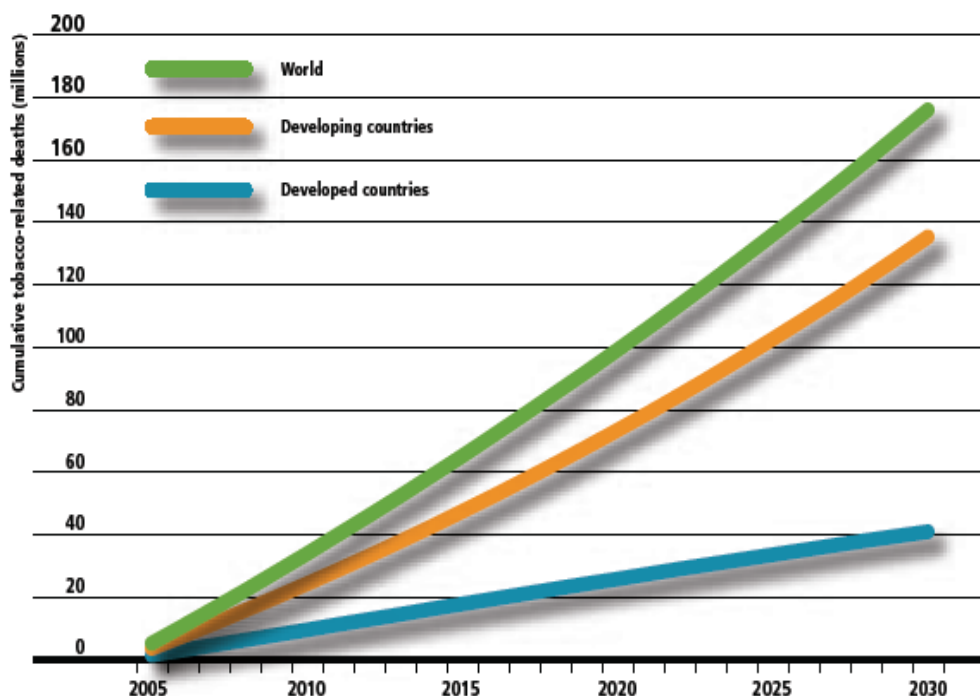


Figure 3: Cumulative tobacco-related deaths, 2005–2030

Source: Mathers, CD and Loncar D, 2006.

2.2 Burden of tobacco use in Thailand

The current smoking prevalence among adults decreased from 32.0% in 1991 to 21.2% in 2007 (a 33.7% decrease over 16 years). The smoking rate for males decreased from 59.3% to 41.7%, a 29.7% reduction. For females, the smoking rate decreased from 4.9% to 1.9%, a 60.9% reduction. Southern Thailand region had highest smoking prevalence at 12.04% while the northern region had lowest prevalence at 9.16% as shown in **Table 1**.³⁴

Table 1: Smoking prevalence in Thailand by region

Year	Region of Thailand				
	Northern	North-east	Southern	Central (excluding Bangkok)	Bangkok
1991	9.61	10.82	14.48	14.85	13.63
1996	10.81	11.37	14.06	14.40	14.72
2001	9.33	9.71	12.01	12.30	12.28
2004	9.30	9.47	12.09	11.63	12.17
2006	9.36	9.01	10.66	10.75	9.55
2007	9.16	9.65	12.04	11.09	11.04

Source: Tobacco control research and knowledge management center, 2008.

In 2009, current adult smoking prevalence was reported at 20.70% (10.9 millions) overall. However, the trend of current adult daily smoking has decreased since 1991. The adult occasional tobacco smoking prevalence has increased to 2.58% compared to 1.54% in 1991. From 2007 to 2009, among smokers aged above 24 years, the smoking prevalence decreased. However, the smoking prevalence among smokers aged lower than 25 years increased (**Figure 4**).³⁵

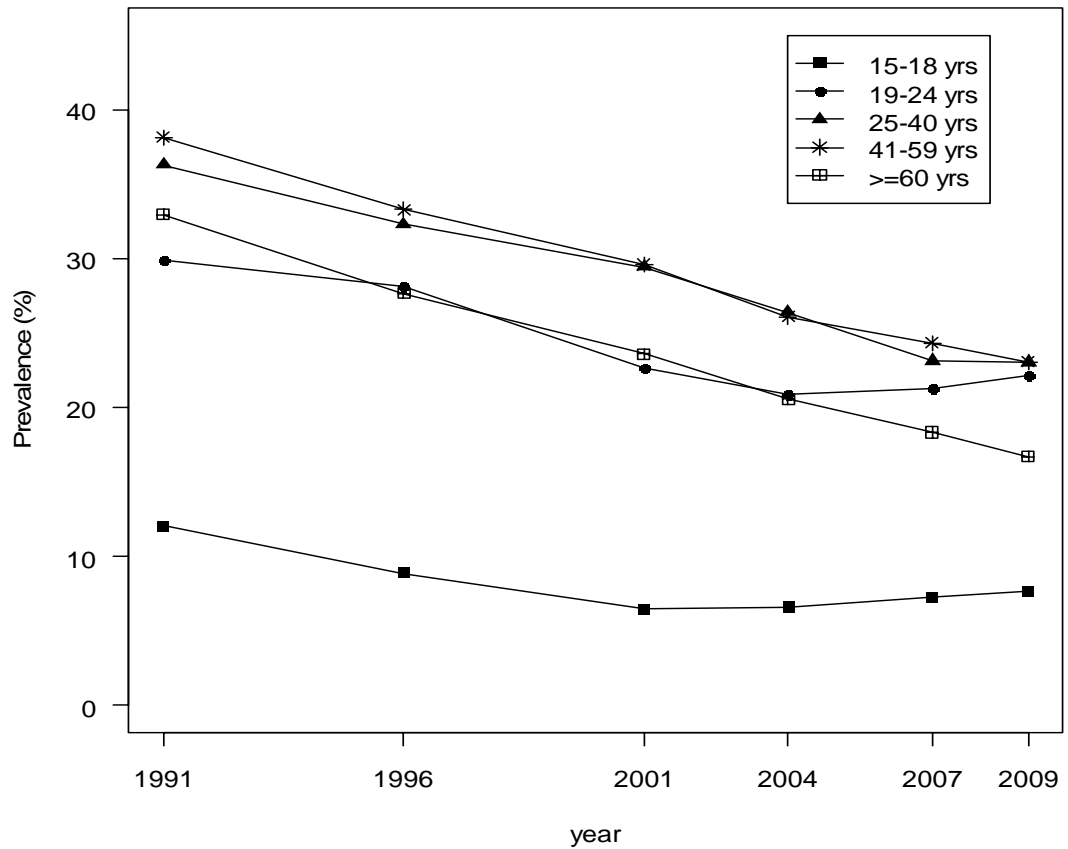


Figure 4: Smoking prevalence in Thailand by age groups

Source: Tobacco control research and knowledge management center, 2010.

2.3 Illicit cigarette problem

2.3.1 Types of illicit cigarette

There are 3 main types of illicit cigarette smuggling, namely large-scale organized smuggling, small-scale smuggling or "bootlegging", and illegal manufacturing.¹⁴

1) Large-scale organized smuggling

Large-scale organized smuggling involves the illegal transportation, distribution and sale of large consignments of cigarettes and other tobacco products. Large-scale smugglers generally avoid all taxes on tobacco products either by diverting them from the legal market while they are in the wholesale distribution chain (where they are carried untaxed), in transit between their country of origin and their official destination, or by smuggling counterfeit products. Tobacco products diverted from the legal market disappear in transit, having been bought and sold by unofficial traders and enter the illicit market in non-official destination countries.

2) Small-scale smuggling or bootlegging

Small-scale smuggling or bootlegging involves the purchase, by individuals or small groups, of tobacco products in low tax jurisdictions in amounts that exceed the limits set by customs regulation, for resale in high tax jurisdictions.

3) Illegal manufacturing

Illegal manufacturing refers to the production of tobacco products contrary to law. The laws in question may be taxation laws or other laws that restrict the manufacture of tobacco products. Counterfeit tobacco production is also a form of illegal manufacturing, in which the manufactured products bear a trademark without the consent of the owner of the trademark.

2.3.2 The burden of illicit cigarettes trade

From a World Bank survey on cigarette consumption, between 6% and 8.5% of all cigarettes purchased worldwide were smuggled³⁶ and constituted around one-quarter of total exports.^{37,38}

The burden of illicit trade falls mainly in lower income countries. The total illicit cigarette market is lower in high income countries: 9.8% in high income countries compared with 16.8% in low income countries. A summary of country estimates of the illicit cigarette trade by the World Bank is shown in **Table 2**.³⁹

Table 2: Estimates of the illicit tobacco trade by the World Bank

Illicit tobacco market share in various countries (%)					
0-5	6-10	11-20		21-30	>30
Chile	Argentina	Algeria	Pakistan	Cameroon	Albania
Indonesia	Australia	Armenia	Philippines	Croatia	Bolivia
Israel	China	Canada	Poland	Estonia	Bosnia & Herzegovina
Italy	Costa Rica	Columbia	Singapore	Lebanon	Brazil
Japan	El Salvador	Côte d'Ivoire	Taiwan	<u>Malaysia</u>	Ethiopia
Mexico	Kazakhstan	Ecuador	<u>Thailand</u>	Morocco	Georgia
New Zealand	Nicaragua	Ghana	United Kingdom	Peru	Hong Kong
Saudi Arabia	Panama	Guatemala	US.	Russia	Iraq
Spain	South Africa	India	Uruguay	Sudan	Laos
	Tunisia	Iran	Yemen	Syria	Macedonia
	Turkey	Jordan		UAE	Uzbekistan
	Ukraine	Nigeria		Venezuela	
	Vietnam	Pakistan		Zambia	

Source: Merriman D et al, 2000.

2.3.3 Illicit cigarettes in Thailand

In Thailand, the data from a survey on cigarette consumption by World Bank reported that 11% of smuggled cigarettes were found in the tobacco trade.³⁹ An empirical analysis of cigarette tax avoidance in Thailand reported that the difference of cigarette trade data between exports and imports to Thailand during the past 16 years had values between 21 million packets and 514 million packets. The highest volume of missing cigarettes was about 83% of exports in the year 1996.⁴⁰

In southern Thailand, a report of illegal cigarettes seized in the fiscal year 2009-2010 from Customs Region 4, Thai Customs Department, Thailand reported that the amount of illicit cigarettes in southern Thailand had high volumes. In the 2009 fiscal year, the amount of illicit cigarettes seized was 323,627 packets and was worth 12,697,377 Thai baht (THB). In the 2010 fiscal year, the amount of illicit cigarettes seized was 340,626 packets and was worth 21,995,412 THB. Illicit cigarettes seized in southern Thailand had an increasing trend. In the last trimester of the 2010 fiscal year the amount of illicit cigarettes seized was 204,591 packets worth 10,497,449 THB, the highest volumes found in Songkhla province. The monthly quantity and value of illicit cigarettes seized in each month are shown in **Figure 5**.⁴¹

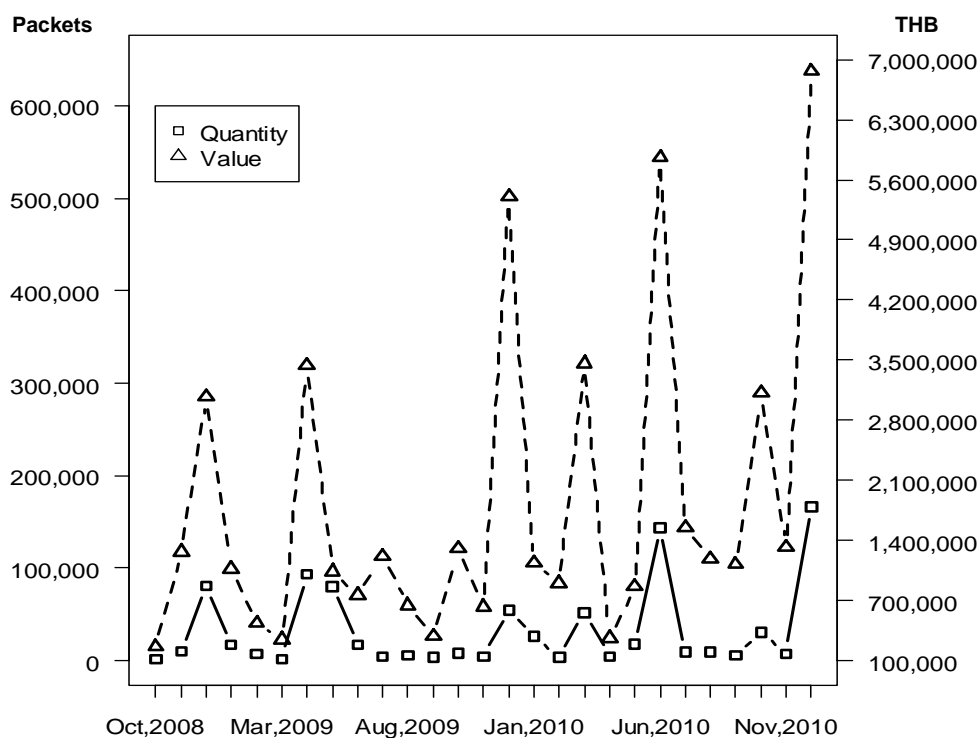


Figure 5: Monthly quantity and value of illicit cigarettes seized in southern Thailand, 2008-2010

Source: Customs Region 4 Thailand, 2011.

2.4 Price elasticity of demand for cigarettes

Price elasticity of demand measures the percentage change in quantity demanded resulting from a one percent change in price. The value of the elasticity of demand for a product varies

depending on the level of price and quantity at which it is evaluated. In other words, at different combinations of price and quantity demanded, the elasticity of demand for a particular product can vary significantly. Economists compute the price elasticity of demand as the percentage change in the quantity demanded divided by the percentage change in the price. That is,

$$\text{Price elasticity} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

The magnitude of the elasticity estimate provides a measure of how responsive demand is. If the value of the price elasticity estimate is greater than one, then demand is said to be elastic. When demand is elastic, consumers are very responsive to changes in price. As such, a small price change will lead to a relatively large change in quantity demanded. In contrast, if the value of the elasticity of demand estimate is less than one, then demand is said to be inelastic and consumers are not very responsive to price changes.⁴² For instance, if price elasticity for a particular good was about -0.1, then the demand for that good would fall by only 0.1% for every 1% increase in the price of the good.

Cross-price elasticity measures the effect of a change in the price of one good or service on the demand for another product. For example, it could be used to measure the percentage change in the quantity of product X demanded resulting from a one percent change in the price of product Y. That is,

Cross-price elasticity = $\frac{\text{Percentage change in quantity demanded for good X}}{\text{Percentage change in price of good Y}}$

The sign of the cross-price elasticity depends on the relationship between the two products. If the goods are "substitutes" in use then the cross-price elasticity will be positive. The positive sign reflects the fact that as the price of one good goes up the demand for a substitute good will increase as consumers switch away from the product that has become relatively more expensive. In contrast, if two goods are "complements" in use, goods that are used together, then the cross-price elasticity of demand between them will be negative. When the price of one good goes up the demand for the other will fall.⁴³ Illicit cigarettes can be a substitute for tax paid cigarettes thus cross-price elasticity of demand for illicit cigarettes can suggest how excise taxation should be used to avoid illicit cigarette substitution.

The estimates of price elasticity of demand for cigarettes from developed countries range from -0.25 to -0.50. Estimates from low-income and middle-income countries suggest that price elasticity of demand varies between -0.50 to -1.00.⁴⁴ Analyses from various South East Asian countries have found that short-run price elasticity estimates for tobacco products range from -0.17 to -0.78, while long-run estimates range from -0.4 to -1.21.⁴⁵

Price elasticity of demand has had an appreciable impact on smoking prevalence and smoking consumption in several countries as shown in **Table 3**. A meta-analysis reviewing 86 different studies on economic aspects of smoking reported a mean price elasticity of -0.48.⁴⁶

Table 3: Price elasticity of demand for cigarettes in selected countries

Countries	Price elasticity of demand
UK ⁴⁷	-0.36
Finland ⁴⁸	-0.49 to -0.94
Italy ⁴⁹	-0.43
Spain ⁵⁰	-0.19 to -1.25
US (California) ^{51,52}	-0.5
US (district of Columbia) ⁵³	-0.48 to -0.62
Canada ⁵⁴	-0.5
Australia ⁵⁵	-0.3 to -0.8
Taiwan ⁵⁶	-0.5 to -0.6
India ⁵⁷	-0.4 to -0.9
China ⁵⁸	-0.54
Malaysia ⁵⁹	-0.08 to -0.57

Similar to other countries in the world, the tobacco epidemic has been an important public health issue, and taxation on tobacco products has been a crucial policy strategy for tobacco control in Thailand. The association between cigarette consumption and cigarette price has also been studied, the price elasticity of demand for cigarettes in Thailand was approximately -0.39, similar to estimates for many other middle-income countries.⁶⁰

2.5 Smoking behaviours and factors associated with illicit cigarette consumption

Smoking behaviour and factors associated with tobacco use have been explored in many different domains. For example, smoking prevalence has been found to be higher among the following groups: men,⁶¹ the lower educated in Western countries,^{62,63} the unemployed,⁶⁴ those with low self-esteem,⁶⁵ and with little control over their lives,⁶⁶ and those who are involved in other types of risky behaviour.⁶⁷

The smoking behaviour of parents and friends were important influences on adolescents smoking behaviours.⁶⁸ Some studies have investigated the association between home smoking bans and the smoking behaviours of adolescents.⁶⁹⁻⁷¹ Adolescents who associated with friends who smoke were at an increased risk of making the transition to experimental and regular use of tobacco. Smoking by

friends was more important than parental smoking in predicting adolescent smoking.⁷²

Cultural factors were found to be related to smoking behaviour; race and ethnicity are significantly associated with smoking behaviour change. Studies in USA found that among Asian Americans, Cambodians were more likely to change their smoking behaviour than Laotians and Vietnamese.⁷³⁻⁷⁶ Vietnamese men residing in Massachusetts were far less likely than the general population to be thinking of quitting smoking.⁷⁷ Similar to the findings among Vietnamese immigrants in California.⁷⁸

A study in the UK found that smoking was associated with residential area and socio-economic status. This study also suggested that usual beneficial elements such as support networks and identity seemed to encourage smoking in the areas, working against smoking cessation and other public health schemes.⁷⁹

Little empirical research has been conducted about the smoking behaviour of illicit cigarette smokers.

A study of cigarette smuggling and the demand for cigarettes in Canada found that the presence of smuggled tobacco reduces the sensitivity of taxation as a government policy instrument.¹³ Two studies reported that information policies and incentives from governments may be effective at reducing cigarette consumption;

this effect being reduced when state tax rates differ, creating an incentive to avoid compliance by bootlegging cigarettes.^{80,81}

Another study of smuggled tobacco in the UK, based in two areas of socio-economic deprivation, found that the smuggling network was viewed positively by low income smokers as a way of dealing with the increasing cost of cigarettes.⁸² Considering the links between smuggled tobacco, deprivation and addiction, people who have bought smuggled tobacco were heavy smokers with high levels of addiction, living in socially deprived areas, but were more likely to be in employment, and they were more likely to use smuggled tobacco to save money and sustain their smoking habit.⁸³

In Asia, a study to evaluate factors that affect an individual smoker's decision to purchase smuggled cigarettes in Taiwan found that cigarette price was the driving factor in the decision to buy smuggled cigarettes.⁸⁴ Smokers who had low-incomes and poorly-educated were most likely to purchase smuggled cigarettes for smoking.⁸⁵ Another study to investigate the effect of price and smoking characteristics on the decision to smoke smuggled cigarettes, found that increasing price of legal cigarettes encouraged smokers who previously did not smoke smuggled cigarettes to smoke smuggled cigarettes. Smokers who were male, under the age of 35, with an education level of junior high or below, relatively low income, high cigarette consumption, and high level of expenditure on

cigarettes were associated with a higher likelihood of smoking smuggled cigarettes.⁸⁶

A study in Iran found that smuggled cigarettes were both foreign cigarettes (20.9%) and domestic branded cigarettes (6.7%). Smuggled cigarettes smoking was higher among younger smokers.⁸⁷

In summary, most literature on illicit cigarettes mainly focused on the effect of raising cigarette prices on use of illicit cigarettes. A few studies have looked at the effect of factors other than cigarette prices. Evaluation of associated factors with illicit cigarette consumption at the individual level will provide more useful information, especially when the smokers face higher cigarette prices after increasing cigarette taxes.

2.6 Snowballing technique

Snowballing technique is a sampling method which is based on respondents who satisfy the criteria of interest being asked to recruit other people in the same situation to extend the sample. It relies on a linkage between people and social networks in the sample population.⁸⁸

Snowball sampling entails identifying an initial number of subjects from whom the desired population and who then serve in order to recruit more subjects. They serve to help identify other

subjects to be included in the sample. These individuals in turn are asked to provide information on other subjects, and the process continues until either a target sample size has been reached or the sample has become saturated.⁸⁹

Although initial seeds in snowball sampling are in theory randomly chosen, in practice this is difficult if not impossible to carry out. Therefore, as a practical matter, initial seeds in snowball sampling tend to be chosen via convenience sampling. In snowball sampling, the sample composition is heavily influenced by the choice of initial seeds, and the method, in practice, also tends to be biased towards favouring more cooperative as opposed to randomly chosen subjects and those that are part of larger personal networks. Snowball sampling is not suitable for producing data that can be confidently generalized to larger populations, however, it is useful in formative research and in problem definition.⁹⁰

Experience has shown that this sampling method is practical and it has already been used to study a number of different hidden populations involved in illegal activities including illicit drug use, drug injectors⁹¹⁻⁹⁵, commercial sex workers⁹⁶⁻⁹⁸ and men who have sex with men.⁹⁸⁻¹⁰⁰

In some studies about smoking, snowballing technique has been used. The study of peers and adolescents smoking revealed that

peers contributed to tobacco use in adolescents.¹⁰¹ In a qualitative of Canadian and English students' beliefs about water pipe smoking, twelve interviews were obtained by snowballing technique to reveal students' beliefs about water pipe smoking.¹⁰² One study suggested that snowball sampling was a potentially useful recruitment method for analytical studies which were focused on associations between variables.¹⁰³

3. Knowledge gap

Previous studies about illicit cigarette were based on secondary data analysis, qualitative design, and survey of smokers among the general population. Studies on actual smoking behaviours among illicit cigarette users are difficult and challenging to conduct due to its illegal nature.

4. Conceptual framework

From the literature review, factors associated with cigarette smoking can be classified into 3 domains, namely socio-demographic, environmental, and personal factors. Thus, this research study investigated factors associated with illicit cigarette consumption in baseline characteristics, knowledge on illicit tobacco control policy, attitude towards increasing the legal cigarette price,

patterns of smoking, and products attributes as shown in the conceptual framework of the study in **Figure 6**.

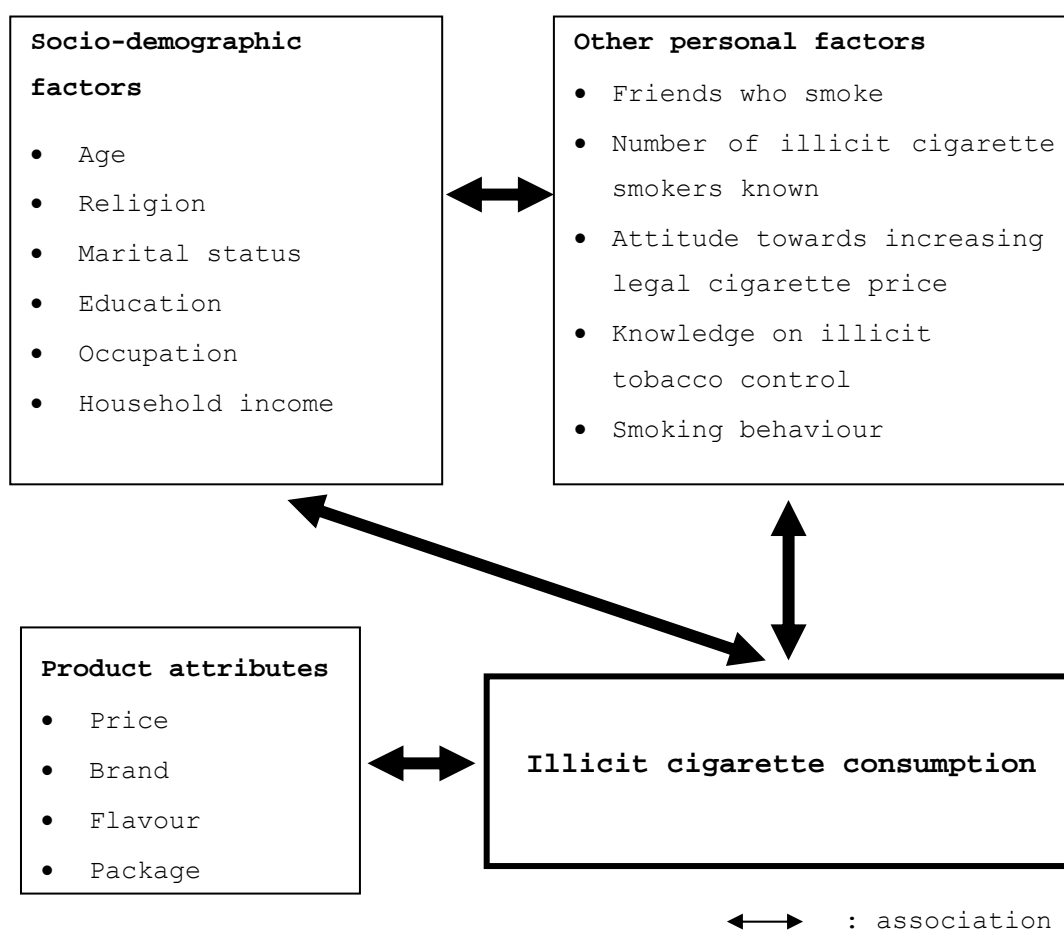


Figure 6: Conceptual framework of the study

5. Rationale of the study

In Thailand, the "SimSmoke" simulation model indicated that an excise tax could reduce the prevalence of smoking by 25% from 1994 to 2006.¹⁰⁴ In 2009, the government increased the tax rate to 85% of the retail price. The current overall smoking rate subsequently decreased to 20.7%. The trend of current adult occasional tobacco smoking prevalence, however, increased to 2.58% compared to 1.54% in 1991. Moreover, the smoking prevalence among smokers aged under 25 years increased, especially in the southern region which had the highest smoking prevalence.³⁵

Illicit cigarettes seized in southern Thailand have had high volumes in recent years. The report of illicit cigarette seized in southern Thailand from the year 2008 to 2010 had increasing trends. The high volumes of illicit cigarettes seized in southern Thailand were found mostly in the border provinces close to Malaysia, especially in Songkhla province.⁴¹

The high magnitude of illicit cigarette trade in southern Thailand offers an opportunity to examine the situation of illicit cigarette consumption. Understanding behaviours and associated factors of illicit cigarettes consumption may provide useful information for policy decision makers.

6. Research questions

1. What is the situation of illicit cigarette consumption in a border province of southern Thailand?
2. What are the factors associated with illicit cigarette consumption?
3. Do different geographic areas affect the smoking behaviour of illicit cigarette smokers?

7. Objectives

7.1 General objective

This study aims to identify smoking behaviours and associated factors of illicit cigarette consumption in a border province of southern Thailand.

7.2 Subsidiary objectives

1. To compare the characteristics of illicit and non-illicit cigarette smokers,
2. To compare smoking behaviours of illicit cigarette smokers in different geographical areas,
3. To find the associated factors of illicit cigarette consumption.

Chapter 2: Methodology

1. Research methodology

1.1 Study design

A survey with a modified snowballing technique and a qualitative study were conducted.

1.2 Study setting

The study was done in Songkhla province, a border province of southern Thailand. A survey was conducted in three districts characterized by different geographical areas. Sadao district is located on the border of Malaysia, Hat Yai district is the biggest trade center in southern Thailand, and Ranot district is mostly a rural area which is 99 and 143 kms away from Hat Yai and Sadao districts, respectively.

1.3 Study sample recruitment

The illegal nature of illicit cigarette trade and consumption makes illicit cigarette smokers a hidden population. Therefore, a modified snowball survey was used to recruit subjects.

An eligible participant in each district was randomly selected from attendees of a smoking cessation clinic in the district. These three subjects, known as seeds, were then asked to invite other illicit and non-illicit cigarette smokers from their social network. One illicit cigarette smoker from this wave who was willing to be a recruiter was randomly selected and asked to invite other illicit and non-illicit cigarette smokers from his social network, known as the second wave of recruitment. The recruitment process was continued until the required sample size of 100 illicit and 50 non-illicit cigarette smokers were reached as shown in **Figure 7**.

The criteria of eligible selection was 1) an illicit cigarette smoker, 2) knew at least 3 other illicit cigarette smokers, and 3) willing to be a recruiter. Consecutive illicit cigarette smokers were asked to select one recruiter in each wave and there was no limit to the number of recruitees.

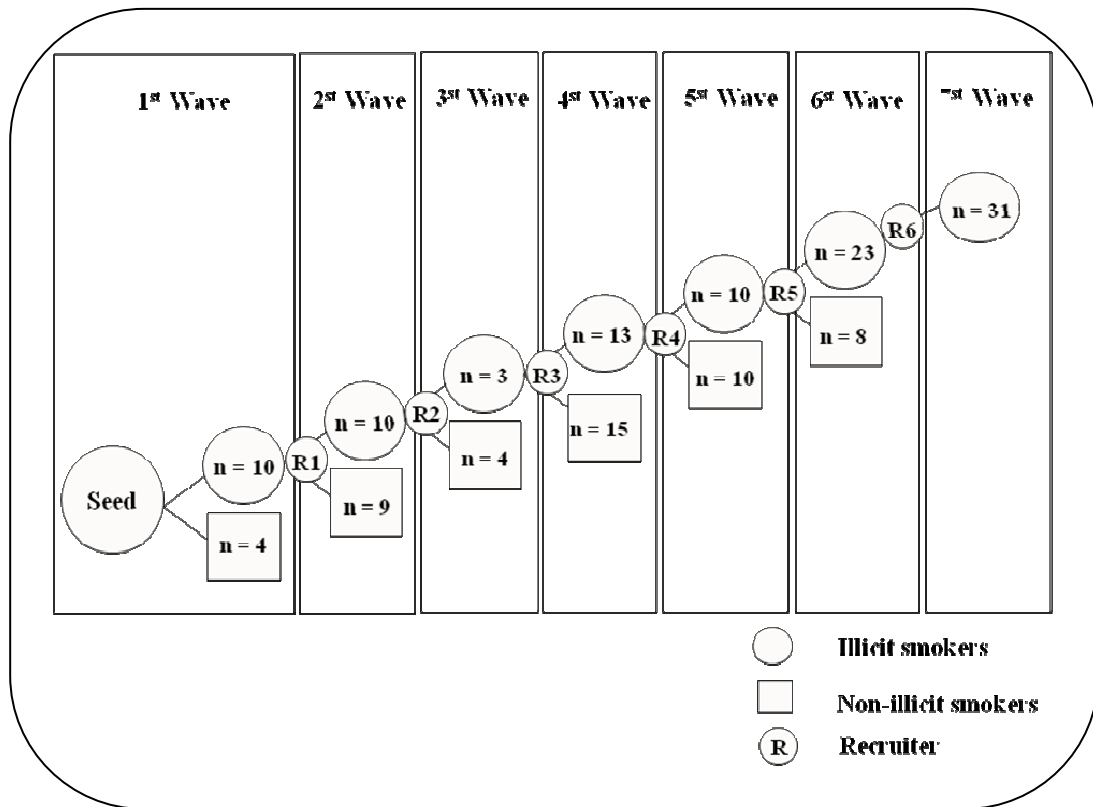


Figure 7: Recruitment of the subjects in one of the three study districts

1.4 Study sample

The study sample included male smokers aged 15 years and above who had lived in the study area for more than 6 months.

1.4.1 Inclusion criteria

The subjects included 2 types of smokers. Illicit cigarette smoker was defined as a current smoker who had purchased and smoked at least three packets of illicit cigarettes during the past 6 months. Non-illicit cigarette smoker was defined as a current smoker who had never purchased and never smoked any illicit cigarettes.

1.4.2 Exclusion criteria

Smokers who could not communicate were excluded in this study.

1.5 Sample size

The sample size was calculated based on the formula for comparing two population proportions¹⁰⁵ between smokers exposed to associated factors who smoked non-illicit cigarettes ($p = 0.5$) and those who smoked illicit cigarettes ($p = 0.2$) to detect associated factors with an odds ratio of at least 2. A design effect of 1.2 and a ratio of 2:1 between illicit and non-illicit cigarette smokers were used, as shown below.

$$n = \frac{[Z_{1-\alpha/2} \sqrt{p(1-p)(1+1/r)} + Z_{\beta} \sqrt{p_1(1-p_1) + p_2(1-p_2)/r}]^2}{\Delta^2} \times \text{deff}$$

$Z_{\alpha/2} = 1.96$, $\alpha = 0.05$, $Z_{\beta} = 0.84$, $\beta = 0.20$, $p_1 = 0.5$, $p_2 = 0.2$,

OR = 2, and with design effect (deff) = 1.2

The sample size of 50 non-illicit smokers (n1) and 100 illicit smokers (n2) were required from each district. In conclusion, 150 non-illicit and 300 illicit cigarette smokers were needed in this study.

1.6 Operational definitions

1.6.1 Illicit cigarette

Illicit cigarette was defined if the packet contained any of the following three characteristics: no domestic excise tax stamp, no health warning label, having "mild or light or low tar" labels.

1.6.2 Non-illicit cigarette

Non-Illicit cigarette was defined if the cigarette packet had a domestic excise tax stamp, health warning label and had no "mild or light or low tar" labels.

1.6.3 Illicit cigarette smoker

Illicit cigarette smoker was defined as a current smoker who has purchased and smoked at least three packets of illicit cigarettes during the past 6 months.

1.6.4 Non-illicit cigarette smoker

Non-illicit cigarette smoker was defined as a current smoker who had neither purchased nor smoked any smuggled cigarettes during their life.

1.7 Study variables

1.7.1 Independent and outcome variables

Table 4: Independent and outcome variables

Variable	Scale of measurement
▪ Baseline characteristics	
Age	Integer
Religion	Categorical <ul style="list-style-type: none"> ▪ Buddhism, Islam
Marital status	Categorical <ul style="list-style-type: none"> ▪ Single, married, divorced, widowed
Education	Categorical <ul style="list-style-type: none"> ▪ Elementary, junior high school, senior high school, diploma, bachelor degree

Table 4: Independent and outcome variables (cont.)

Variable	Scale of measurement
▪ Baseline characteristics	
Occupation	Categorical <ul style="list-style-type: none"> ▪ Student, government service, farmer, merchant, employee
Household income	Integer
▪ Personal factors	
Number of friends who smoked	Discrete
Number of illicit cigarette smokers known	Discrete
Attitude toward increasing legal cigarette price	Categorical <ul style="list-style-type: none"> ▪ Agree, Disagree
Knowledge on illicit tobacco control	Ordinal <ul style="list-style-type: none"> Low (<40%) Moderate (41-80%) High (>80%)
▪ Accessibility of cigarette	
Source of information to purchase cigarette	Categorical <ul style="list-style-type: none"> ▪ Oneself, friends, cigarette shop
Place where cigarettes were obtained	Categorical <ul style="list-style-type: none"> ▪ Vendors, other persons, alcohol and cigarette store
Reason for smoking	Categorical <ul style="list-style-type: none"> ▪ Cheap price, good taste, best image
Encourage others to smoke	Dichotomous <ul style="list-style-type: none"> ▪ Yes, no
Cigarette price	Continuous

Table 4: Independent and outcome variables (cont.)

Variable	Scale of measurement
<ul style="list-style-type: none"> ▪ Smoking behaviour 	
Smoking periods	Continuous
Cigarettes smoked per day	Discrete
Days smoked per week	Discrete
Cigarette expenditure per month	Continuous
<ul style="list-style-type: none"> ▪ Characteristic of illicit cigarette 	
Illicit cigarette identification	Categorical <ul style="list-style-type: none"> ▪ No Thai language on packet ▪ Cheap price ▪ No domestic excise tax stamp ▪ Were not usually displayed for sale ▪ Hearsay (Heard from others)
Illicit cigarette packet	Categorical <ul style="list-style-type: none"> ▪ Barcode visible ▪ Health warning text displayed ▪ Pictorial health warning displayed ▪ Amounts of tar and nicotine indicated ▪ Thai domestic excise tax stamp affixed ▪ Country of manufacture
Outcome variable	
<ul style="list-style-type: none"> ▪ Illicit cigarette consumption 	Dichotomous <ul style="list-style-type: none"> ▪ Yes, no

1.7.2 In-depth interview guide in qualitative data

In the qualitative study, there were 5 items asked during the in-depth interview among seeds and recruiters.

- 1) Opinion towards increasing legal cigarette price
- 2) Marketing strategies of illicit cigarette trade
- 3) Opinion about quality of illicit cigarettes
- 4) Opinion on the way to reduce illicit cigarette consumption problem
- 5) Magnitude and situation of illicit cigarette consumption in the community

1.8 Data collection

1.8.1 Preparatory phase

The questionnaire in the study was modified from the Global Youth Tobacco Survey (GYTS).¹⁰⁶ Before data collection, the questionnaire was tested on 10 illicit and 5 non-illicit smokers in Tamot district, Phatthalung province which was not in the study site.

1.8.2 Data collection

Data were collected using a structured questionnaire via face-to-face interviews. The questionnaire covered general socio-demographic

characteristics, accessibility of cigarettes, attitude and knowledge of illicit tobacco control policy, cigarette prices and demands, and behaviour on illicit and non-illicit cigarette consumption. Before interview, each participant was given a full explanation about the research, and after verbally agreeing to participate, a written informed consent was obtained. Then an interview was performed by one researcher in a private room. Illicit cigarette smokers were asked if they were carrying any illicit cigarettes with them and if so, were asked to produce them for inspection of the packet. Incentive was given to a certain extent for transportation to the clinic and time spent for the interview.

An in-depth interview was conducted among the seeds and recruiters from the sample recruitment. The in-depth interview guide was thematic and flexible to explore the hidden situation, smoking behaviour, and associated factors of illicit cigarette consumption in the study areas. All in-depth interviews were manually recorded and the duration of interview varied between 60 to 90 minutes (**Figure 8**).

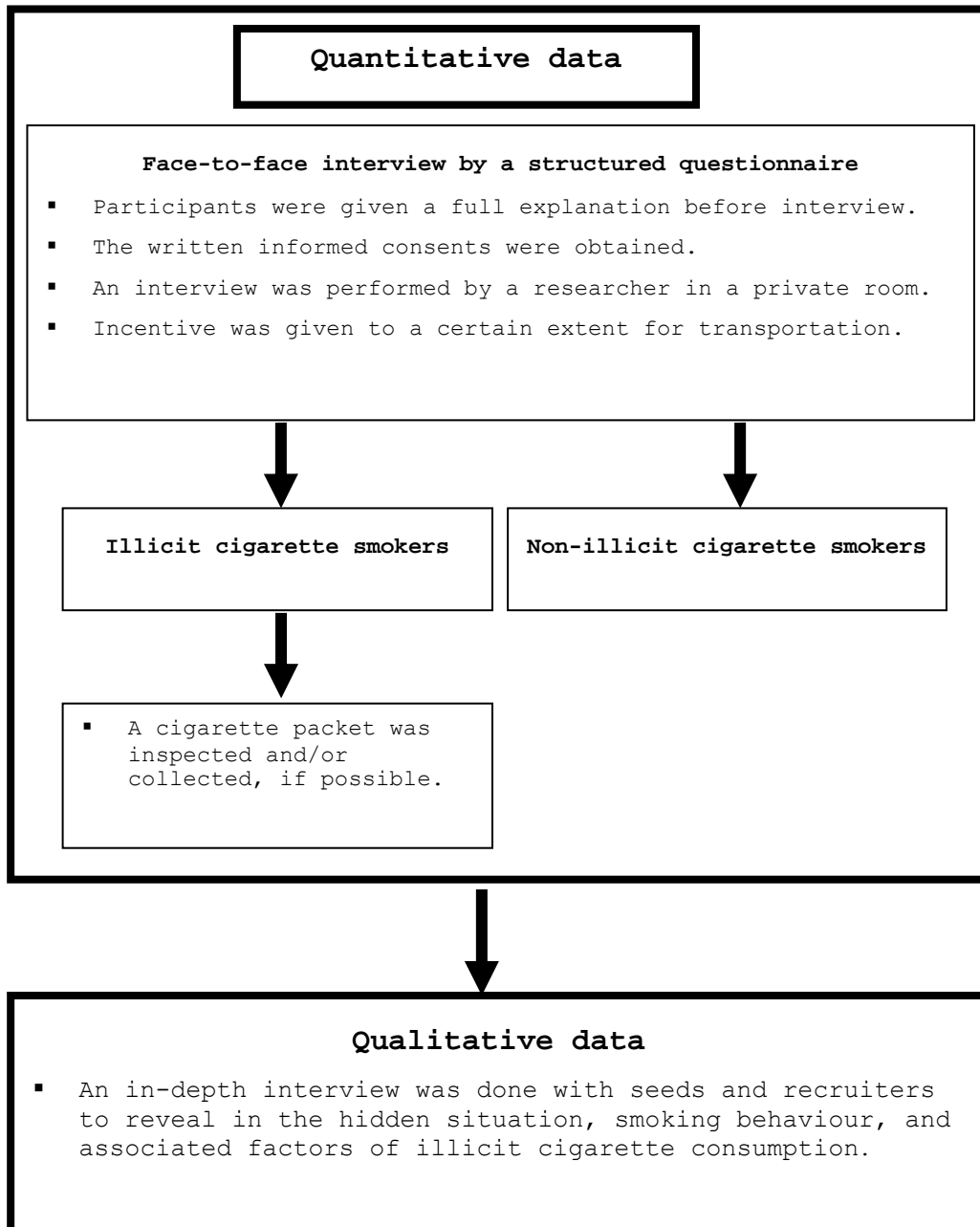


Figure 8: Process of data collection

1.9 Data management and statistical analysis

1.9.1 Quantitative data

All questionnaires were checked for completeness, correctness and internal consistency to find out missing or inconsistent data. The data from the questionnaire were entered into a computer using EpiData version 3.1¹⁰⁷ and transferred R version 2.12.1¹⁰⁸ for analysis. Survey package¹⁰⁹ was used to adjust for the clustering effect due to the use of snowballing technique. Summary statistics and standard errors were used to describe study variables. Tabulation of independent variables was performed to compare between illicit and non-illicit cigarette smokers and to compare among three different geographical areas. Those variables showing any difference between the illicit and non-illicit cigarette smokers at $p \leq 0.2$, in addition to selected parameters of associated factors, were included in initial multivariate survey logistic regression models. The models were refined by successive removal of variables showing no statistically significant contribution to the fitted model. Likelihood ratio test p-values ≤ 0.05 were considered as statistically significant. A dose-response relationship was also tested when appropriate.

1.9.2 Qualitative data

Content analysis was used for data collected from the in-depth interviews. Condensed and coded for creating categories, and themes describing both the manifest and the latent meaning were created manually. Field observation notes were also used to help evaluate the revelation in data collection and the analytical process.

2. Ethical consideration

Ethical approval was sought and received from the Ethics Committee of the Faculty of Medicine, Prince of Songkla University, Thailand. Details of the study were given to all eligible participants. Only those who were willing to participate in the study were recruited and a written informed consent was obtained from all respondents before their participation. All potential participants in the study were informed that the study caused no potential physical harm to any participants. The researcher ensured that the interview was conducted in a private room and all information was kept confidential to the research staff only.

3. Budget

This study was supported by Tobacco Control Research and Knowledge Management Center (TRC) and Thai Health Promotion Foundation (ThaiHealth).

Chapter 3: Results

1. Recruitment of study subjects

A total of 300 illicit and 150 non-illicit cigarette smokers were recruited by 3 seeds and 13 recruiters. There were 7 waves of recruitment process in Ranot by a seed and 6 recruiters, 5 waves of recruitment process in Sadao by a seed and 4 recruiters and 4 waves of recruitment process in Hat Yai by a seed and 3 recruiters. The non-response rate was 7.3% (27 illicit and 6 non-illicit cigarette smokers). The proportion of illicit and non-illicit cigarette smokers in each cluster is shown in **Table 5**.

2. Magnitude of cigarette consumption in the study areas

Figure 9 shows the distribution of type of cigarette most often smoked by each illicit cigarette smoker by district. The proportion of illicit cigarettes smoked among illicit cigarette smokers was high, particularly in Ranot and Hat Yai. Hand-rolled cigarette was the most common in Sadao whereas non-illicit cigarette was more common in Ranot.

Among non-illicit cigarette smokers, the total numbers of hand-rolled cigarettes were higher than non-illicit cigarettes in Sadao and Ranot. However, non-illicit cigarette was slightly more common in Hat Yai (**Figure 10**)

Table 5: Distribution of study subjects

Cluster	Type of cigarette smoker		Total (n=450) n (%)
	Illicit(n=300)	Non-illicit(n=150)	
	n (%)	n (%)	
Ranot district			
1	10 (3.3)	4 (2.7)	14 (3.1)
2	10 (3.3)	9 (6.0)	19 (4.2)
3	3 (1.0)	4 (2.7)	7 (1.6)
4	13 (4.3)	15 (10.0)	28 (6.2)
5	10 (3.3)	10 (6.7)	20 (4.4)
6	23 (7.7)	8 (5.3)	31 (6.9)
7	31 (10.3)	0 (0.0)	31 (6.9)
Sadao district			
8	25 (8.3)	7 (4.7)	32 (7.1)
9	11 (3.7)	5 (3.3)	16 (3.6)
10	21 (7.0)	6 (4.0)	27 (6.0)
11	23 (7.7)	20 (13.3)	43 (9.6)
12	20 (6.7)	12 (8.0)	32 (7.1)
Hat Yai district			
13	16 (5.3)	22 (14.7)	38 (8.4)
14	53 (17.7)	11 (7.3)	64 (14.2)
15	18 (6.0)	10 (6.7)	28 (6.2)
16	13 (4.3)	7 (4.7)	20 (4.4)

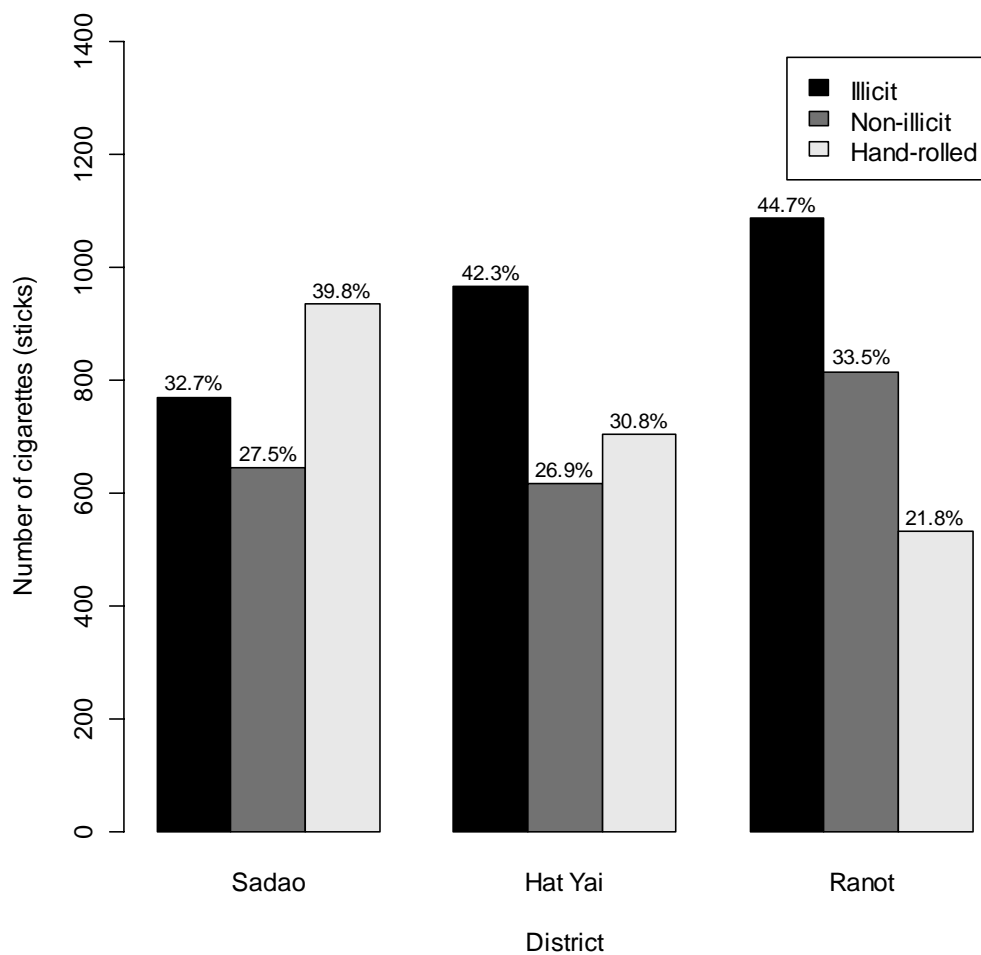


Figure 9: Total number of cigarettes smoked per day among illicit cigarette smokers by area

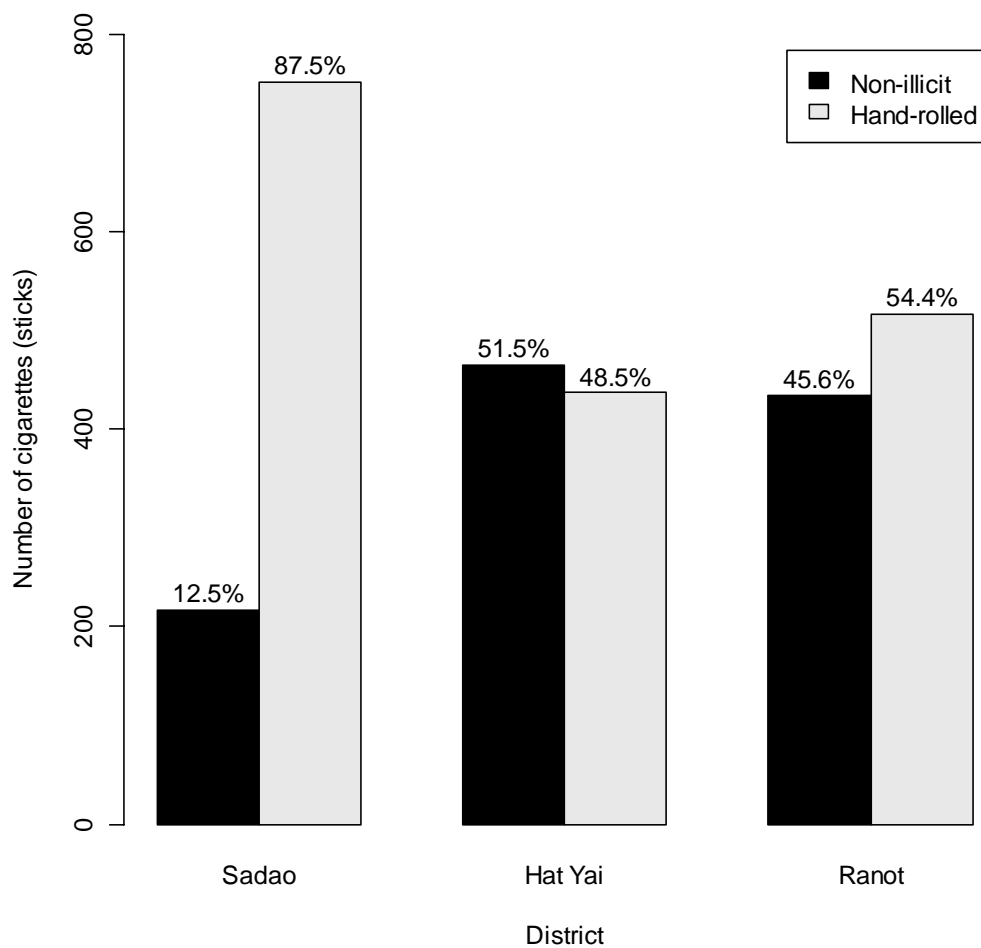


Figure 10: Total number of cigarettes smoked per day among non-illicit cigarette smokers by area

3. Characteristics of illicit and non-illicit cigarette smokers

Illicit cigarette smokers were significantly younger, and had a higher education (high school level). Almost all smokers smoked more than one type of cigarette. Illicit smokers had a higher average monthly expenditure on cigarettes, had a shorter smoking duration, knew more people who also smoked illicit cigarettes, and had a higher knowledge of illicit tobacco control policies. Religion, occupation, monthly household income, number of close friends who smoked, cigarettes smoked per day, days smoked per week, and attitude toward increasing cigarette taxes were not significantly different between the two groups (**Table 6**).

Table 6: Comparison of baseline characteristics between illicit and non-illicit cigarette smokers

Characteristic	Illicit smokers	Non-illicit smokers	p-value*
	n (%)	n (%)	
Age (years) (mean±SE)	32.7±0.9	41.1±1.7	<0.001
Religion			0.28
Buddhism	139 (46.3)	83 (55.3)	
Islam	161 (83.7)	67 (44.7)	
Marital status			0.002
Single	121 (40.3)	35 (23.3)	
Married	175 (58.4)	107 (71.4)	
Divorced/widowed	4 (1.3)	8 (5.3)	
Education			0.002
Elementary	113 (37.6)	85 (56.7)	
Junior high school	83 (27.7)	20 (13.3)	
Senior high school	62 (20.7)	23 (15.3)	
Diploma/Bachelor degree	42 (14.0)	22 (14.7)	
Occupation			0.056
Student	21 (7.0)	15 (10.0)	
Government service	5 (1.7)	4 (2.7)	
Farmer	73 (24.3)	54 (36.0)	
Merchant	44 (14.7)	15 (10.0)	
Employee	157 (52.3)	62 (41.3)	
Monthly household income (THB/month)			0.88
(mean±SE)	21665.0±1544.6	21263.3±1925.7	

*p-value from likelihood ratio test

Table 6: Comparison of baseline characteristics between illicit and non-illicit cigarette smokers (cont.)

Characteristic	Illicit smokers	Non-illicit smokers	p-value*
	n (%)	n (%)	
Smoking duration (years) (mean±SE)	16.7±0.7	24.5±1.8	<0.001
Number of all cigarettes smoked per day (mean±SE)	17.0±0.8	17.4±0.8	0.67
Days smoked per week (mean±SE)	6.9±0.0	6.8±0.1	0.25
Total cigarette expenditure (THB/month) (mean±SE)	830.7±50.9	647.8±57.7	0.027
Number of friends who smoked (persons) (mean±SE)	7.6±0.6	7.6±0.4	0.97
Number of illicit smokers known (persons) (mean±SE)	25.9±3.2	16.9±5.8	0.022
Attitude towards increasing the legal cigarette price			0.45
Not agree	214 (71.3)	101 (67.3)	
Agree	86 (28.7)	49 (32.7)	
Knowledge on illicit tobacco control policy			0.016
Low (<40%)	4 (1.3)	7 (4.7)	
Moderate (40-80%)	63 (21.0)	48 (32.0)	
High (>80%)	233 (77.7)	95 (63.3)	

*p-value from likelihood ratio test

4. Pattern and types of cigarette used among illicit and non-illicit cigarette smokers

As shown in **Table 7**, almost all smokers smoked more than one type of cigarette. Four patterns were found among illicit cigarette smokers including only illicit cigarette, illicit combined with hand-rolled cigarettes, illicit combined with non-illicit cigarettes, and more than half of them smoked illicit cigarette, hand-rolled, and non-illicit cigarettes. Two patterns were observed among non-illicit cigarette smokers including only non-illicit cigarette and majority of them smoked both non-illicit and hand-rolled cigarettes.

Table 7: Pattern of smoking among illicit and non-illicit cigarette smokers

Pattern	n (%)
Pattern among illicit cigarette smokers	
Only illicit cigarette	14 (4.7)
Illicit cigarette combined with hand-rolled cigarette	79 (26.3)
Illicit cigarette combined with non-illicit cigarette	35 (11.7)
Illicit cigarette, hand-rolled, and non-illicit cigarettes	172 (57.3)
Pattern among non-illicit cigarette smokers	
Only non-illicit cigarette	28 (18.7)
Non-illicit cigarette combined with hand-rolled cigarette	122 (81.3)

5. Price and demand of illicit cigarettes

Almost all illicit cigarette smokers (95.3%) commonly smoked more than one type of cigarette. Prices of illicit cigarettes varied between 18-55 THB/packet. Overall, the price of illicit cigarettes was inversely related to the total number of cigarettes smoked per day with a dose-response relationship ($p < 0.001$). Among smokers who smoked illicit cigarettes with lower price had higher consumption of illicit and non-illicit cigarettes with a dose-response relationship ($p < 0.002$, $p < 0.001$). However, illicit cigarette prices above 35 THB (1.1 USD) per packet caused smokers to purchase more of hand-rolled cigarettes as shown in **Figure 11**.

Non-illicit cigarette prices were less varied (45-65 THB/packet) than illicit cigarettes. Consumption of non-illicit cigarettes and illicit cigarettes was stable across the price range of non-illicit cigarettes. The average number of hand-rolled cigarettes tended to be higher in higher price of non-illicit cigarettes but this was not statistically significant (**Figure 12**).

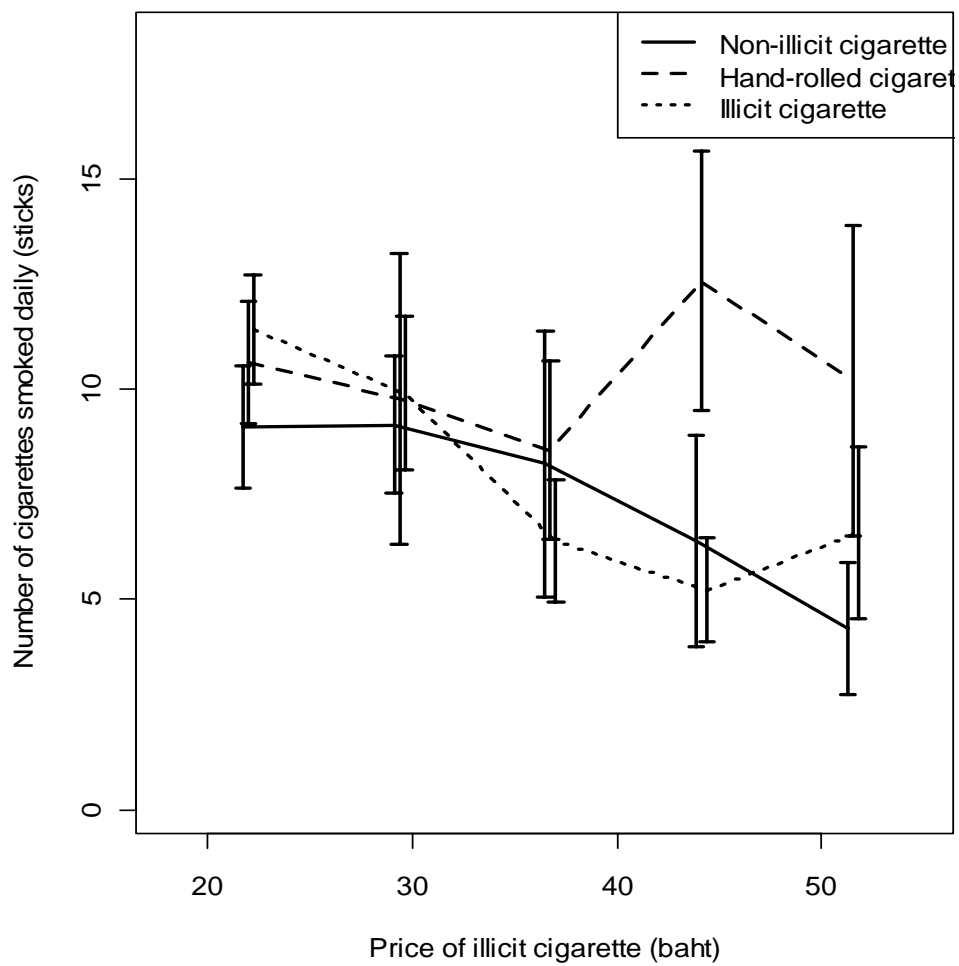


Figure 11: Number of cigarettes smoked per day by price of illicit cigarette

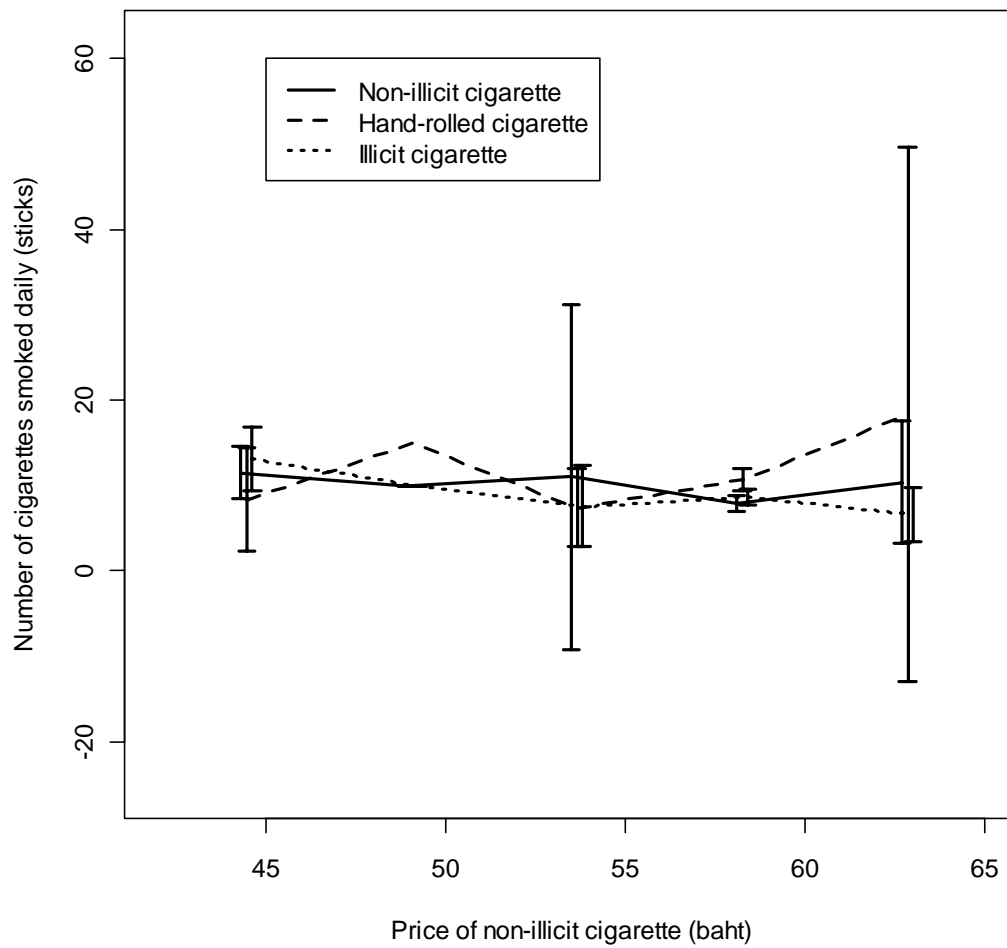


Figure 12: Number of cigarettes smoked per day by price of non-illicit cigarette

6. Smoking behaviours of illicit cigarette smokers by district

Among the three study areas, illicit cigarette purchases and consumption were different in terms of common place of purchase, main reasons for smoking, price, smoking duration, as well as pattern of smoking (**Table 8**).

Small shops were the most common place to purchase illicit cigarettes in all districts. In Hat Yai, illicit cigarettes were also commonly purchased from liquor and tobacco stores. In Ranot, however, a direct sale of illicit cigarettes was commonly reported. Duration of smoking illicit cigarettes in Ranot was lower than the other two districts. Friends were the most common source of information about illicit cigarettes and were the key person who encouraged illicit cigarette consumption.

The common reason for illicit cigarette consumption in all areas was low price. However, favouring of cigarette taste was the most common reason reported in Sadao where the average price of illicit cigarettes per pack was significantly higher than Ranot but was not different with Hat Yai.

Almost all illicit cigarette smokers (95.3%) smoked illicit cigarettes combined with non-illicit and hand-rolled cigarettes. The number of illicit cigarettes smoked per day across three areas

was not significantly different. However, number of hand-rolled cigarettes smoked per day was mostly reported in Sadao and was significantly different with other districts. Number of non-illicit cigarettes was lowest in Sadao and was significantly different with Ranot but not Hat Yai. Friends were source of information about places that sold illicit cigarettes and were the factor causing initial consumption of illicit cigarettes across all three areas, however, this was not significantly different.

Table 8: Smoking behaviour of illicit cigarette smokers by district

Characteristic	Sadao	Hat Yai	Ranot	p-value*
	n (%)	n (%)	n (%)	
Main place illicit cigarette purchased				<0.001
Vendors	94 (94.0) ^{a,b}	75 (75.0) ^{a,b}	76 (76.0) ^{a,b}	
Other persons	6 (6.0)	3 (3.0)	24 (24.0)	
Alcohol and cigarette stores	0 (0.0)	22 (22.0)	0 (0.0)	
Had ever encouraged others to smoke illicit cigarettes	25 (25.0) ^{a,b}	40 (40.0) ^{a,b}	56 (56.0) ^a	0.016
Main reason for smoking illicit cigarettes				<0.001
Cheap price	35 (35.0) ^{a,b}	74 (74.0) ^{a,b}	99 (99.0) ^{a,b}	
Good taste	64 (64.0)	24 (24.0)	1 (1.0)	
Good image	1 (1.0)	1 (1.0)	0 (0.0)	

* p-value from the likelihood ratio test

^{a, b} The same superscript shows significantly different among groups

Table 8: Smoking behaviour of illicit cigarette smokers by district (cont.)

Characteristic	Sadao	Hat Yai	Ranot	p-value*
	mean±SE	mean±SE	mean±SE	
Price of illicit cigarettes per pack usual purchased (THB)	25.7±1.9 ^{a,b}	16.8±2.0 ^{a,b}	18.2±2.4 ^a	<0.001
Duration of smoking illicit cigarettes (years)	3.0±0.1 ^a	2.9±0.7 ^b	0.9±0.1 ^{a,b}	<0.001
Number of cigarettes smoked daily				
Illicit cigarettes	5.1±0.6	6.4±1.1	7.2±1.0	0.283
Hand-rolled cigarettes	11.2±0.9 ^a	7.6±1.0 ^a	6.9±0.6 ^a	0.001
Non-illicit cigarettes	5.7±0.9 ^a	7.2±0.5	8.3±0.6 ^a	0.020

* p-value from the likelihood ratio test

^{a, b} The same superscript shows significantly different among groups

Table 8: Smoking behaviour of illicit cigarette smokers by district (cont.)

Characteristic	Sadao	Hat Yai	Ranot	p-value*
	n (%)	n (%)	n (%)	
Factor causing initial consumption of illicit cigarettes				0.716
Invitation by friends	65 (65.0)	56 (56.0)	79 (79.0)	
Own decision	35 (35.0)	44 (44.0)	21 (21.0)	
Source of information about places that sold illicit cigarettes				0.155
Oneself	26 (26.0)	17 (17.0)	17 (17.0)	
Friends	74 (74.0)	83 (83.0)	78 (78.0)	
Cigarette shop	0 (0.0)	0 (0.0)	5 (5.0)	

* p-value from the likelihood ratio test

7. Factors associated with illicit cigarette consumption

The final model shows that age and number of illicit smokers known were associated with illicit cigarette consumption. The odds of illicit cigarette smoking tended to decrease with increasing age with a dose response relationship. Education was not significantly associated with illicit cigarette consumption (Table 9).

Table 9: Factors associated with illicit cigarette smoking

Variable	OR (95% CI)		p-value*
	Crude	Adjusted	
Age (years)			0.001 [‡]
<21	(ref)	(ref)	
21-30	0.7 (0.4,1.2)	0.7 (0.4,1.3)	
31-40	0.3 (0.1,0.9)	0.4 (0.2,1.1)	
41-50	0.2 (0.1,0.6)	0.2 (0.1,0.6)	
>50	0.1 (0.0,0.3)	0.2 (0.1,0.3)	
Education			0.13
Elementary	(ref)	(ref)	
Junior high school	3.1 (1.5,6.3)	2.1 (1.1,4.0)	
Senior high school	2.0 (1.4,2.9)	1.3 (0.8,1.9)	
Diploma/Bachelor	1.4 (0.7,2.9)	1.1 (0.5,2.4)	
Illicit smokers known (persons)			<0.001
<11	(ref)	(ref)	
11-20	3.3 (2.1,5.4)	3.2 (2.1,4.7)	
>20	5.0 (2.8,8.9)	5.5 (3.0,9.9)	

*p-value from likelihood ratio test

[‡]significant linear trend at p-value <0.001

ref: Reference group

8. Characteristics of illicit cigarettes and their packets

Table 10 shows the top three methods that smokers were able to identify their illicit cigarettes, which were no Thai language on packet, cheap price, and no domestic excise tax stamps. As shown in **Table 11**, most illicit cigarette smokers (87.7%) showed their illicit cigarette packets. The requested illicit cigarette packets had similar appearance to non-illicit cigarettes in term of bar code, health warning label, and amount of tar and nicotine. None of them had Thai domestic excise tax stamp affixed. Most of them were made in Malaysia or Indonesia.

Table 10: Characteristics of illicit cigarettes identified by illicit cigarette smokers (n=300)

Characteristic	n (%)
(Not mutually exclusive)	
No Thai language on packet	153 (51.0)
Cheap price	128 (42.7)
No domestic excise tax stamp	81 (27.0)
Were not usually displayed for sale	27 (9.0)
Hearsay (heard from others)	26 (8.7)

Table 11: Characteristics of illicit cigarette packets identified by interviewer (n=263)*

Characteristic	n (%)
Barcode visible	263 (100.0)
Health warning text displayed	247 (93.9)
Pictorial health warning displayed	142 (53.9)
Amounts of tar and nicotine indicated	127 (48.3)
Thai domestic excise tax stamp affixed	0 (0.0)
Country of manufacture	
Malaysia	147 (55.9)
Indonesia	94 (35.7)
Macau	20 (7.6)
US	2 (0.8)

*37 subjects were not carrying any cigarette packets during the interview.

9. Qualitative results from in-depth interview

Content analysis of qualitative data reported the important themes in marketing and price strategies of illicit cigarettes, attitudes towards cigarette price and tobacco taxation, and attitude towards quality and use of illicit cigarettes.

9.1 Marketing and price strategies of illicit cigarettes

The main marketing feature of the product was its cheap price. Illicit cigarettes have been introduced in Hat Yai and Sadao for more than 20 years and spread to suburban and rural areas recently. Illicit cigarettes are widely known by community residents. Strategies of marketing included offering cheap cigarettes for sale when smokers purchased other types of cigarettes, display of an advertisement sign such as "Cheap cigarettes are available here", and requesting customers to share information about product availability to their social network. In turn, smokers also asked for cheap cigarettes from the shop sellers. Relatives, family members and close friends could buy the illicit cigarettes from a trade centre area nearby and sell to their social network members with some small profit. Also, the cigarettes could be sold in individual sticks instead of in packets to allow those with low incomes, such as youth, to buy in small quantities (**Box 1**).

Box 1: Quotations of marketing and price strategies of illicit cigarettes

I1 *"My friend and I know a person who sells illicit cigarettes in our village"*

I2 *"Besides me, there were many smokers who know someone who sells illicit cigarettes, even people who do not smoke"*

I3 *"It's easy to buy illicit cigarettes, nearly all people in my village know the shop to buy them from"*

I4 *"At present, almost all of my friends who smoke buy illicit cigarettes, sometimes I can share with them"*

I5 *"The seller told me that she had the cheap cigarettes for sale, she showed me the cigarette product, as it is nearly three times cheaper than my legal tobacco product so I bought a packet to first test its taste"*

I6 *"I know that cheap cigarettes were available from the board in front of the shop, so I asked the seller for those cigarettes"*

I7 *"The seller said to me to tell my friends that she has cheap priced cigarettes for sale in their shop"*

I8 *"I heard about foreign cigarettes which are much cheaper than Thai cigarettes, so I asked the seller if she had those cigarettes and she did not but she asked her relative in Hat Yai (the district where trade and shopping centres are located and is 50 kms away from the border) to look for those cigarettes for sale"*

I11 *"For me I can buy these cigarettes from my uncle, he makes a profit of 5 baht per packet"*

I13 *"My son works in the town and he comes back home every Sunday so he can buy those cigarettes for me. They are cheap, only 210 baht per carton, so that I can save my money for smoking"*

I16 *"The seller sold these cigarettes in sticks at 4 baht for one. It is easy for me to buy 3 sticks for 10 baht"*

9.2 Attitudes towards cigarette prices and tobacco taxation

Since tobacco is an addictive substance, it is difficult for smokers to quit completely, even with the high price of cigarettes. A pricing strategy might not be effective for nicotine addicts whereas it might be useful for preventing youths smoking. Addicted smokers can find other cheap products, such as illicit and hand-rolled cigarettes, replacing the expensive legal cigarette primarily for saving money and maintaining their smoking behaviour (**Box 2**).

Box 2: Quotations of attitudes towards cigarette prices and tobacco taxation

I3 "As I am unable to quit, it is good for me to have cheap cigarettes as I save money that way"

I5 "I think illicit cigarettes can replace factory made [ones] as I can't quit. If no cheap cigarettes I will have some problems in [affording] smoking"

I7 "I think, many smokers use illicit cigarettes because the price of Thai cigarettes are very expensive"

I9 "The high price is a good way to protect the teenagers from smoking, but it cannot protect everyone"

I10 "I think the cheap price will not encourage people to smoke but we smoke cheap priced cigarettes because we can't quit"

I11 "I don't agree with the government, the government gets a lot of tax revenue but we pay a lot"

I14 "It is unfair for us, we increase cigarette expenditure and the government gets more revenue"

I15 "Besides smoking illicit cigarettes to save money, I also smoke hand-rolled cigarettes which allow me to save my money"

9.3 Attitude towards quality and use of illicit cigarettes

Regardless of the quality of illicit cigarette products, and regardless of the potential to be more harmful than that of non-illicit cigarettes, smokers still accepted to buy them primarily for reducing their cigarette expenditure. Some complained that illicit cigarettes had more effects on their health, thus they also used hand-rolled cigarettes to dilute the harmful effects of the illicit cigarette while still saving money. The taste of illicit cigarettes was not different from the taste of non-illicit cigarettes. Reasons for replacing hand-rolled cigarettes with illicit cigarettes were lower cost and convenience and time saved by not having to roll a cigarette. Smokers also felt that they provide them with a better image at work and give them more enjoyable social activities when smoking illicit cigarettes than hand-rolled cigarettes. Finally, some illicit cigarettes smokers mentioned co-use with other illicit substances (Box 3).

Box 3: Quotations of attitude towards quality and use of illicit tobacco products

I1 *"I have tested the illicit cigarettes smoked by blowing the smoke on my finger nail. They make my nail look dark brown in colour, more so than legal factory made cigarettes, but I still smoke nowadays"*

I2 *"I don't know if it is a good cigarette or not but I can smoke and I can save money"*

I4 *"I think it has a lower quality than legal cigarettes, and mostly when I am at home I smoke hand-rolled cigarettes but when I work, I mostly smoke illicit cigarettes"*

I9 *"I like its taste and I can smoke like Thai cigarettes as I smoked before"*

I10 *"I cannot roll cigarettes when I am in my business or when I go out as my friends do not like their smell, so I smoke illicit cigarettes"*

I11 *"To roll cigarettes takes time"*

I12 *"Sometimes it is not easy to roll cigarettes so I must buy illicit cigarettes instead"*

I13 *"I smoke these [illicit] cigarettes when I have party and I also smoke when I use other substances with my friends"*

Chapter 4 Discussion and conclusion

1. Discussion

1.1 Findings of the study

1.1.1 Difference of baseline characteristics between illicit and non-illicit cigarette smokers

In the present study, most illicit cigarette smokers were young single men with a high school level of education. They knew more other illicit cigarette smokers in their social network and were well aware of illicit cigarette control policies than non-illicit cigarette smokers. Previous studies have consistently reported that illicit cigarette smokers were in a younger age group with a high school education.^{87,110} This may be due to low income among this group, thus they try to purchase tax avoidance cigarettes from a private supplier.^{47,111} In addition, smoking of illicit cigarettes may look more acceptable to the youth compared to hand-rolled cigarettes (16.4% of illicit cigarette smokers did not smoke hand-rolled cigarette). As most illicit cigarette smokers were young single men, they had shorter smoking duration compared to most non-illicit cigarette smokers. Although no difference in number of cigarettes smoked per day was found, non-illicit cigarette smokers had lower cigarette expenditures than illicit cigarette smokers. Most non-illicit cigarette smokers (81.3%) combined their smoking pattern with hand-rolled cigarette. Hand-rolled cigarettes are 4 times cheaper than illicit cigarettes (most of hand-rolled cigarettes

were 7 THB per packet). Therefore, non-illicit cigarette smokers had low cigarette expenditures.

Household income was not different between illicit and non-illicit cigarette smokers. When many tobacco products, both illicit and non-illicit, are available in the market offering a large range of quality and prices, smokers regardless of any socio-economic status can easily access cigarettes of any kinds. A previous study in Taiwan found that personal income was not significantly associated with purchasing smuggled cigarettes.⁸⁴ In contrast, other study in the UK found smokers with low income were more likely to purchase smuggled cigarettes.^{83,85}

Both illicit and non-illicit cigarette smokers had no difference in number of close friends who smoked but illicit cigarette smokers knew more illicit cigarette smokers than non-illicit cigarette smokers did. Smokers are more likely to choose other smokers as their friends.^{112,113} There were no statistically significant differences in number of cigarettes smoked per day as well as days smoked per week between illicit and non-illicit cigarette smokers, a finding similar to another study of contraband cigarette consumption among adolescent daily smokers in Ontario, Canada.¹¹⁴

1.1.2 Smoking behaviours of illicit cigarette smokers in different geographical areas

In different geographic areas, illicit cigarette purchase and consumption were different in terms of common place of purchase, main reasons for smoking, price, smoking duration, and pattern of smoking.

A previous study in UK found that area of residence was associated with the decision to smoke smuggled cigarettes.⁸³ Smokers purchased illicit cigarettes from different sources, including the Internet, military bases, or out-of-state vendors.^{115,116} Smoking duration of illicit cigarettes differed in different geographic areas as well in terms of pattern of smoking. Low price was the main factor prompting smokers to purchase smuggled cigarettes.⁸⁴ This study found that price of illicit cigarettes rather than price of non-illicit cigarettes was the main reason for smoking illicit cigarettes. However, taste of illicit cigarettes was also found to be the main reason which most smokers reported in one study area. This may be due to the high consumption of the only brand of illicit cigarettes available in the border areas in which had high price and was commonly used with other substances. This co-use has made the price of this particular brand of illicit cigarettes two times higher than other brands.

The shortest duration of illicit cigarette smoking was observed in the rural area which was away from border and urban areas. Consistently, a UK study found that place of residence was associated with smoking.⁷⁹ Smokers living in non-deprived areas had a lower probability of purchasing smuggled tobacco.⁸³

1.1.3 Associated factors with illicit cigarette consumption

Age and number of other illicit cigarette smokers known were associated with illicit cigarette consumption in this study. Similar to other reports, age was highly associated with illicit cigarette consumption.^{47,110,117} Young smokers purchased low priced or illicit cigarettes to accommodate with an increasing price of legal cigarettes to save money and satisfy their smoking habits.⁸⁷

Social network was an important factor related to illicit cigarette consumption as also reported in other studies.^{82,111} These support networks could encourage smuggled cigarettes especially among low income smokers. Relatives or friends are an important source of information for smokers who smoke the same type of cigarettes and have the same objective to maintain their smoking as well as reducing their cigarette expenditure.

1.1.4 Price and demand of illicit cigarettes

The cheaper price of illicit cigarettes, two times lower than non-illicit cigarettes, was the strongest incentive of smokers to buy illicit cigarettes, similar in other previous studies.^{84,85,111} Although illicit cigarettes are more expensive than hand-rolled cigarettes, its convenience, taste, and image outweigh the cheap price of hand-rolled ones, especially among young adults. Young people are relatively sensitive to cigarette prices, thus they will increase their tobacco consumption when they find it easy to procure cigarettes.¹⁷

The qualitative study confirmed the results from a survey that price of illicit cigarette was the main reason for smokers to purchase and smoke illicit cigarettes. An economic analysis of tobacco control in Thailand found that price elasticity of demand for cigarettes among smokers who smoked legal cigarettes was -0.39 (the response of demand for tobacco to price changed with each 1% real price increased causing a fall in tobacco consumption of about 0.4%).⁶⁰ The cheaper price of illicit cigarettes compared to legal cigarettes, therefore was the main reason for smokers to smoke those products.

1.1.5 Illicit cigarette consumption in southern Thailand

This study shows that illicit cigarette consumption is still a hidden public health risk. It has increased substantially during the past three years. Smoking of illicit cigarettes was popular and socially acceptable by smokers in the study area. It is an alternative cigarette that has a lower price compared to non-illicit cigarettes. It was especially popular among young adults.

Purchasing of illicit cigarettes is done in the same manner as other goods in the community. Social network plays an important role in the spread of information regarding the illicit cigarette trade. There are many marketing strategies related to the promotion of illicit cigarettes such as cheaper prices, high variety of products, product advertisement, and the sale of individual sticks. The market price of illicit cigarettes affects their demand more than the price of non-illicit cigarettes.

The study was conducted in an area close to the Malaysian border where illicit cigarettes are highly prevalent.⁴¹ Most cigarette packets are smuggled in from Malaysia and Indonesia with no domestic excise tax stamps affixed. A variety of illicit cigarettes such as brand and price are available in the market for smokers to buy.

In the past, illicit cigarette packets did not have any health warnings which would be easily differentiate them from other legal cigarettes.¹⁷ This study found that many features found on legal cigarette packets were added to illicit cigarette packets, such as health warning labels, both in text and pictures, and the amount of tar and nicotine are contained. Absence of domestic excise tax stamps on imported cigarette packets was currently the best means to identify illicit cigarettes. However, the most distinguishable feature of illicit cigarettes is its cheaper price compared to non-illicit cigarettes.

Illicit cigarettes are not commonly displayed in shops. Thus social network plays an important role in providing information on places to purchase illicit cigarettes.⁸² Members in social network, friends, relatives, and family members could even be private sellers themselves as reported in this study. Small vendor shops are the most common place to purchase illicit cigarettes by subjects in this study whereas purchasing from duty free shops in cross border areas are rare. In this study, none of the subjects purchased illicit cigarettes from the Internet, different with the report from USA where the three most common places to buy illicit cigarettes were neighbourhood store, private supplier or importer, duty free shop or overseas, and the Internet.¹¹¹

Smokers find it difficult to stop smoking cigarettes. Many tobacco products, both illicit and non-illicit, are available in the market offering large ranges of quality and prices. Smokers usually smoke more than one type of tobacco product to lessen the harm and reduce their expenditure on cigarettes. The elderly smoke more numbers of hand-rolled cigarettes which has the cheapest price among the three types of cigarettes (around 4 to 8 times lower than illicit and non-illicit cigarettes).

Intensity of illicit cigarette consumption was not different in different geographical areas—border area, trade centre, and rural area. Marketing strategies, however, were different. Recently, in the last three years illicit cigarettes have gradually been spreading from border and trade centre areas to rural areas. Illicit cigarette consumption is still a hidden public health risk problem in southern Thailand.

1.2 Implications

This study reveals the current local situation of illicit cigarette consumption in southern Thailand. The tobacco industry has found ways to circumvent government policies on tobacco control. Packets of illicit cigarettes contain health warning labels, barcodes, and look similar to other legal packets. Seizure of illicit cigarettes and fines are effective ways to control illicit cigarette consumption reported by subjects in this study and elsewhere,³⁹ however wide-ranging involvement of social networks, high availability and easy access to illicit cigarettes are difficult barriers to overcome.

The number of illicit cigarettes in southern Thailand has increased in the last three years as evident by an increasing amount of illicit cigarettes seized.⁴¹ Since illicit cigarette products are varied, cheap, easy to access, and provide a better image of smoking than that of hand-rolled cigarettes, they have become popular during the last few years. In addition, due to the fact that the average price of a packet of illicit cigarettes (33 THB or 1.1 USD) is about half that of legal cigarettes (59 THB or 2 USD), the price of illicit cigarettes has a greater effect on illicit cigarette consumption than regular cigarettes have. Increased price of legal cigarettes can result in increased price of illicit cigarettes, however, the pricing policy should be done carefully. Moreover, increasing the price of hand-rolled cigarettes should be considered since it is another choice of cheap cigarettes for smokers.

1.3 Strengths of the study

Most previous studies on illicit cigarette consumption used secondary data or were based on surveys among smokers in the general population. This study used both quantitative and qualitative methods from illicit cigarette smokers compared to non-illicit smokers in a high prevalence area of illicit cigarette consumption. Information of illicit cigarette consumption was obtained from current illicit cigarette smokers to reveal the actual situation and smoking behaviours. Recruitment process by a modified snowballing technique was appropriate for this hard to reach population.

1.4 Limitations of the study

Due to the difficulty in reaching this population, the study used a modified snowballing technique to recruit study subjects. The clustering effect of social network may influence the study findings, however complex survey analysis adjusted for cluster was used in this study to accommodate the dependency of smokers in the same social networks. A study in one border province may not represent all other border areas around Thailand.

2. Conclusion and recommendation

2.1 Conclusions

The results of this study suggested that illicit cigarette consumption has become more acceptable by smokers as the reason to maintain their smoking behaviour as well as reducing their cigarette expenditure. Both price and non-price factors, such as age and social networks, are important factors associated with illicit cigarette consumption.

2.2 Recommendations

Tobacco control of illicit cigarette consumption should target the youth and young adults. The situation should also be monitored at the community level and illicit cigarettes should be included in a measurement of smoking problem. Fines and punishment for individual illicit cigarette smokers are difficult to be enforced since they are difficult detect. Systematic control measure may be more effective in tobacco control policy. Further studies should be conducted in highly prevalent areas of illicit cigarette trade in other parts of Thailand.

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Appendices

Appendix I: Invitation to participate form

Project: "Determinants of smuggled cigarette consumption in a border province in southern Thailand"

Information Sheet for the respondents participating in the research titled "Determinants of smuggled cigarette consumption in a border province in southern Thailand"

Purpose of the research:

This study aims to examine the smoking behavior and determinants of smuggled cigarette consumption.

Procedure:

If you decide to take part in this study, you will be interviewed by a researcher about your smoking behaviour in a private room. This interview will take approximately 50 minutes.

Risks and Discomforts:

There is no physical risk or harm to participate in this study. Your information will be kept confidential to research staff only.

Benefits:

The information we receive from you will be analysed with information obtained from others. The findings from the analysis will potentially become an input for policy decision making on tobacco control.

Compensation:

In case you are asked to recruit new participants, you will receive 100 baht for your kind effort at each successful contact and interview. Otherwise, you will receive 100 baht for your participation in the project.

Confidentiality:

We will give you a personal number, which will be used when filling in this study forms. Your information will be kept confidential and used only in this research.

Right to refuse or withdraw:

You have the right to either agree or disagree to take part in this study. You have the right to refuse or withdraw from the study at any time. Whether or not you decide not to join in this study, it will not affect to any of your rights.

Whom to contact:

If you have any questions or require further information, you can contact a researcher, Mr. Chittawet Ketchoo, at Epidemiology Unit, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand 90110. You can also call on 074-451165-6 or 087-2860759 all the time. You can contact a principle investigator, Dr. Rassamee Sangthong, at Epidemiology Unit, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand 90110; phone number is 074-451165-6 on working days.

Appendix II: Consent form

Project: "Determinants of smuggled cigarette consumption in a border province in southern Thailand"

I am (Mr.)surname.....
 consent voluntarily to be a participant in this study as the researcher, Mr. Chittawet Ketchoo, Position Health worker Office, has explained the details to me as in the invitation to participation form.

I have had the opportunity to ask questions about it and any questions which I have asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study and understand that I have no risk in this study and I have the right to refuse or withdraw from the study at any time. Whether or not I decide not to join in this study, it will not affect to any of my rights.

...../...../.....
 (Name of participant) (Participant's signature) (Date)

...../...../.....
 (Name of interviewer) (Signature of interviewer) (Date)

Appendix III: Ethical approval letter



EC 53-254-18-5-3

คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์
 ตำบลคอหงส์ อำเภอหาดใหญ่
 จังหวัดสงขลา 90110

หนังสือรับรองนี้ให้ไว้เพื่อแสดงว่า

- โครงการวิจัยเรื่อง : ปัจจัยต่อการบริโภคบุหรี่ปลอมภายในจังหวัดติดชายแดนในภาคใต้ของประเทศไทย
 (Determinants of smuggled cigarette consumption in a border province in southern Thailand)
- หัวหน้าโครงการ : นายจิตตเวช เกตุชู
- ภาควิชา/คณะ : หน่วยระบาดวิทยา คณะแพทยศาสตร์

ได้ผ่านการพิจารณาและได้รับความเห็นชอบจากคณะกรรมการอนุกรรมการจริยธรรมด้านวิจัยเกี่ยวกับบริบาลผู้ป่วย สิ่งส่งตรวจ และสังคมศาสตร์ ของคณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์ แล้ว

ให้ไว้ ณ วันที่ 30 มิถุนายน 2553

.....ประธานอนุกรรมการ
 (รองศาสตราจารย์นายแพทย์วิระพล จันทร์ดียิ่ง)
 รองคณบดีฝ่ายวิจัย

Appendix IV: Questionnaire

ID: [_ _ _]

Record form and questionnaire

Research title: "Determinants of smuggled cigarette consumption in a border province in southern Thailand"

Date of interview....., 2010

Part 1: Eligible criteria for smokers	
1. Types of cigarette smoker	<input type="checkbox"/> Non-illicit smoker <input type="checkbox"/> Illicit smoker
2. Eligible criteria for regular cigarette smoker: 1. You have lived in this district at least 6 months 2. You have smoked during the last 6 months 3. You have never bought and smoked smuggled cigarette If there is at least one "no" answer, that person is ineligible for the study.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No
3. Eligible criteria for smuggled cigarette smoker: 1. You have lived in this district at least 6 months 2. You have smoked during the last 6 months 3. You have bought and smoked illicit cigarette at least 3 packets in the last 6 months 4. Do you know at least 2 other persons who smoke smuggled cigarettes? If there is at least one "no" answer, that person is ineligible for the study.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No

Part 2: Identification of illicit cigarette and its packet

1. How do you know that it is a smuggled cigarette?

- Its price is cheaper.
- It has no excise tax stamp on a cigarette packet.
- It has no warning labels on a cigarette packet.
- Others: 1).....
- 2).....

Information of the cigarette packet by the researcher

1. Cigarette brand

- No Yes (Details)

2. Cigarette price

- No Yes (Details)

3. Domestic stamp on a cigarette packet

- No Yes (Details)

4. Health warning text displayed

- No Yes (Details)

5. Pictorial health warning displayed

- No Yes (Details)

6. Amounts of tar and nicotine indicated

- No Yes (Details)

7. Country of manufacture

- No Yes (Details)

Part 3: Baseline characteristics	
1. District of current living	DISTRIC []
<input type="checkbox"/> 1. Sadao district	
<input type="checkbox"/> 2. Hat Yai district	
<input type="checkbox"/> 3. Ranot district	
2. Name of sub-district current living	SUBD [][]
3. Date of Birth <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	BD[][]/ [][][][]
4. Age (year) <input type="text"/> <input type="text"/>	[][] AGE [][]
5. What is your religion?	RELIG []
<input type="checkbox"/> 1. Buddhism <input type="checkbox"/> 2. Islam <input type="checkbox"/> 3. Other.....	EDU[]
6. What is your highest level of education?	
<input type="checkbox"/> 1. No formal school	
<input type="checkbox"/> 2. Less than primary school	
<input type="checkbox"/> 3. Secondary school	
<input type="checkbox"/> 4. High school	
<input type="checkbox"/> 5. College/University	
<input type="checkbox"/> 6. Post-graduate degree	
<input type="checkbox"/> 7. Others.....	
7. What is your marital status?	MARITAL []
<input type="checkbox"/> 1. Never married	
<input type="checkbox"/> 2. Currently married	
<input type="checkbox"/> 3. Separated	
<input type="checkbox"/> 4. Divorced	
<input type="checkbox"/> 5. Widowed	

<p>8. What is your main occupation?</p> <p><input type="checkbox"/> 1. Government employee <input type="checkbox"/> 2. Casual work</p> <p><input type="checkbox"/> 3. Self-employed business <input type="checkbox"/> 4. Student</p> <p><input type="checkbox"/> 5. Agriculture <input type="checkbox"/> 6. Retired</p> <p><input type="checkbox"/> 7. Other.....</p>	OCC[]
<p>9. How many people, including yourself, are there in your household? persons</p>	FMEM []
<p>10. How many people, beside yourself, are there in your household who smoke? persons</p>	FMSSMOKE []
<p>11. What is your average monthly income?..... baht</p>	INCOME []
<p>12. What is your average monthly household income?..... baht</p>	HHINC []
<p>13. What is your average monthly expenditure?.....baht</p>	EXP []
<p>14. What is your average monthly household expenditure?..... baht</p>	HHEXP []
<p>15. How long have you been living in this town?.....years</p>	LIVE []
<p>16. How many best friends do you have?.....persons</p>	FRIEND []
<p>17. How many of them smoke?.....persons</p>	FSMO []
<p>18. How many of other illicit cigarette smokers as you know?.....persons</p>	ILLSMO []
<p>19. Do you agree with an increasing in legal cigarette price?</p> <p><input type="checkbox"/> 1. I agree <input type="checkbox"/> 2. I disagree</p>	OPPRICE []

Part 4: Smoking behaviours	
1. How old were you when you first smoked?years	FIRST1[]
2. What type of cigarette when you first smoked? <input type="checkbox"/> 1. Regular cigarette <input type="checkbox"/> 2. Smuggled cigarette <input type="checkbox"/> 3. Hand-rolled cigarette <input type="checkbox"/> 4. other	FIRST2[]
3. How long have you been smoking? years	LONGY[]
4. Have you ever tried to stop smoking cigarettes? If yes, for how many times? <input type="checkbox"/> 1. Never <input type="checkbox"/> 2. Yes..... times.	QUIT[]
5. On an average, how many cigarettes do you smoke per day?cigarettes/day	DAYS[]
6. How many days do you smoke cigarette a week?days	WEEKS[]
7. On an average, how much do you spend on cigarettes a month?baht/month	MONTHS[]
8. What time do you usually smoke after wake up in the morning? <input type="checkbox"/> 1. Less than 5 minutes <input type="checkbox"/> 2. 5 - 30 minutes <input type="checkbox"/> 3. 31 - 60 minutes <input type="checkbox"/> 4. More than 60 minutes	TIMES[]
9. Do you find it difficult to refrain from smoking in places where it is forbidden, e.g., in church, the library, the cinema, etc? <input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No	REFRAIN[]
10. Which cigarette would you hate most to give up? <input type="checkbox"/> 1. The first one in the morning <input type="checkbox"/> 2. All others	GIVEUP[]

<p>11. Do you smoke more often during the first hours after waking than during the rest of the day?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p>	FIRSTHO[]
<p>12. Do you smoke even if you are so ill that you are in bed most of the day?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p>	INBED[]
<p>13. What are types of cigarette you usually smoke at present?</p> <p>1. Non-illicit cigarette <input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p> <p>2. Hand-rolled cigarette <input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p> <p>3. Illicit cigarette <input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p>	OTHERCI[]

Part 5: Smoking behaviour of non-illicit cigarettes	
1. How long have you been smoking? months	LONGY1[]
2. If you smoked this type of cigarette but not anymore, what were the main reasons for stop smoking it? <input type="checkbox"/> 1. Expensive price <input type="checkbox"/> 2. Did not like its taste <input type="checkbox"/> 3. Did not like its smell <input type="checkbox"/> 4. Harmful to health <input type="checkbox"/> 5. Changed to smoke other type <input type="checkbox"/> 6. Other reason.....	REASTO1[]
3. What are the reasons for smoking this cigarette type? (Can choose more than 1 answer) <input type="checkbox"/> 1. Price <input type="checkbox"/> 2. Taste <input type="checkbox"/> 3. Image <input type="checkbox"/> 4. Brand <input type="checkbox"/> 5. less harmful <input type="checkbox"/> 6. Other reason.....	REASMO1[]
4. What is the main reason for smoking this cigarette? <input type="checkbox"/> 1. Price <input type="checkbox"/> 2. Taste <input type="checkbox"/> 3. Image <input type="checkbox"/> 4. Brand <input type="checkbox"/> 5. less harmful <input type="checkbox"/> 6. Other reason.....	REAREAL1[]
5. If you never smoked this type of cigarette, what are the main reasons for not smoking it? <input type="checkbox"/> 1. Expensive price <input type="checkbox"/> 2. Harmful to health <input type="checkbox"/> 3. Other reason.....	REACON1[]
6. How many cigarettes do you usually smoke a day? cigarettes	DAYPIE1[]

7. How many days do you smoke this type of cigarette per week?days	WEEKDA1[]
8. How long does it take to smoke one cigarette?..... minutes	SMOKPE1[]
9. Compare with other cigarette type, how different do you inhale? <input type="checkbox"/> 1. No difference <input type="checkbox"/> 2. Bigger puff <input type="checkbox"/> 3. Smaller puff <input type="checkbox"/> 4. Do not know/Not sure	INHAL1[]
10. How many packets do you buy cigarette a month?....packets	NOPACK1[]
11. How much do you usually pay for a pack cigarettes?baht	PAYPAC1[]
12. How much you spent on cigarettes a month?.....baht	PAYMON1[]
13. How many cigarettes do you normally buy each time? <input type="checkbox"/> 1. A few pieces <input type="checkbox"/> 2. A packet <input type="checkbox"/> 3. A carton <input type="checkbox"/> 4. Other.....	PIECPAC1[]
14. Where do you usually buy that cigarette? <input type="checkbox"/> 1. Village supermarket <input type="checkbox"/> 2. Convenient store <input type="checkbox"/> 3. Department store <input type="checkbox"/> 4. Vendor shop <input type="checkbox"/> 5. Duty free shop <input type="checkbox"/> 6. Other persons <input type="checkbox"/> 7. Others.....	PLACBUY1[]
15. How do you know the place you usually buy that cigarette? <input type="checkbox"/> 1. By yourself <input type="checkbox"/> 2. Friend <input type="checkbox"/> 3. Other.....	PLACKNO1[]
16. Are there warning labels on the packet? <input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 3. occasionally	LABEL1[]

<p>17. Is there a filter?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 3. Occasionally</p>	FILTER1[]
<p>18. Are there other members in your family smoke this cigarette type and how many of them?</p> <p><input type="checkbox"/> 1. Yes persons <input type="checkbox"/> 2. No</p>	FAMSMOK1[]
<p>19 Have you ever invited other people to smoke this cigarette?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p>	INVITE1[]
<p>20. Are there any of these terms: light, mild, low tar or fruit taste on a cigarette packet?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p> <p><input type="checkbox"/> 3. Occasionally <input type="checkbox"/> 4. Do not know/no answer</p>	TERMS1[]
<p>21. Do you think that current cigarette price is suitable?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. Too expensive</p> <p><input type="checkbox"/> 3. Too cheap <input type="checkbox"/> 4. Do not know/no answer</p>	CURPRIC1[]
<p>22. How much can you afford to buy a packet of cigarette?</p> <p>.....baht</p>	AFFORD1[]

Part 6: Smoking behaviour of hand-rolled cigarettes	
1. How long have you been smoking? months	LONGY2 []
2. If you smoked this type of cigarette but not anymore, what were the main reasons for stop smoking it? <input type="checkbox"/> 1. Expensive price <input type="checkbox"/> 2. Did not like its taste <input type="checkbox"/> 3. Did not like its smell <input type="checkbox"/> 4. Harmful to health <input type="checkbox"/> 5. Changed to smoke other type <input type="checkbox"/> 6. Other reason.....	REASTO2 []
3. What are the reasons for smoking this cigarette? (Can choose more than 1 answer) <input type="checkbox"/> 1. Price <input type="checkbox"/> 2. Taste <input type="checkbox"/> 3. Image <input type="checkbox"/> 4. Brand <input type="checkbox"/> 5. less harm <input type="checkbox"/> 6. Other reason.....	REASMO2 []
4. What is the main reason for smoking of cigarette? <input type="checkbox"/> 1. Price <input type="checkbox"/> 2. Taste <input type="checkbox"/> 3. Image <input type="checkbox"/> 4. Brand <input type="checkbox"/> 5. less harm <input type="checkbox"/> 6. Other reason.....	REAREAL2 []
5. If you never smoked this type of cigarette, what are the main reasons for not smoking it? <input type="checkbox"/> 1. Expensive price <input type="checkbox"/> 2. Harmful to health <input type="checkbox"/> 3. Other reason.....	REACON2 []
6. How many cigarettes do you usually smoke a day? cigarettes	DAYPIE2 []

7. How many days do you smoke this type of cigarette per week?days	WEEKDA2 []
8. How long does it take to smoke one cigarette?..... minutes	SMOKPE2 []
9. Compare with other cigarette type, how different do you inhale? <input type="checkbox"/> 1. No difference <input type="checkbox"/> 2. Bigger puff <input type="checkbox"/> 3. Smaller puff <input type="checkbox"/> 4. Do not know/Not sure	INHAL2 []
10. How many packets do you buy cigarette a month?packets	NOPACK2 []
11. How much do you usually pay for a pack cigarettes?baht	PAYPAC2 []
12. How much you spent on cigarettes a month?.....baht	PAYMON2 []
13. How many cigarettes do you normally buy each time? <input type="checkbox"/> 1.A few pieces <input type="checkbox"/> 2.A packet <input type="checkbox"/> 3.A carton <input type="checkbox"/> 4. Other.....	PIECPAC2 []
14. Where do you usually buy that cigarette? <input type="checkbox"/> 1. Village supermarket <input type="checkbox"/> 2. Convenient store <input type="checkbox"/> 3. Department store <input type="checkbox"/> 4. Vendor shop <input type="checkbox"/> 5. Dutyfree shop <input type="checkbox"/> 6. Other persons <input type="checkbox"/> 7. Others.....	PLACBUY2 []
15. How do you know the place you usually buy that cigarette? <input type="checkbox"/> 1. By yourself <input type="checkbox"/> 2. Friend <input type="checkbox"/> 3. Other.....	PLACKNO2 []

<p>16. Are there warning labels on the packet?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 3. occasionally</p>	LABEL2[]
<p>17. Is there a filter?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 3. Occasionally</p>	FILTER2[]
<p>18. Are there other members in your family smoke this cigarette and how many of them?</p> <p><input type="checkbox"/> 1. Yes persons <input type="checkbox"/> 2. No</p>	FAMSMOK2[]
<p>19 Have you ever invited other people to smoke this cigarette?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p>	INVITE2[]
<p>20. Are there any of these terms: light, mild, low tar or fruit taste on a cigarette packet?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p> <p><input type="checkbox"/> 3. Occasionally <input type="checkbox"/> 4. Do not know/no answer</p>	TERMS2[]
<p>21. Do you think that current cigarette price is suitable?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. Too expensive</p> <p><input type="checkbox"/> 3. Too cheap <input type="checkbox"/> 4. Do not know/no answer</p>	CURPRIC2[]
<p>22. How much can you afford to buy a packet of cigarette?</p> <p>.....baht</p>	AFFORD2[]

Part 7: Smoking behaviour of illicit cigarettes	
1. How long have you been smoking? months	LONGY3[]
2. If you smoked this type of cigarette but not anymore, what were the main reasons for stop smoking it? <input type="checkbox"/> 1. Expensive price <input type="checkbox"/> 2. Did not like its taste <input type="checkbox"/> 3. Did not like its smell <input type="checkbox"/> 4. Harmful to health <input type="checkbox"/> 5. Changed to smoke other type <input type="checkbox"/> 6. Other reason.....	REASTO3[]
3. What are the reasons for smoking this cigarette type? (Can choose more than 1 answer) <input type="checkbox"/> 1. Price <input type="checkbox"/> 2. Taste <input type="checkbox"/> 3. Image <input type="checkbox"/> 4. Brand <input type="checkbox"/> 5. less harm <input type="checkbox"/> 6. Other reason.....	REASMO3[]
4. What is the main reason for smoking this cigarette? <input type="checkbox"/> 1. Price <input type="checkbox"/> 2. Taste <input type="checkbox"/> 3. Image <input type="checkbox"/> 4. Brand <input type="checkbox"/> 5. less harm <input type="checkbox"/> 6. Other reason.....	REAREAL3[]
5. If you never smoked this type of cigarette, what are the main reasons for not smoking it? <input type="checkbox"/> 1. Expensive price <input type="checkbox"/> 2. Harmful to health <input type="checkbox"/> 3. Other reason.....	REACON3[]
6. How many cigarettes do you usually smoke a day? cigarettes	DAYPIE3[]

7. How many days do you smoke this cigarette per week?days	WEEKDA3[]
8. How long does it take to smoke one cigarette?..... minutes	SMOKPE3[]
9. Compare with other types of cigarettes, how different do you inhale? <input type="checkbox"/> 1. No difference <input type="checkbox"/> 2. Bigger puff <input type="checkbox"/> 3. Smaller puff <input type="checkbox"/> 4. Do not know/Not sure	INHAL3[]
10. How many packets do you buy cigarette a month?.....packets	NOPACK3[]
11. How much do you usually pay for a pack cigarettes?baht	PAYPAC3[]
12. How much you spent on cigarettes a month?.....baht	PAYMON3[]
13. How many cigarettes do you normally buy each time? <input type="checkbox"/> 1. A few pieces <input type="checkbox"/> 2. A packet <input type="checkbox"/> 3. A carton <input type="checkbox"/> 4. Other.....	PIECPAC3[]
14. Where do you usually buy that cigarette? <input type="checkbox"/> 1. Village supermarket <input type="checkbox"/> 2. Convenient store <input type="checkbox"/> 3. Department store <input type="checkbox"/> 4. Vendor shop <input type="checkbox"/> 5. Dutyfree shop <input type="checkbox"/> 6. Other persons <input type="checkbox"/> 7. Others.....	PLACBUY3[]

<p>15. How do you know the place you usually buy that cigarette?</p> <p><input type="checkbox"/> 1. By yourself <input type="checkbox"/> 2. Friend <input type="checkbox"/> 3. Other.....</p>	PLACKNO3[]
<p>16. Are there warning labels on the packet?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 3. occasionally</p>	LABEL3[]
<p>17. Is there a filter?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 3. Occasionally</p>	FILTER3[]
<p>18. Are there any of these terms: light, mild ,low tar or fruit taste on a cigarette packet?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 3. Occasionally <input type="checkbox"/> 4. Do not know/no answer</p>	FAMSMOK3[]
<p>19. Who was person who invited you to the first smoke of this cigarette?</p> <p><input type="checkbox"/> 1. Family member <input type="checkbox"/> 2. Friend <input type="checkbox"/> 3. Partner <input type="checkbox"/> 4. Shop seller <input type="checkbox"/> 5. Other.....</p>	WHOINV1[]
<p>20. Are there other members in your family smoke this cigarette and how many of them?</p> <p><input type="checkbox"/> 1. Yes persons <input type="checkbox"/> 2. No</p>	FAMSMOK3[]
<p>21. Are there other persons know that you smoke this cigarette?</p> <p><input type="checkbox"/> 1. Yes.....persons <input type="checkbox"/> 2. No</p>	OTHEKNO3[]

<p>22. Have you ever invited other people to smoke this cigarettes?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No</p>	INVITE3[]
<p>23. Do you think that its price is suitable?</p> <p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. Too expensive</p> <p><input type="checkbox"/> 3. Too cheap <input type="checkbox"/> 4. Do not know/no answer</p>	CURPRIC3[]
<p>24. How did the price changes during the last 6 months?</p> <p><input type="checkbox"/> 1. No change <input type="checkbox"/> 2. increased</p> <p><input type="checkbox"/> 3. decreased <input type="checkbox"/> 4. Both increased and decreased</p>	CHANGE3[]
<p>25. How much can you afford to buy a packet of cigarette?</p> <p>.....baht</p>	AFFORD3[]

Appendix V: Manuscript

Title page

**Smoking behaviour and associated factors
of illicit cigarette consumption in a border province
of southern Thailand**Chittawet Ketchoo^a, Rassamee Sangthong^b, VirasakdiChongsuvivatwong^b,Alan F Geater^b, Edward McNeil^b

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Abstract

Background: Illicit cigarette consumption has increased worldwide. It sabotages national tobacco taxation and tobacco control strategies. Therefore, it is important to understand this problem thoroughly in order to reduce it.

Objectives: To investigate behaviours and factors associated with illicit cigarette consumption in southern Thailand.

Design: A survey and qualitative study were conducted in a border province in southern Thailand next to Malaysia. A modified snowballing technique was used to recruit 300 illicit and 150 non-illicit cigarette smokers. A structured questionnaire was used to interview subjects. Illicit cigarette packs were obtained from the subjects in order to identify their characteristics. Smoking behaviours and associated factors with illicit consumption were analysed by complex survey regression adjusted for a cluster of samples identified by each recruiter.

Results: Smoking of illicit cigarettes has spread from border areas and the trade centres to rural areas in southern Thailand. It has become accepted in the communities, and the availability and accessibility of illicit cigarettes in supermarkets has made them easy to purchase. Friends and other illicit smokers were the key component for access and source of information. The main factors associated with smoking illicit cigarettes, compared to smoking non-illicit cigarettes, were younger age, higher education, higher average monthly expenditure on cigarettes, and knowledge of other illicit cigarette smokers. The low price of illicit cigarettes was the main reason for illicit cigarette use.

Selling strategies included low price, sale in individual stick, sale in shop, and direct sale through social networking.

Conclusions: Illicit cigarette consumption is still a hidden public health risk problem, especially among youth and young adults.

Introduction

An increase in cigarette prices through excise tax can lead to a significant reduction of cigarette consumption.[1-7] Conversely, cigarette tax hikes are also widely thought to cause surges in the illicit tobacco trade.[8;9] The reduction of tobacco consumption due to rises in cigarette taxes may be misleading since consumption of illicit tobacco may be under reported.

Consumption of illicit cigarettes poses a serious threat to public health as well as being the source of huge losses in government revenues. It brings tobacco onto the market cheaply, making cigarettes more affordable and thus stimulating consumption, especially among the youth, consequently increasing the burden of ill-health.[10;11] Illicit cigarette trade sabotages national tobacco taxation and tobacco control strategies and has become a major concern for governments and international organizations.[12] The WHO Framework Convention on Tobacco control (FCTC) stated that the elimination of the illicit trade in tobacco was an essential component of tobacco control.[13]

The global illicit cigarette trade represents approximately 10.7% of global sales, or 600 million cigarettes annually.[14] It is mainly distributed in low- (16.8%), middle- (11.8%), and low to middle- income (12.1%) countries while 9.8% is reported in high-income countries.[15] However such problems have rarely been examined, especially in low- to middle- income countries where the problem is highly prevalent.

In Thailand, the "SimSmoke" simulation model indicated that excise tax could reduce the prevalence of smoking by 25% during 1994 to 2006.[16] In 2009, the government increased the tax to 85% of the retail price,[17] however, the adult occasional tobacco smoking prevalence and the incidence of new smokers, especially in the young population, has surprisingly increased.[18]

In the border provinces of southern Thailand adjacent to Malaysia, a growing illicit cigarette trade is evident. The amount of illicit cigarettes seized has increased in recent years from approximately 430,000 USD in 2009 to 785,000 USD in 2010. And 357,000 USD worth of illicit cigarettes were seized in the first trimester of 2011 alone.[19]

Previous studies on illicit cigarette consumption mainly used secondary data to examine economic determinants. Behavioural and other factors associated with illicit cigarette consumption have been rarely studied due to its illegal nature. The high magnitude of the illicit cigarette trade in southern Thailand offers an opportunity to examine the situation of illicit cigarette consumption. This study aims to identify smoking behaviours and factors associated with illicit cigarette consumption in a border province of southern Thailand.

Materials and methods

A survey was conducted in three districts characterized by different geographical areas in southern Thailand. Sadao district is located on the border of Malaysia, Hat Yai district is the biggest trade centre in southern Thailand, and Ranot district is

mostly a rural area which is 50 and 130 kms away from Hat Yai and Sadao, respectively. A modified snow balling technique was used to recruit 100 illicit cigarette smokers and 50 non-illicit smokers from each district. The estimated sample sizes of 300 illicit and 150 non-illicit cigarette smokers in the three districts were based on a prevalence of 20% and 50% of illicit and non-illicit cigarette smoking in the study area and an ability to detect associated factors with an odds ratio of at least 2. A design effect of 1.2 and a ratio of 2:1 between illicit and non-illicit cigarette smokers were used.

A cigarette was defined as illicit if the packet containing it had any of the following three characteristics: no domestic excise tax stamp, no warning label, or with "mild or light" labels. Eligibility criteria were male gender, aged 15 years or above, and resident of the study area for more than 6 months. Illicit and non-illicit cigarette smokers were respectively defined as those who smoked at least three packets of illicit cigarettes during the past 6 months and those who had never smoked any illicit cigarettes in their lifetime. One eligible participant in each district was randomly selected from attendees of a smoking cessation clinic in the district. These three subjects, known as seeds, were then asked to invite other illicit and non-illicit cigarette smokers from their social network. One illicit cigarette smoker from this wave who was willing to be a recruiter was randomly selected and asked to invite other illicit and non-illicit cigarette smokers from his social network, known as the second wave of recruitment. This process was continued until the required sample size was reached (**Figure 1**).

A structured questionnaire was modified from the Global Youth Tobacco Survey (GYTS).[20;21] Other relevant items including behaviour on illicit cigarette consumption, attitude and knowledge of illicit tobacco control policy, and cigarette prices and demands were added. Before interview, each participant was given a full explanation about the research, and after verbally agreeing to participate, a written informed consent was obtained. An interview was performed by one researcher in a private room at a health center in a study site. Illicit cigarette smokers were asked if they were carrying any illicit cigarettes with them and if so, were asked to produce them for inspection of the packet. Incentive was given to a certain extent for transportation to the clinic and time spent for the interview. In addition to the survey findings, an in-depth interview was conducted among the seeds to reveal the hidden situation, smoking behavior, and associated factors of illicit cigarette consumption in the study areas.

All information obtained from the interviews was kept highly confidential. The study was approved by the ethical committee of the Faculty of Medicine, Prince of Songkla University, Thailand.

Complex survey analysis adjusted for a cluster of samples recruited by each seed was used for descriptive statistics and multivariate survey logistic regression analysis was used to adjust for potential confounders. Likelihood-ratio tests were used for selecting the best fitting model. Data analysis was carried out using R software, version 2.12.0.[22] Content analysis was used for data collected from in-depth interview.[23]

Results

A total of 300 illicit cigarette smokers and 150 non-illicit cigarette smokers were recruited by 16 seeds. The non-response rate was 7.3% (27 illicit and 6 non-illicit cigarette smokers). Overall proportion of total sticks of illicit, hand-rolled, and non-illicit cigarette consumption in the study were 28.5%, 39.2%, and 32.3%, respectively.

The characteristics of illicit smokers compared to non-illicit smokers are shown in **Table 1**. Illicit smokers were significantly younger, single, and had a higher education. Illicit smokers had a higher average monthly expenditure on cigarettes, had a shorter smoking duration, knew more people who also smoked illicit cigarettes, and had a higher knowledge of illicit tobacco control policies. Occupation, monthly household income, number of close friends who smoked, number of cigarettes smoked daily, number of days smoked weekly, and attitude toward increasing cigarette taxes were not significantly different between the two groups.

Among illicit cigarette smokers, approximately 90% showed their illicit cigarette packets. The top three methods subjects were able to identify that they were smoking illicit cigarettes were no Thai language on packet (51%), cheap price (42.7%), and no domestic excise tax stamps (27%). All requested illicit cigarette packets contained a barcode and most of them had non-Thai language textual health warning displayed (93.9%) while 53.9% had a pictorial warning label and 48.3% indicated amounts of tar and nicotine. None of the packets had a domestic excise tax stamp

affixed. Most of them were made in Malaysia (55.9%) or Indonesia (35.7%).

Table 1 Characteristics of illicit (n=300) and non-illicit (n=150) cigarette smokers

Characteristic	Illicit smokers	Non-illicit smokers	p-value*
	n (%)	n (%)	
Age (years)			<0.001
(mean±SE)	32.7±0.9	41.1±1.7	
Marital status			0.002
Single	121 (40.3)	35 (23.3)	
Married	175 (58.4)	107 (71.4)	
Divorced/widowed	4 (1.3)	8 (5.3)	
Education			0.002
Elementary	113 (37.6)	85 (56.7)	
Junior high school	83 (27.7)	20 (13.3)	
Senior high school	62 (20.7)	23 (15.3)	
Diploma/Bachelor degree	42 (14.0)	22 (14.7)	
Smoking duration (years)			<0.001
(mean±SE)	16.7±0.7	24.5±1.8	
Cigarette expenditure (THB/month)			0.027
(mean±SE)	830.7±50.9	647.8±57.7	
Illicit smokers known (persons)			0.022
(mean±SE)	25.9±3.2	16.9±5.8	
Knowledge on illicit tobacco control policy (% correct answer)			0.016
Low (<40%)	4 (1.3)	7 (4.7)	
Moderate (41-80%)	63 (21.0)	48 (32.0)	
High (>80%)	233 (77.7)	95 (63.3)	
Religion			0.28
Buddhism	139 (46.3)	83 (55.3)	
Islam	161 (83.7)	67 (44.7)	
Monthly household income (THB/month)			0.88
(mean±SE)	21665.0±1544.6	21263.3±1925.7	
Occupation			0.056
Student	21 (7.0)	15 (10.0)	
Government service	5 (1.7)	4 (2.7)	
Farmer	73 (24.3)	54 (36.0)	
Merchant	44 (14.7)	15 (10.0)	
Employee	157 (52.3)	62 (41.3)	

*p-value from likelihood ratio test

Table 1 Characteristics of illicit (n=300) and non-illicit (n=150) cigarette smokers (cont.)

Characteristic	Illicit smokers	Non-illicit smokers	p-value*
	n (%)	n (%)	
Close friends who smoked (persons)	7.6±0.6	7.6±0.4	0.97
Cigarettes smoked daily (sticks)	17.0±0.8	17.4±0.8	0.67
Days smoked per week	6.9±0.0	6.8±0.1	0.25
Attitude toward increasing the legal cigarette price			0.45
Not agree	214 (71.3)	101 (67.3)	
Agree	86 (28.7)	49 (32.7)	

*p-value from likelihood ratio test

Price was an important factor for choosing type of cigarette smoked. Almost all illicit smokers (95%) commonly smoked more than one type of cigarette including illicit, non-illicit, and hand-rolled cigarettes. A lower consumption of illicit and non-illicit cigarettes was found for higher priced illicit cigarettes with a dose-response relationship ($p < 0.002$, $p < 0.001$). However, illicit cigarette prices above 35 THB (1.1 USD) per pack caused smokers to replace illicit and non-illicit cigarettes with hand-rolled cigarettes. The price of illicit cigarettes was inversely related to the total number of daily cigarettes smoked with a dose-response relationship ($p < 0.001$) as shown in **Figure 2**.

The price of non-illicit cigarettes did not vary much (1.6-2.1 USD/pack) as shown in **Figure 3**. Thus, consumption of non-illicit cigarettes and illicit cigarettes was stable across the price range. However, the number of hand-rolled cigarettes

increased as the price of non-illicit cigarettes increased. The total number of cigarettes smoked daily was similar across all price range.

Age and number of illicit smokers known were associated with illicit cigarette consumption. The odds of illicit cigarette smoking tended to decrease with increasing age with a dose response relationship (**Table 2**).

Table 2 Factors associated with illicit cigarette smoking

Variable	OR (95% CI)		p-value*
	Crude	Adjusted	
Age			
<21	(ref)	(ref)	0.001 [‡]
21-30	0.7 (0.4,1.2)	0.7 (0.4,1.3)	
31-40	0.3 (0.1,0.9)	0.4 (0.2,1.1)	
41-50	0.2 (0.1,0.6)	0.2 (0.1,0.6)	
>50	0.1 (0.0,0.3)	0.2 (0.1,0.3)	
Education			
Elementary	(ref)	(ref)	0.13
Junior high school	3.1 (1.5,6.3)	2.1 (1.1,4.0)	
Senior high school	2.0 (1.4,2.9)	1.3 (0.8,1.9)	
Diploma/Bachelor degree	1.4 (0.7,2.9)	1.1 (0.5,2.4)	
Illicit smokers known (persons)			
<11	(ref)	(ref)	<0.001
11-20	3.3 (2.1,5.4)	3.2 (2.1,4.7)	
>20	5.0 (2.8,8.9)	5.5 (3.0,9.9)	

*p-value from likelihood ratio test

[‡]p-value for linear trend <0.001

ref: Reference group

Among the three study areas, behaviours of illicit cigarette purchase and consumption were different in terms of common place of purchase, main reasons for smoking, price, smoking duration, as well as pattern of smoking (**Table 3**).

Vendors were the most common places to purchase illicit cigarettes in all districts. In Hat Yai, illicit cigarettes were also commonly purchased from liquor and tobacco stores. In Ranot, however, a direct sale of illicit cigarettes was commonly reported. Duration of smoking illicit cigarettes in Ranot was lower than the other two districts. Friends were the most common source of information about illicit cigarettes and were the keyperson who encouraged illicit cigarette consumption.

Common reasons for illicit cigarette consumption in all areas were low price, however, favouring of cigarette taste was the most common reason in Sadao. The average price of illicit cigarettes per pack was significantly higher in Sadao than the other two districts.

The number of illicit cigarettes smoked per day across three areas was not significantly different. Numbers of hand-rolled cigarettes and non-illicit cigarettes smoke per day were mostly reported in Sadao and Ranot.

Table 3 Characteristics of illicit cigarette smokers by district (n=300)

Characteristic	Sadao	Hat Yai	Ranot	p-value*
	n (%)	n (%)	n (%)	
Main place illicit cigarette purchased				<0.001
Supermarket and vender shop	94 (94.0) ^{a,b}	75 (75.0) ^{a,b}	76 (76.0) ^{a,b}	
Other persons	6 (6.0)	3 (3.0)	24 (24.0)	
Alcohol and cigarette store	0 (0.0)	22 (22.0)	0 (0.0)	
Had ever encouraged others to smoke illicit cigarettes	25 (25.0) ^{a,b}	4 (40.0) ^{a,b}	56 (56.0) ^a	0.016
Main reason for smoking illicit cigarettes				<0.001
Cheap price	35 (35.0) ^{a,b}	74 (74.0) ^{a,b}	99 (99.0) ^{a,b}	
Good taste	64 (64.0)	24 (24.0)	1 (1.0)	
Good image	1 (1.0)	1 (1.0)	0 (0.0)	
Price of illicit cigarettes per pack usual purchased (THB)	(25.7±1.9) ^{a,b}	(16.8±2.0) ^{a,b}	(18.2±2.4) ^a	<0.001
(mean±SE)				
Duration of smoking illicit cigarettes (years) (mean±SE)	(3.0±0.1) ^a	(2.9±0.7) ^b	(0.9±0.1) ^{a,b}	<0.001
Number of cigarettes smoked daily				
Illicit cigarettes (mean±SE)	(5.1±0.6)	(6.4±1.1)	(7.2±1.0)	0.283
Hand-rolled cigarettes (mean±SE)	(11.2±0.9) ^a	(7.6±1.0) ^a	(6.9±0.6) ^a	0.001
Non-illicit cigarettes (mean±SE)	(5.7±0.9) ^a	(7.2±0.5)	(8.3±0.6) ^a	0.020
Factor causing initial consumption of illicit cigarettes				0.716
Invitation by friend	65 (65.0)	56 (56.0)	79 (79.0)	
Own decision	35 (35.0)	44 (44.0)	21 (21.0)	
Source of information about places that sold illicit cigarettes				0.155
Oneself	26 (26.0)	17 (17.0)	17 (17.0)	
Friends	74 (74.0)	83 (83.0)	78 (78.0)	
Cigarette shop	0 (0.0)	0 (0.0)	5 (5.0)	

* p-value from the likelihood ratio test

^{a, b} The same superscript shows significantly different among groups

Results from qualitative method

Marketing and price strategies of illicit cigarettes (Box 1)

The main marketing feature of the product was its cheap price. Illicit cigarettes had been introduced in a trade centre area for more than 20 years but only recently in suburban and rural areas. The introduction of illicit cigarettes has been widely known by community residents. Strategies of marketing included offering cheap cigarettes for sale when smokers purchased other types of cigarettes, display of an advertisement sign such as "Cheap cigarettes are available here", and requesting customers to share information about product availability to their social network. Smokers also asked for cheap cigarettes from the shop sellers. Relatives, family members and close friends could buy the illicit cigarettes from a trade centre area nearby and sell to their social network members with some small profit. Also, the cigarettes could be sold in individual sticks instead of in packets to allow those with low incomes, such as youth, to buy in small quantities.

Attitudes towards cigarette prices and tobacco taxation (Box 2)

Since tobacco is an addictive substance, it is difficult for smokers to quit completely, even with the high price of cigarettes. A pricing strategy may not be effective for nicotine

addicts whereas it may be useful for preventing youth smoking. Addicted smokers attempt to find other cheap products, such as illicit and hand-rolled cigarettes, replacing the expensive legal cigarette primarily for saving money and maintaining their smoking behaviour.

Quality and use of illicit cigarettes (Box 3)

Regardless of the quality of illicit cigarette products, and regardless of the potential to be more harmful than that of non-illicit cigarettes, smokers still accepted to buy them primarily for reducing their cigarette expenditure. Some complained that illicit cigarettes had more effects on their health, thus they also used hand-rolled cigarettes to dilute the harm of the illicit cigarette while still saving money. The taste of illicit cigarettes was not different from the taste of non-illicit cigarettes. Reasons for replacing hand-rolled cigarettes with illicit cigarettes were low cost, convenience, and time saved by not having to roll a cigarette. Smokers also felt that they provided them with a better image at work and give them more enjoyable social activities when smoking illicit cigarettes than hand-rolled cigarettes. Finally, some illicit cigarettes smokers mentioned co-use with other illicit substances.

Box 1: Quotations of marketing and price strategies of illicit cigarettes

I1 "My friend and I know a person who sells illicit cigarettes in our village"

I2 "Besides me, there were many smokers who know someone who sells illicit cigarettes, even people who do not smoke"

I3 "It's easy to buy illicit cigarettes, nearly all people in my village know the shop to buy them from"

I4 "At present, almost all of my friends who smoke buy illicit cigarettes, sometimes I can share with them"

I5 "The seller told me that she had the cheap cigarettes for sale, she showed me the cigarette product, as it is nearly three times cheaper than my legal tobacco product so I bought a packet to first test its taste"

I6 "I know that cheap cigarettes were available from the board in front of the shop, so I asked the seller for those cigarettes"

I7 "The seller said to me to tell my friends that she has cheap priced cigarettes for sale in their shop"

I8 "I heard about foreign cigarettes which are much cheaper than Thai cigarettes, so I asked the seller if she had those cigarettes and she did not but she asked her relative in Hat Yai (the district where trade and shopping centres are located and is 50 kms away from the border) to look for those cigarettes for sale"

I11 "For me I can buy these cigarettes from my uncle, he makes a profit of 5 baht per packet"

I13 "My son works in the town and he comes back home every Sunday so he can buy those cigarettes for me. They are cheap, only 210 baht per carton, so that I can save my money for smoking"

I16 "The seller sold these cigarettes in sticks at 4 baht for one. It

Box 2: Quotations of attitudes towards cigarette prices and tobacco taxation

I3 *"As I am unable to quit, it is good for me to have cheap cigarettes as I save money that way"*

I5 *"I think illicit cigarettes can replace factory made [ones] as I can't quit. If no cheap cigarettes I will have some problems in [affording] smoking"*

I7 *"I think, many smokers use illicit cigarettes because the price of Thai cigarettes are very expensive"*

I9 *"The high price is a good way to protect the teenagers from smoking, but it cannot protect everyone"*

I10 *"I think the cheap price will not encourage people to smoke but we smoke cheap priced cigarettes because we can't quit"*

I11 *"I don't agree with the government, the government gets a lot of tax revenue but we pay a lot"*

I14 *"It is unfair for us, we increase cigarette expenditure and the*

Box 3: Attitudes towards quality and use of illicit tobacco products

I1 *"I have tested the illicit cigarettes smoked by blowing the smoke on my finger nail. They make my nail look dark brown in colour, more so than legal factory made cigarettes, but I still smoke nowadays"*

I2 *"I don't know if it is a good cigarette or not but I can smoke and I can save money"*

I4 *"I think it has a lower quality than legal cigarettes, and mostly when I am at home I smoke hand-rolled cigarettes but when I work, I mostly smoke illicit cigarettes"*

I9 *"I like its taste and I can smoke like Thai cigarettes as I smoked before"*

I10 *"I cannot roll cigarettes when I am in my business or when I go out as my friends do not like their smell, so I smoke illicit cigarettes"*

I11 *"To roll cigarettes takes time"*

I12 *"Sometimes it is not easy to roll cigarettes so I must buy illicit cigarettes instead"*

I13 *"I smoke these [illicit] cigarettes when I have party and I also*

Discussion

Smoking of illicit cigarettes was popular and socially acceptable by smokers in the study area. It is an alternative cigarette, and being cheaper than non-illicit cigarettes, it is especially popular among young adults. Purchasing of illicit cigarettes was done in the same manner as other goods in the community. Social network plays an important role in the spread of information regarding the illicit cigarette trade. Many marketing strategies have been used to promote the consumption of illicit cigarettes such as cheaper prices, high variety of products, product advertisement, and the sale of individual sticks. The market price of illicit cigarettes affects their demand more than the price of non-illicit cigarettes. Our study shows that illicit cigarette consumption is still a hidden public health risk. It has increased substantially during the past three years, and thus needs to be monitored and investigated carefully.

Most illicit cigarette smokers in the present study were young single men with a high school level of education. All of them had friends who smoked and knew other illicit cigarette smokers in their social network and were well aware of illicit cigarette control policies. Young age and having a large social network were the main predictors of illicit smoking in this study. Previous studies have consistently reported that illicit cigarette

smokers were in a younger age group with a high school education.[24-26] This may be due to low income among this group, thus they try to purchase tax avoidance cigarettes from a private supplier.[27;28] In addition, smoking of illicit cigarettes may look more acceptable to the youth compared to hand-rolled cigarettes.

This study was conducted in an area close to the Malaysian border where illicit cigarettes were highly prevalent, [19] thus most cigarettes were smuggled in from Malaysia and Indonesia with no domestic excise tax stamps affixed. A variety of illicit cigarettes such as brand and price are available in the market for smokers to buy. In the past, illicit cigarette packets did not have any health warnings which would easily differentiate them from other legal cigarettes.[10] Our study found that many features found on legal cigarette packets have been added to illicit cigarette packets, such as health warning labels, both in text and pictures, and the amount of tar and nicotine contained. Absence of domestic excise tax stamps on imported cigarette packets is currently the best means to identify illicit cigarettes. However, the most distinguishable feature of illicit cigarettes is its cheaper price compared to non-illicit cigarettes.

Due to the illegality of consumption and sale, illicit cigarettes are not commonly displayed in shops. Thus social network plays an important role in providing information on places to purchase illicit cigarettes.[29] Members of social network, friends, and family members could even be private sellers themselves as reported in this study. Vendors, the owners of which mainly obtain illicit cigarettes from suppliers, were the most common place to purchase illicit cigarettes by subjects in our study, whereas purchasing from duty free shops in cross border areas were rare. None of the subjects in our study purchased illicit cigarettes from the Internet. The three most common places to buy illicit cigarettes reported by a US study were neighbourhood store, private supplier/importer, and duty free shop/overseas whereas only 12% purchased through the Internet.[27]

Smokers who are addicted to nicotine find it difficult to avoid smoking cigarettes. Many tobacco products, both illicit and non-illicit, are available in the market offering a large range of quality and prices. Smokers usually smoke more than one type of tobacco product to lessen the harm and reduce their expenditure on cigarettes.

The cheaper price of illicit cigarettes, compared to non-illicit cigarettes, is the strongest incentive of smokers to buy illicit cigarettes. Although illicit cigarettes are much more expensive

than hand-rolled cigarettes, its convenience, taste, and image outweigh the cheap price of hand-rolled ones, especially among young adults. Young people are relatively sensitive to cigarette prices, thus they will increase their tobacco consumption when they find it easy to procure cigarettes.[10] A low quality of illicit cigarettes are a concern for some smokers, however the price-quality trade off is acceptable among illicit cigarette consumers.

Intensity of illicit cigarette consumption was not different in different geographical areas-border, trade centre, and rural areas-but marketing strategies were different. Recently, marketing of illicit cigarettes have gradually been spreading from border and trade centre areas to rural areas. In the border and trade centre areas, illicit cigarettes could be easily accessed at supermarket and tobacco stores whereas in the rural areas, a direct sale from friends and relatives was a common marketing strategy. The highest average price per pack was reported in the border area (Sadao). This may be due to a high consumption of one brand only available in the border areas that had high price, and popular to be co-used with other substances.

Proposed solutions of eliminating the illicit tobacco trade by WHO FCTC include international collaboration of a system management approach such as increasing existing penalties, tax-paid stamp

marking, tobacco-specific licenses to identify, monitor, and facilitate anti-smuggling enforcement.[30] Achieving effective illicit cigarette control at an international level, as recommended, may take time. This study reveals the current local situation of illicit cigarette consumption. The tobacco industry has found ways to circumvent government policies on tobacco control. Packets of illicit cigarettes contain health warning labels, barcodes, and look similar to other legal packets. Seizure of illicit cigarettes and fines are effective ways to control illicit cigarette consumption reported by our sample and elsewhere,[15] however wide-ranging involvement of social networks, high availability and easy access to illicit cigarettes are difficult barriers to overcome.

The latest increase in the excise tax of Thai regular cigarettes was in 2009.[18] The number of illicit cigarettes in southern Thailand has increased in the last three years as evident by an increasing amount of illicit cigarette seized.[19] Since illicit cigarette products have many varieties, are cheap, easy to access, and provide a better image of smoking than that of hand-rolled cigarettes, it has become popular during the last few years. This also may be due to the fact that the average price of a pack of illicit cigarettes (33 THB or 1.1 USD) is about half that of regular cigarettes (59 THB or 2 USD). The market price of illicit cigarettes has a greater effect on illicit cigarette consumption

than regular cigarettes. Increased excise tax of legal cigarettes, however, can increase price differences between illicit and non-illicit cigarettes which in turn encourage smokers to smoke more illicit cigarettes.

Most previous studies on illicit cigarette consumption used secondary data or were based on a survey among smokers in the general population. [29;31-34] This study used both quantitative and qualitative methods from illicit cigarette smokers compared to non-illicit smokers in a high prevalence area of illicit cigarettes. Due to the difficulty in reaching this sub-group, the study used a modified snow balling technique to recruit study subjects. The clustering effect of social network may influence the study findings, however complex survey analysis adjusted for cluster used in this study could accommodate the inter-dependence of smokers in the same social network.

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Authors' contributions

Chittawet Ketchoo carried out the study and drafted and revised the manuscript. Rassamee Sangthong and Virasakdi Chongsuvivatwong conceptualized the research idea, participated in the design of the study, laid out the framework for data analysis, interpreted the results, helped drafting and revising the manuscript. Alan Geater gave advice on data analysis and helped to draft and revised the manuscript. Edward McNeil helped to analyse and interpret the results and revised the final manuscript. All authors read and approved the final manuscript.

Figure 1 An example of study sample recruitment process in one of the three study districts

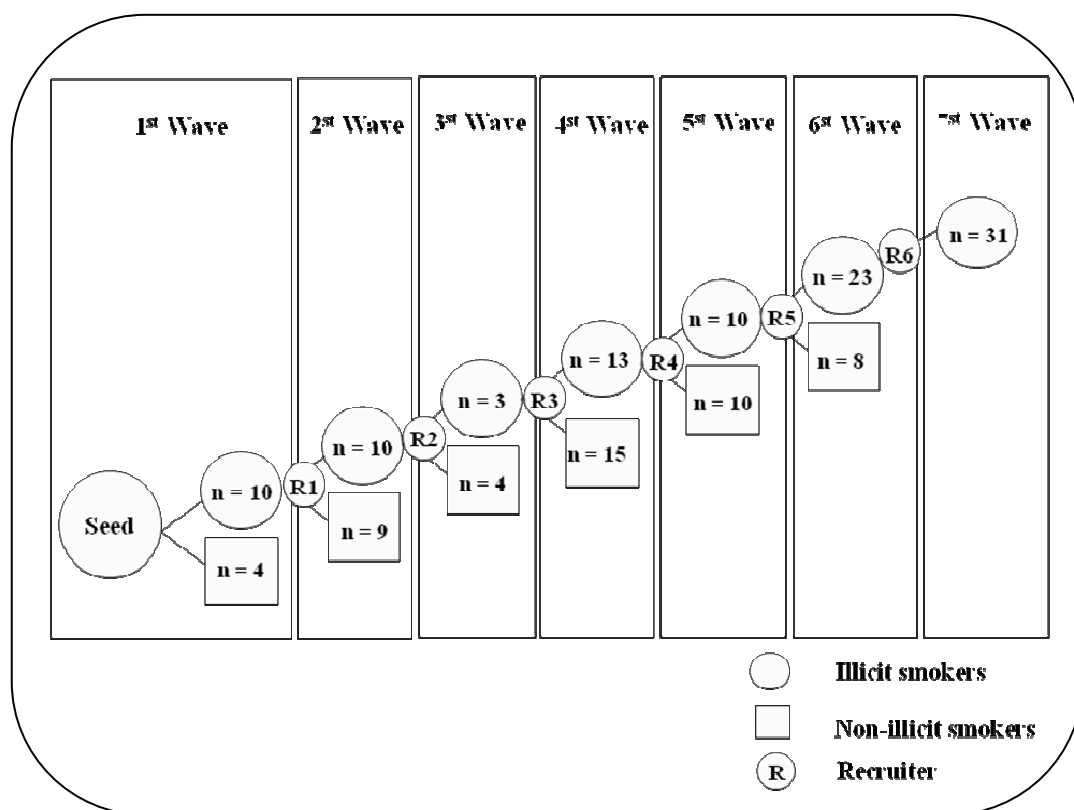


Figure 2 Number of cigarettes smoked daily by price of illicit cigarette

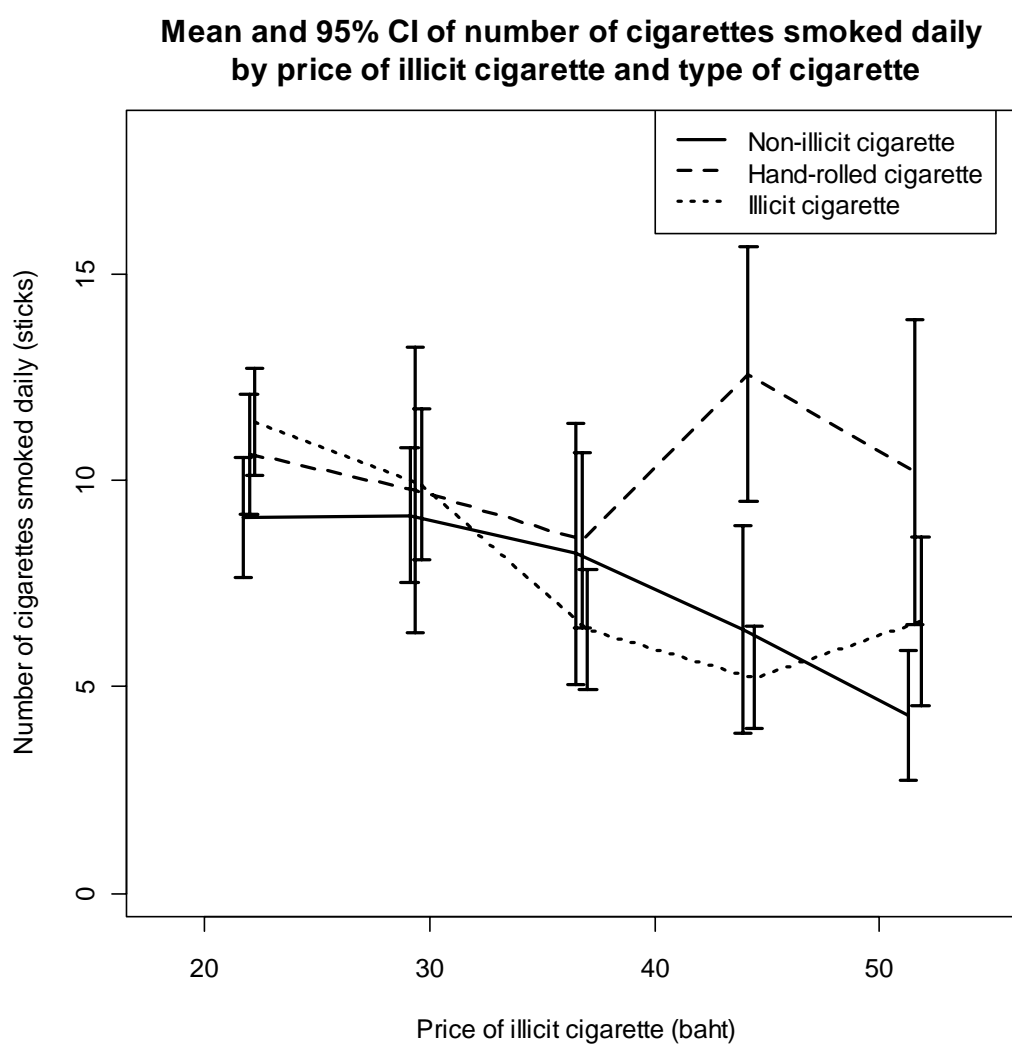
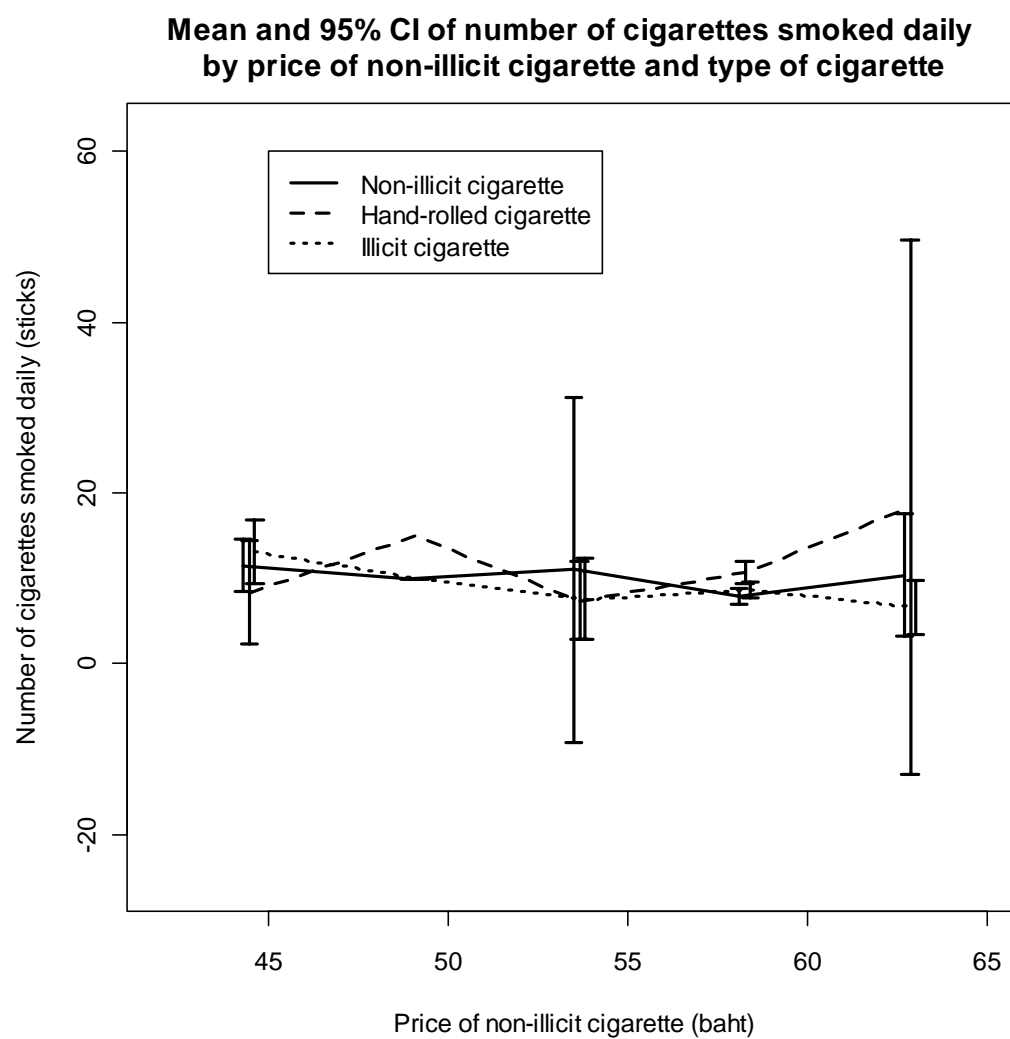


Figure 3 Number of cigarettes smoked daily by price of non-illicit cigarette



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