Cigarette purchasing behaviour in Thailand and Malaysia: Comparative analysis of a semi-monopolistic and a free-market structure

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Abstract

A wide range of cigarette prices can undermine the impact of tobacco tax policy when smokers switch to cheaper cigarettes instead of quitting. In order to better understand this behaviour, we study socio-economic determinants of price/brand choices in two different markets: a semi-monopolistic market in Thailand and a competitive market in Malaysia. The hypothesis that the factors affecting the price/brand choice are different in these two markets is analysed by employing a 2005 survey among smokers. This survey provides a unique perspective on market characteristics usually described only in business reports by the tobacco industry. We found that smokers in Thailand have fewer opportunities to trade down to save money on cigarettes, but pay lower prices than smokers in Malaysia, despite Thailand's higher tax rate. The Malaysian market, on the other hand, offers many possibilities to shop around for cheaper cigarettes. Higher income and education increase the price paid per cigarette in both countries, but the impact of these factors is larger in Malaysia. This has implications for sensitivity to cigarette prices. Using tax policy alone should be a more effective tobacco control measure in Thailand as compared to Malaysia. The effectiveness of a tax increase in Malaysia can be improved by adding programmes focusing on smoking cessation among low-income/low-educated smokers.

Keywords

cigarette prices; tax policy; monopoly vs. free market

Introduction

Malaysia, with a population of 26 million, has an estimated five million smokers. Its tobacco market is largely dominated by trans-national companies and can be characterised as competitive, with occasional 'price wars' among the leading manufacturers. In addition, new

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'mid-priced' and 'value' brands are frequently introduced to the market (New Straits Times 2005).

Population growth (Sarntisart et al. 2003) is fuelling an expansion of the cigarette market in Thailand despite a reduction in smoking prevalence from 49% in 1986 to 37% in 2004 (National Statistical Office 2005). The local tobacco market is dominated by the Thailand Tobacco Monopoly (TTM), a state-owned enterprise that has a monopoly to manufacture and distribute local tobacco products. Foreign brands accounted for only 17% of total cigarette volume sales in 2003 (Euromonitor 2005). Cigarette prices are controlled by the Ministry of Finance, which sets the maximum retail price for imported and domestic cigarettes (FAS Online 2003). Most foreign brands are priced as luxury cigarettes and are perceived as better quality products compared to TTM brands (Euromonitor 2005).

The goal of this paper is to study the socio-economic determinants of price/brand choices in two different markets: a semi-monopolistic market in Thailand and a competitive market in Malaysia. We hypothesise that these determinants will differ in these two markets. The price/brand choices have implications for the way smokers respond to a price increase by searching for cheaper cigarettes or by quitting.

Data and methods

Data for this study are drawn from the International Tobacco Control (ITC) - Southeast Asia Survey (Thailand and Malaysia) collected from January to March 2005 using face-to-face interviews. All survey questions and study procedures were standardised as much as possible across the two countries. The sampling scheme for households was a stratified multi-stage design. The primary strata in Thailand consisted of Bangkok and four regions, and the six zones of Malaysia. In both countries, each region or zone was further stratified into urban and rural areas and the sample selection was made proportional to their population sizes. A total of 4207 households were contacted in Thailand with the combined eligibility and cooperation rate of 58.7% (=2470/4207). In Malaysia, a total of 8697 households were contacted with a combined eligibility and cooperation rate of 32.4% (=2821/8697). The number of households interviewed in Malaysia was higher because both smokers and non-smokers[1] were eligible to participate in the survey, while only smokers took part in the survey in Thailand. The combined eligibility and cooperation rate is substantially lower in Malaysia than Thailand, reflecting a more urbanised and heterogeneous population.

After eliminating missing observations, the full sample consisted of 2000 and 2004 adult smokers aged 18 years and older who were smoking at least weekly in Thailand and Malaysia, respectively. The sample is generally representative of the population of smokers in both countries with the exception of female smokers in Thailand, who were over-sampled in urban areas. Female smokers were not included in our analysis because they have very low smoking prevalence and in many cases do not purchase their own cigarettes.

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[1]Non-smokers were added at the request of the Ministry of Health of Malaysia to study the impact of an anti-tobacco advertising campaign.

To study cigarette purchasing, we have also excluded the exclusive roll your own (RYO) cigarette users and those who purchase single cigarettes.[2] Controlling for RYO use among cigarette smokers and for income eliminates potential bias due to fewer observations in our analytic sample.[3]

Numerous variables were created from the survey data. Our main outcome measure was the self-reported average price paid per cigarette that allowed us to classify smokers in each country as low, medium or high-price cigarette buyers (Table 1). In Malaysia, we split smokers into approximate tertiles based on the price they paid per cigarette. This approach was modified for Thailand where there is less price variation. Here, smokers were grouped based on the modal purchase price (35 baht). Respondents who paid less than the modal price were assigned to the low-price category while those who paid more than the modal price were assigned to the high- price category. Price ranges are reported in Table 1.

We converted cigarette prices to standard US dollars using 2005 purchasing power parity (PPP) in order to compare prices between Malaysia and Thailand (World Bank 2006). PPP equalises the purchasing power of Malaysian ringgit and Thai baht with US dollars for a given basket of goods.

Effort to obtain cheaper cigarettes was measured using a binary indicator set to one if a smoker reported any special effort to buy cigarettes at a cheaper price than s/he would normally pay in the last six months and zero otherwise.

The independent variables used in our study were age, ethnicity, urban vs. rural residence, education, income, exclusive use of factory-made cigarettes (FMC) and number of cigarettes consumed per day. Respondents were classified into three age groups: 18–24, 25–54 and 55+. Ethnicity was defined as the major group or otherwise; in Malaysia, the major ethnic group was Malay while in Thailand the major ethnic group was Thai. Education was captured by two categories: less than secondary education vs. secondary education or more. Income was defined as a categorical variable representing the relative annual income per family member obtained by dividing the total reported family income by the number people living in the household. Three income groups were created using the whole sample and creating income tertiles: low, moderate and high. The classification of respondents to these income categories allows us to examine the impact of income on smoking behaviour without a need to convert income reported in local currencies (ringgit or baht) to a common denominator.

Smokers classified themselves into four categories according to the number of cigarettes consumed per day: 0–10, 11–20, 21–30 and 31+ cigarettes per day. The average smoking intensity was calculated by averaging midpoints of these categories. The demographic characteristics of the analytic sample are presented in Table 2.

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[2]Single cigarette purchase occurred among 11 and 4% of those who purchased cigarette in Thailand and Malaysia, respectively. We found that the price of a single cigarette can be up to twice the price of a cigarette purchased in a pack, and that this form of purchase is strongly correlated with low income. The primary motivation for these purchases is the lack of disposable income.
[3]Results of the analysis including both pack and single cigarette buyers that controlled for the form of purchase do not change our conclusions based on the sample that excludes single cigarette buyers.

Micro-level determinants of price paid per cigarette were examined using linear regression models. In these models, self-reported price adjusted for PPP was regressed on a set of independent variables that included age, income, education, race and residence. A dichotomous indicator for RYO consumption controls for product substitution instead of the RYO price since the survey did not collect this information. Due to potential endogeneity problems (i.e., when cigarette prices are high, the use of RYO can be expected to increase), we considered equations with and without the RYO variable. Since both versions of the model produced consistent results, we believe that endogeneity does not affect our estimates and present models with RYO included. Cigarette tax variable was not included in the models, because it would play a role similar to a constant as both Thailand and Malaysia have a uniform tobacco tax across the country.

A variation of this model controlled for brand choices in order to examine the tobacco industry pricing strategy and the price sensitivity of various socio-economic groups. Models were estimated for each country separately to evaluate differences between the two countries, as well for the whole sample.

Finally, logistic regression was used to estimate the odds of trying to buy cheaper cigarettes. The independent variables for the logistic models were the same as those used for the linear regression models. A variation of this model also controlled for smoking intensity (the number of cigarettes consumed per day).

All results are weighted to take into account the urban/rural distribution of the households as well as individual characteristics within each household. The weights used to produce the frequency tables (and other descriptive statistics) are calibrated to the national level, taking into account the adult/youth distribution in both countries; they also take into account the ethnicity distribution by zone in Malaysia. The weights used for regression models are the national-level weights in Thailand, while those in Malaysia are calibrated to state-level adult/youth distribution, since the sampling design in Malaysia selected just one state per zone.

Results

Table 1 above shows the average price per cigarette in local currencies and converted to standard US dollars. We found that smokers in Malaysia buy on average more expensive cigarettes compared to smokers in Thailand; this difference is statistically significant (t=11.33; p < 0.001). The coefficient of variation indicates larger price variation in Malaysia compared to Thailand. Smokers in Malaysia reported smoking 46 different FMC brands (including kretek cigarettes) compared to 18 in Thailand. The top five most popular brands in Malaysia are produced by international companies and four of them are considered premium brands since they cost more than the average cigarette. On the other hand, four of the five most popular brands consumed in Thailand are manufactured by the TTM and the imported brand is the most expensive. About 28 and 3.6% of smokers in Malaysia and Thailand named a brand other than one of the top five brands as their preferred brand, respectively.

There is no price variation for a cigarette brand at different purchase locations in Thailand. In Malaysia, street vendors have slightly higher prices as well as larger price variations even when controlling for brand choices. For example, the average price for a pack of Dunhill purchased from street vendors is 7.2 ringgit with the coefficient of variation 22.0, but its price at a local store is 6.8 ringgit with coefficient variation equal to 19.1.

Table 3 compares the average price per cigarette paid by different socio-economic groups in each country. Smokers in rural areas pay less for their cigarettes in both countries, but the difference is not statistically significant (Thailand: p =0.27; Malaysia: p =0.13).

Brand choices vary by urban/rural status in both countries. In Malaysia, the most popular brand, Dunhill is preferred to a similar degree in both urban and rural areas, but the other premium cigarette brands, such as Marlboro and Benson & Hedges, dominate urban markets. Lower-priced kretek cigarettes are most popular in Malaysian rural areas. The top Thai brand, Krong Thip, is equally popular in urban and rural markets, but the less expensive Wonder brands are primarily consumed in rural areas. Therefore, the price difference between these two markets could be related to different brand choices by the urban and rural population. The pricing strategy in the two markets is analysed below.

The price paid per cigarette differs by income and education. As expected, the price paid increases with income and the level of education, and the impact of these two factors seems to be stronger in Malaysia.

Younger smokers are willing to pay more for their cigarettes. The association between young age and higher cigarette prices, though statistically significant in both countries, is stronger in Thailand; on average, 18–24-year-old smokers pay 36.4 baht per pack (PPP US $ 2.82) compared to 31.2 baht per pack (PPP US$ 2.41) paid by smokers 55+ years old. Since there is almost no price variation within cigarette brands, this difference is driven by the preference for more expensive foreign brands among young smokers in Thailand. Thai smokers who consume both FMC and RYO cigarettes pay less for their cigarettes, meaning they choose less expensive cigarette brands.

In order to examine the impact of individual socio-economic characteristics on cigarette price choices, we estimated linear regression models (OLS) for Thai and Malay smokers, regressing price paid per cigarette on urban/rural status, age, income, education, race and consumption of RYO (Table 4). The results show that income and education are the most important determinants of price paid per cigarette in both countries. Wealthier and more educated smokers are willing to pay higher prices for their cigarettes, and this is primarily a result of their brand choices, due to the small variation of price within brand.

Judging by the size of the regression coefficients, income plays a more important role in price paid for cigarettes in Malaysia compared to Thailand.[4] The income effect is particularly strong among low-income smokers in Malaysia who purchase one cigarette on average 2.8 and 3.2 US cents cheaper compared to middle and high- income smokers,

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[4]This model was also estimated with interaction terms confirming statistically significant difference between the coefficients for age, income and ethnicity in Thailand and Malaysia. Results are available upon request.

respectively. On the other hand, low-income smokers in Thailand manage to buy a cigarette only 0.2 and 0.6 US cents cheaper compared to middle and high-income smokers, respectively. In Malaysia, income is not a significant determinant of the price paid for cigarettes among middle and high-income smokers, suggesting that cigarettes are quite affordable in Malaysia for people above the low- income threshold. In Thailand, income plays a role, albeit smaller, even among middle-income smokers.

The impact of education on the price paid for cigarettes (i.e., brand choice) is positive and could suggest that more expensive (and in Thailand that means foreign) brands might be perceived as less harmful, since more educated smokers have a better knowledge of the harmful effects of smoking.[5] Alternatively, more educated smokers are willing to pay more for cigarettes, since they perceive more expensive brands as a status symbol.

Buying an image can be also a reason why young smokers in Thailand pay more for their cigarettes even when income and education are controlled. Despite their limited disposable income that should result in higher price sensitivity (Chaloupka and Warner 2000), these young smokers are willing to buy more expensive foreign cigarette brands. The model shows that the overall impact of age on price choice is stronger in Thailand compared to Malaysia, and this difference is statistically significant.

Ethnicity is an important determinant of the price paid per cigarette in Malaysia, but this effect can be a result of brand preference among different ethnic groups. Urban/rural status as well as simultaneous consumption of RYO cigarettes is not important determinants of price paid per cigarette once other socio-economic status (SES) characteristics are controlled.

The model presented in Table 4 was also estimated while controlling for brand choices in order to assess the availability of the same brands for different prices. The results confirm that brand choices are primarily responsible for the differences in price paid by smokers in both countries. Apart from brand choice, some socio- economic characteristics play a role in the price paid for the preferred cigarette brand. In Thailand, the youngest smokers and more educated smokers pay more for their cigarettes, even when brand choice is controlled. This can be explained by higher cigarette prices in places such as discos, bars, café´s and resorts, places more likely to be patronised by these groups of smokers. Income is not a significant determinant of price paid in Thailand once brand choice is controlled, meaning that those who would be motivated the most to find cheaper cigarettes can do so only by purchasing a cheaper brand, but not by shopping around to get their brand at a cheaper price.

In Malaysia, the significant determinants of cigarette prices beyond brand choice are income and race. Both low and middle-income groups pay less for their cigarettes compared to the high-income group. Thus, unlike in Thailand, shopping around for the preferred brand pays off. Minority groups in Malaysia also buy their brands of choice cheaper, which could be

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[5]A regression analysis shows that having higher education, living in urban areas, being of younger age and being a Thai is associated with higher knowledge of the harmful effects of smoking measured on a scale from zero to seven based on an answer to the relation between seven health conditions and smoking.

related to their ability to secure cigarettes via their local networks and perhaps smuggling channels.

We did not find any strong evidence of 'pricing to the market' in either country. Prices in rural areas are generally lower compared to urban areas after controlling for brand choices, but the differences are not statistically significant.

Since some of the differences in prices paid for cigarettes can be attributed to smokers' socio-economic characteristics, we expect these characteristics are also important for smokers' efforts to buy cheaper cigarettes. This effort can be a function of both smokers' motivation and the opportunity to obtain cheaper cigarettes including RYO. We expect this effort to be greater in Malaysia compared to Thailand since the Malaysian market offers a larger price variety even within the same cigarette brand.

During the six months before the survey, about 21.2% of Malaysian smokers made a special effort to buy their cigarettes at a price cheaper than what they would normally pay. In Thailand where cigarette prices are to a large degree under government control, the majority of smokers (95.2%) did not make any effort in this respect.

The socio-economic determinants of smokers' effort to buy their cigarettes cheaper are summarised in Table 5. In Malaysia, this effort is driven by lower income. Thai smokers are much less likely to search for cheaper cigarettes. Those who do so also are more educated and consume RYO cigarettes. These results indicate that the lack of price variation in Thailand and the possibility of substituting FMC for cheaper RYO result in less payoff for Thai smokers looking for cheaper cigarettes. Smoking intensity is not an important determinant of the effort to buy cigarettes cheaper, once income is controlled for.

Discussion

We found substantial differences in the cigarette markets in Thailand and Malaysia in terms of price/brand choices and their socio-economic determinants. Smokers in Thailand have much narrower price/brand choices, which is consistent with the semi-monopolistic structure of the market. In both countries, low-income smokers prefer cheaper cigarette brands, and this income effect is stronger in Malaysia. Thus, our hypothesis that the factors affecting the price/brand choice are different in these two markets has been only partially confirmed. However, the influence of income disappears in Malaysia (but not in Thailand) once a smoker reaches the middle-income level, indicating a higher affordability of cigarettes in Malaysia compared to Thailand. Since affordability is inversely related to price sensitivity of consumers, a price increase in Thailand can be expected to result in a larger reduction of cigarette consumption than in Malaysia.

There is some evidence that more educated smokers choose more expensive cigarette brands, even when controlling for income. Future studies should examine whether higher-priced cigarette brands are perceived as lower risk or whether this behaviour is related to the social status communicated by purchasing more expensive cigarette brands.

In Malaysia, but not in Thailand, low and middle-income smokers paid lower prices for their brand of choice compared to high-income smokers, suggesting that those motivated by lower income to buy a particular brand cheaper can do so in Malaysia, but not in Thailand. This finding suggests lower effectiveness of tobacco tax policy in Malaysia in reducing cigarette use and disparity in smoking behaviour.

RYO cigarettes in Thailand offer an alternative for smokers who want to escape the impact of higher cigarette taxes. Since RYO cigarettes enjoy a preferable tax treatment, substituting them for the higher taxed FMC results in lower effectiveness of a cigarette tax increase as a public health policy as well as in a loss of tax income. Smokers in Thailand's semi-monopolistic market pay lower prices for their cigarettes compared to smokers in a competitive market in Malaysia. This was an unexpected finding, especially given the higher level of cigarette taxes in Thailand compared to Malaysia (the 2005 tax rates in Thailand and Malaysia were 61 and 25% of retail price, respectively). We speculate that the lower prices in Thailand are due to the effort of the TTM to stay competitive with the little-regulated RYO market, and/ or due to its attempt to secure future customers by making cigarettes more affordable and attractive despite the strong tobacco control policies.

One limitation of our study is that we could not fully analyse the substitution effect with respect to RYO cigarettes and its impact on smoking behaviour, because prices of RYO cigarettes were not collected by the survey.

Another limitation is that our sample excludes ex-smokers and smokers-to-be, creating a potential bias in our estimates. We took advantage of the longitudinal nature of our survey and examined price choices among those who were smokers at wave 1 but quit at wave 2. We found that in both Thailand and Malaysia, there was no difference in price paid among future quitters vs. those who continue to smoke. As far as smokers-to-be, we assumed that their behaviour would be similar to young/ occasional smokers that are included in our survey.

Studies in both low and high-income countries confirm that high cigarette prices are the most effective and practical way to reduce the negative health and economic consequences of tobacco use (Chaloupka and Warner 2000). To the extent that the monopolistic structure of the cigarette market in Thailand results in narrower price choices, it provides an environment more suitable for using taxes as a public health measure compared to the competitive cigarette market in Malaysia. The effectiveness of a tax increase in Malaysia can be improved by adding programmes focusing on smoking cessation among low-income and low-educated smokers.

Acknowledgments

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Table 1

Price paid per cigarette purchased by pack.

Price category		Malaysia				Thailand	
	N	Price (ringgit)	Price (PPP US$)		N	Price (baht)	Price (PPP US$)
Low	385	0.03–0.25	0.02–0.14		209	0.90–1.70	0.07–0.13
Medium	840	0.26–0.35	0.14–0.19		477	1.75	0.136
High	225	0.36–0.93	0.20–0.52		142	1.80–2.75	0.14–0.21
Average	1450	0.3 (28.64)	0.17		828	1.65 (16.46)	0.13

Note: PPP, purchasing power parity; the numbers in parentheses are coefficients of variation.

Table 2

Demographic characteristics of analytic sample.

Characteristic	Malaysia Percentage (%)	N	Thailand Percentage (%)	N
Age group				
18–24	16.5	235	12.1	100
25–54	69.7	993	76.4	633
55+	13.8	197	11.5	95
Ethnicity				
Other than major ethnic group	33.5	486	1.6	13
Major ethnic group	66.5	964	98.4	815
Residence				
Urban	66.5	964	43.1	357
Rural	33.5	486	56.9	471
Education				
Secondary or more	54.5	774	26.7	220
Less than secondary	45.5	646	73.0	604
Income groups (income range in local currency[a])				
Low	29.4 (0–2200)	392	17.0 (0–12,000)	141
Moderate	33.8 (2201–5999)	451	29.1 (12,001–29,999)	241
High	36.8 (6000)	492	53.8 (30,000)	445
Smokes exclusively factory-made cigarettes				
FM only	92.7	1344	87.8	727
Both FM and RYO or RYO alone	7.3	106	12.2	101
Cigarettes per day				
Mean	14.0	1435	14.3	828
SD	7.8		8.6	

[a] Local currency: Malaysia, ringgit; Thailand, baht.

Table 3

SES and price per cigarette in local currencies and in standard US dollars.

SES characteristics	Malaysia			Thailand		
	N	Price (CV)	US$ PPP	N	Price (CV)	US$ PPP
Residence						
Rural	486	0.28 (33.7)	0.16	471	1.63 (17.5)	0.13
Urban	964	0.31 (25.6)	0.17	357	1.68 (14.9)	0.13
Income						
Low	392	0.27 (37.7)	0.15	141	1.58 (17.6)	0.12
Moderate	451	0.31 (25.1)	0.17	241	1.61 (17.2)	0.13
High	492	0.32 (23.3)	0.18	445	1.70 (15.2)	0.13
Education						
Less than secondary	646	0.29 (32.4)	0.16	604	1.62 (15.8)	0.13
Secondary or more	774	0.32 (24.7)	0.18	220	1.72 (17.4)	0.13
Age						
18–24	235	0.30 (30.4)	0.17	100	1.82 (11.6)	0.14
25–54	993	0.31 (28.1)	0.17	633	1.63 (16.7)	0.13
55+	197	0.28 (29.3)	0.16	95	1.56 (16.2)	0.12
Race						
Major group (Thai and Malay)	964	0.31 (23.7)	0.17	815	1.65 (16.5)	0.13
Minor groups	486	0.29 (36.4)	0.16	13	1.64 (12.9)	0.13
Type smoked						
Both FMC and RYO	106	0.31 (31.4)	0.17	101	1.58 (18.1)	0.12
FMC only	1344	0.30 (28.4)	0.17	727	1.66 (16.1)	0.13

Table 4

OLS model: impact of socio-economic characteristics on price paid per cigarette (PPP US$, male smokers).

Parameter	Malaysia (n =1291)				Thailand (n =823)				Whole sample (n =2114)			
	b	SE	t	P	b	SE	t	p	b	SE	T	p
Intercept	0.140	0.015	9.51	<0.001	0.129	0.007	17.60	<0.001	0.143	0.011	13.25	<0.001
Residence												
Urban (vs. rural)	0.019	0.012	1.49	0.156	0.001	0.003	0.21	0.833	0.012	0.008	1.55	0.127
Age *												
18–24 (vs. 55+)	0.003	0.011	0.32	0.753	0.017	0.003	5.54	<0.001	0.007	0.007	1.01	0.317
25–54 (vs. 55+)	0.010	0.005	1.91	0.075	0.004	0.003	1.70	0.099	0.008	0.003	2.33	0.024
Income **												
Low (vs. high)	-0.032	0.006	-5.30	<0.001	-0.006	0.003	-2.03	0.051	-0.025	0.004	-6.16	<0.001
Moderate (vs. high)	-0.004	0.003	-1.19	0.251	-0.004	0.002	-2.47	0.019	-0.003	0.002	-1.28	0.208
Education												
BSecondary (vs.|secondary)	-0.010	0.005	-2.05	0.057	-0.005	0.002	-2.37	0.024	-0.009	0.003	-2.66	0.011
Race												
Major group (vs. other)	0.023	0.009	2.51	0.023	-0.0003	0.006	-0.05	0.962	0.023	0.010	2.46	0.018
RYO												
RYO (vs. FMC only)	0.015	0.009	1.73	0.103	-0.002	0.002	-1.04	0.304	0.009	0.005	1.83	0.074
Country												
Thailand (vs. Malaysia)	NA				NA				-0.039	0.005	-8.01	<0.001

*
Overall effect of age: Malaysia F=9.56; df=2, 16; p=0.002. Thailand F=32.02; df=2, 31; p<0.001. Whole sample F=19.20; df=2, 47; p<0.001.

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Overall effect of income: Malaysia F=14.09; df=2, 16, p<0.001. Thailand F=4.40; df=2, 31; p=0.024. Whole sample F=4.61; df=2, 47; p=0.015.

Note: There are 159 missing observations for Malaysia and five missing observations for Thailand due to incomplete covariate data. Estimating the model with all observations while controlling for missing observations produces similar results. These results are available upon request.

Table 5

Logistic model: effort to buy cheaper cigarettes.

	Malaysia (*n* =1273)				Thailand (*n* =823)				Whole sample (*n* =2096) Parameter			
	OR	95% CI	χ^2	*p*	OR	95% CI	χ^2	*p*	OR	95% CI	χ^2	*p*
Residence												
Urban (vs. rural)	0.73	0.38–1.40	0.92	0.338	1.74	0.68–4.48	1.33	0.248	0.79	0.42–1.49	0.54	0.463
Age *												
18–24 (vs. 55+)	1.19	0.56–2.54	0.20	0.653	1.10	0.23–5.15	0.01	0.908	1.15	0.57–2.33	0.16	0.691
25–54 (vs. 55+)	1.05	0.59–1.87	0.03	0.861	0.62	0.19–2.07	0.60	0.440	1.00	0.59–1.69	0.00	0.991
Income **												
Low (vs. high)	1.53	1.06–2.21	5.23	0.022	0.44	0.07–2.77	0.75	0.386	1.44	1.01–2.06	4.02	0.045
Moderate (vs. high)	0.89	0.57–1.39	0.26	0.610	0.40	0.11–1.54	1.77	0.183	0.81	0.52–1.26	0.87	0.350
Education												
BSecondary (vs.]secondary)	1.14	0.88–1.47	0.99	0.321	0.38	0.15–0.93	4.50	0.034	1.02	0.78–1.33	0.02	0.894
Race												
Major group (vs. other)	0.77	0.44–1.35	0.84	0.359	0.30	0.02–4.06	0.82	0.366	0.74	0.43–1.27	1.18	0.278
RYO												
RYO (vs. FMC only)	0.98	0.46–2.08	0.00	0.966	4.87	1.62–14.66	7.91	0.005	1.22	0.68–2.18	0.44	0.508
Consumption												
Per cigarette	0.98	0.95–1.01	2.10	0.147	0.97	0.92–1.03	0.87	0.352	0.98	0.96–1.01	2.56	0.109
Country												
Thailand (vs. Malaysia)									0.12	0.07–0.20	63.28	< 0.001

*
Overall effect of age: Malaysia χ^2 =0.24, df=2, *p*=0.888. Thailand χ^2 =1.49, df=2, *p*=0.474. Whole sample χ^2 =0.33, df=2, *p*=0.847.

**
Overall effect of income: Malaysia χ^2 =5.85, df=2, *p*=0.054. Thailand χ^2 =2.22, df=2, *p*=0.330. Whole sample χ^2 =5.65, df=2, *p*=0.059.

Note: There are 177 missing observations for Malaysia and five missing observations for Thailand due to incomplete covariate data. Estimating the model with all observations while controlling for missing observations produces similar results. These results are available upon request.