

Use of less expensive cigarettes in six cities in China: findings from the International Tobacco Control (ITC) China Survey

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ABSTRACT

Objective The existence of less expensive cigarettes in China may undermine public health. The aim of the current study is to examine the use of less expensive cigarettes in six cities in China.

Methods Data was from the baseline wave of the International Tobacco Control (ITC) China Survey of 4815 adult urban smokers in 6 cities, conducted between April and August 2006. The percentage of smokers who reported buying less expensive cigarettes (the lowest pricing tertile within each city) at last purchase was computed. Complex sample multivariate logistic regression models were used to identify factors associated with use of less expensive cigarettes. The association between the use of less expensive cigarettes and intention to quit smoking was also examined.

Results Smokers who reported buying less expensive cigarettes at last purchase tended to be older, heavier smokers, to have lower education and income, and to think more about the money spent on smoking in the last month. Smokers who bought less expensive cigarettes at the last purchase and who were less knowledgeable about the health harm of smoking were less likely to intend to quit smoking.

Conclusions Measures need to be taken to minimise the price differential among cigarette brands and to increase smokers' health knowledge, which may in turn increase their intentions to quit.

INTRODUCTION

It is well accepted that the most effective way to reduce cigarette consumption is to raise the price of cigarettes.^{1–2} Most econometric studies conducted in Western countries yielded price elasticity for cigarette demand estimates between -0.3 and -0.5 ,^{1–3 4–7} which implies that a 10% increase in cigarette price may result in 3% to 5% decrease in cigarette consumption. Article 6 of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC), the first ever global public health treaty, asks party countries to raise the price of and tax on tobacco products.

Economists used to believe that cigarette price elasticity was higher in developing countries compared to developed countries.^{1–8} However, several studies suggest that China may have lower price elasticity than Western countries. For example, Lance *et al* estimated that the price elasticity in China was -0.082 ⁹; and Mao *et al* concluded that price elasticity in China was -0.15 .¹⁰ One possible interpretation proposed by Mao *et al* is that smokers' brand switching behav-

ours from expensive cigarettes to cheaper cigarettes lowered price elasticity.¹⁰

As shown in figure 1, when cigarette price goes up, smokers have different responses. Besides quitting and consumption reduction, some smokers may switch to less expensive brands or engage in tax avoidance behaviours^{11–12}; some smokers may purchase cigarettes from different retail outlets such as tobacco discount stores¹¹; there are also smokers engage in compensating behaviours, for example, switching to cigarettes higher in tar and nicotine.¹³ The current study focuses on the use of less expensive cigarettes in China.

Like most goods, the price of cigarettes differs among brands. Examples include the three-tier cigarette pricing structure in the US (premium, discount and generic)¹⁴ and Australia (premium, mainstream and supervalued).¹⁵ China is the largest cigarette-producing country in the world, and cigarette prices vary considerably among brands. In 2006, there were 40 tobacco companies producing more than 200 domestic cigarette brands in China,¹⁶ and within brand families there were multiple brand varieties. Chinese cigarettes are classified into different grades according to the quality of tobacco leaves and the price of cigarettes. As shown in table 1, according to the classification criteria of the China National Tobacco Company, there are five grades of cigarettes in China. The factory price of grade 1 cigarettes is at least six times higher than grade 5 cigarettes. In addition, China has a two-tier taxing system for cigarettes. Namely, the tax rate for higher grades of cigarettes is higher than lower grades of cigarettes, which further widens the price differential among different grades of cigarettes.

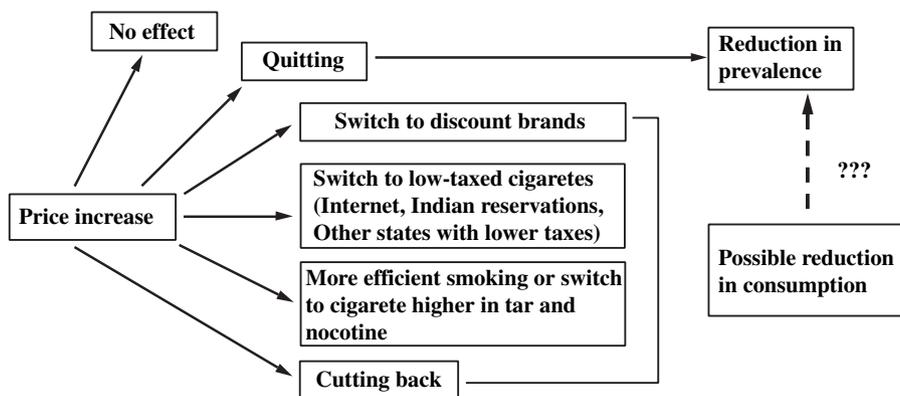
The tobacco monopoly system in China has policies that guarantee the supply of low-level (grades 4 and 5) cigarettes. China National Tobacco Company requires local tobacco companies produce certain amounts of low-level cigarettes each year and subsidises them to compensate for the relatively low profit margin. Thus, the production and the sale of low-level cigarettes in China are maintained according to objectives set by the China National Tobacco Company. For example, in 2006, 24.9% (503.9 billion sticks) of the cigarette production and 24.7% (500.6 billion sticks) of the cigarette sales in China were low-level cigarettes.¹⁶ The China National Tobacco Company claimed that low-level cigarettes may help satisfy low-income populations' needs.

Cummings *et al* reported that in the US, smokers of discount or generic cigarette brands tend to be Caucasian, more addicted to smoking and to have



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Figure 1 Compensatory model of cigarette price effects.



Adapted from: Fong GT. The International Tobacco Control Policy Evaluation Project (ITC Project): Evaluating the Impact of Policies of the WHO Framework Convention on Tobacco Control. Presentation given at the 8th Asia Pacific Conference on Tobacco or Health, Taipei, Taiwan. October 2007.

a lower income.¹⁴ Studies also suggest that poorer and heavier smokers are sensitive to changes in cigarette prices and more likely to engage in tax avoidant behaviours.¹² Researchers proposed that less expensive cigarettes may undermine the public health effects of price and tax policies.¹⁴⁻¹⁷ Theoretically, when cigarette prices increase, smokers may switch to less expensive cigarettes to minimise the financial burden and to maintain their smoking habit. As shown in figure 1, after a price increase, smokers who switch to less expensive cigarettes may not perceive much additional financial burden and may not choose to quit or reduce consumption. Given the enormous price differential among cigarette grades in China, it is particularly important to examine the use of less expensive cigarettes because of the increased potential for smokers to choose lower priced cigarettes. The aim of the current study is to determine the major characteristics of smokers of less expensive cigarettes, and whether the use of less expensive cigarettes are associated with decreased intentions to quit smoking.

METHODS

The International Tobacco Control (ITC) China Survey

The ITC China Survey is a prospective cohort survey in six cities in China: Beijing, Shanghai, Guangzhou, Shenyang, Changsha and Yinchuan. The six cities were selected based on their size, diverse geographic location and level of economic development. Table 2 shows the registered population, gross domestic product (GDP), per capita annual disposable income and consumption expenses in 2006 in each of the six cities. The wave 1 survey was conducted between April and August 2006. In each wave, about 800 smokers and 200 non-smokers were interviewed in each city. Participants included in this study come from 4815 smokers who completed the wave 1 survey. A more detailed description of the study design can be found in Wu *et al.*¹⁸ Briefly, in each city the ITC China Survey employed a multistage cluster sampling design to select representative adult urban smokers and non-

Table 1 Factory price of different grades of cigarettes in 2006 in China

Grades of cigarettes	Price per carton before VAT (¥)	Ad valorem tax rate
1	50>	45%
2	30–49	30%
3	15–30	30%
4	10–14	30%
5	<10	30%

Grades 4 and 5 are defined as 'low-level cigarettes', grades 1 and 2 are defined as 'high-level cigarettes' and grade 3 is defined as 'medium-level cigarettes'. VAT, value added tax.

smokers. The ITC China Survey was conducted using face-to-face interviews. The wave 1 cooperation rates range from approximately 80.0% in Beijing and Guangzhou to 95.0% in Changsha. The response rates range from 39.4% in Yinchuan to 66.0% in Guangzhou. All materials and procedures used in the ITC China Survey were reviewed and cleared with regard to ethics by the Office of Research at the University of Waterloo (Waterloo, Canada) and the Institutional Review Boards at: Roswell Park Cancer Institute (Buffalo, USA), the Cancer Council Victoria (Victoria, Australia) and the China National Centres for Disease Control and Prevention (Beijing, China). This study only used the data of current smokers.

Measures

Dependent variables

Purchase of less expensive cigarettes

We asked smokers to provide information on the cost of their cigarettes: 'The last time you bought cigarettes for yourself, how much did you pay for each pack of the cigarettes?' For smokers who didn't remember price paid per pack, the price was calculated from the smokers' response to the following two questions: (1) 'The last time you bought cigarettes for yourself, how many packs of cigarettes did you purchase?' and (2) 'How much did you pay for all the cigarettes you bought last time?' In this study, less expensive cigarettes were defined as cigarettes with reported price paid in the lowest tertile within each city (coded as 1), whereas cigarettes with reported prices paid in the middle or the highest tertile were defined as regular cigarettes (coded as 0).

Intention to quit smoking

We asked current smokers: 'Are you planning to quit smoking?' Smokers who responded 'within the next month', 'within the next 6 months', or 'sometime in the future, beyond 6 months'

Table 2 City population, gross domestic product (GDP), per capita annual disposable income and consumption expenses in 2006*

City	Number of registered residents	GDP	Per capita annual disposable income (¥)	Per capita annual consumption expense (¥)
Beijing	11	7720	19978	†
Guangzhou	5	6068	19851	15445
Shanghai	13	10297	20668	14762
Changsha	2	1791	13924	10680
Shenyang	6	2483	11651	8670
Yinchuan	1	335	10068	8288

*Data were from Statistical Report on the 2006 Economic and Social Development of each city. †Data were not available for 2006 in Beijing.

were defined as having any intention to quit smoking (coded as 1), whereas smokers who responded 'not planning to quit' or 'don't know/cannot say' were defined as 'having no intention to quit or others' (coded as 0).

Independent variables

The major independent variables in this study included:

- ▶ City (Beijing, Shenyang, Shanghai, Changsha, Guangzhou, Yinchuan)
- ▶ Gender (male, female)
- ▶ Age (18–34 years, 35–44 years, 45–54 years, 55 years or older)
- ▶ Highest level of education (low=no education or elementary school, medium=junior high school or high school/technical high school, high=college, university or higher)
- ▶ Household income per month (low: <1000¥ per month, medium: 1000¥ to 2999¥, high: >3000¥, don't know/cannot say)
- ▶ Ethnicity (Han, others)
- ▶ Number of cigarettes smoked per day (1–10, 11–20, 21–30, 31+)
- ▶ How often did you think about the money spent on smoking in the last month? (never, occasionally, often, don't know/cannot say)

Knowledge about the adverse health effects of smoking: This index was based on smokers' responses to the following questions: 'Based on what you know or believe, does smoking cause the following: (1) stroke; (2) impotence in male smokers; (3) lung cancer in smokers; (4) emphysema; (5) stained teeth in smokers; (6) premature ageing; (7) lung cancer in non-smokers from secondhand smoke; and (8) CHD (coronary heart disease). Response options were: 'yes' (coded as 1), 'no' (coded as 0), 'don't know/cannot say' (coded as 0). The index was computed by summing the scores for the eight questions.

Weighting procedures

Sampling weights were constructed to provide the best possible prevalence estimates. The weights were constructed separately for male adult smokers and female adult smokers. Wave 1 weights were constructed by accounting for the four levels of sample selection: Jie Dao, Ju Wei Hui, household and individual. The final weight for a sampled individual was the number of people in the city population and the sampling category represented by that individual. A full description of the weighting methodology is available at <http://www.itcproject.org>.

Statistical analyses

Descriptive analysis

SPSS for Windows, V.17.0 (SPSS, Chicago, Illinois, USA), was used for all analyses. For each of the six cities, the median and the interquartile range for cigarette price paid were calculated.

Factors associated with purchasing less expensive cigarettes

Complex samples multivariate logistic regression models were constructed to examine factors associated with purchasing less expensive cigarettes. The dependent variable was purchase of less expensive cigarettes and the independent variables were forced to enter the model. All categorical variables were changed to dummy variables before entering the model.

Factors associated with intentions to quit smoking

Complex samples multivariate logistic regression models were constructed to examine whether use of less expensive cigarettes was associated with decreased intentions to quit. The dependent variable was intention to quit smoking, the major independent variable of interest was purchase of less expensive cigarettes. All

Table 3 Median, IQR and lowest tertile of cigarette price paid (per pack) in the six cities

City	Valid N	Median	IQR	The lowest tertile of cigarette price paid (Yuan RMB)
Beijing	761	4.00	2.20	3.00 (US\$ 0.44)
Shenyang	740	3.70	2.50	2.80 (US\$ 0.41)
Shanghai	783	7.50	1.50	7.33 (US\$ 1.08)
Changsha	793	4.40	1.00	4.00 (US\$ 0.59)
Guangzhou	777	4.00	3.70	3.50 (US\$ 0.51)
Yinchuan	784	5.00	3.50	4.00 (US\$ 0.59)

categorical variables were changed to dummy variables before entering the model.

RESULTS

The demographics of the study participants can be found in Wu *et al.*¹⁸

Cigarette price in each city

Table 3 presents the median, interquartile range and the lowest tertile of cigarette price paid (per pack) of the last purchase by city. Overall, the self-reported price of cigarettes ranges from 0.70¥ RMB per pack to 100¥ RMB per pack. The median price paid per pack was highest in Shanghai (7.50¥), followed by Yinchuan (5.00¥), Changsha (4.40¥), Guangzhou (4.00¥), Beijing (4.00¥) and Shenyang (3.70¥). The lowest tertile of cigarette price paid (per pack) of the last purchase was 3.00 in Beijing, 2.80 in Shenyang, 7.33 in Shanghai, 4.00 in Changsha, 3.50 in Guangzhou and 4.00 in Yinchuan.

Factors associated with purchasing less expensive cigarettes

Table 4 shows the results of a complex samples multivariate logistic regression examining factors associated with purchasing less expensive cigarettes. Smokers who bought less expensive cigarettes at the last purchase tended to be older, heavier smokers, to have lower education and income, to smoke more cigarettes per day and to think more about the money spent on smoking in the last month.

Factors associated with intentions to quit smoking

Table 5 shows the results of a complex samples multivariate logistic regression model examining factors associated with intentions to quit smoking. Smokers who reported buying less expensive cigarettes at the last purchase were less likely to have intention to quit (OR=0.75, 95% CI 0.58 to 0.96). Compared to Beijing smokers, smokers in Shanghai (OR=0.50, 95% CI 0.27 to 0.92) and Guangzhou (OR=0.54, 95% CI 0.31 to 0.96) were less likely to have intention to quit. Other factors associated with decreased intention to quit included heavier smokers, smokers less knowledgeable about the harms of smoking and smokers who thought more about the money spent on smoking in the last month.

DISCUSSION

In this study, the median cigarette price paid ranged from 3.70¥ (about US\$ 0.54) per pack in Shenyang to 7.50¥ (about US\$ 1.10) per pack in Shanghai. The lowest tertile of cigarette price paid ranged from 2.80¥ (about US\$ 0.41) per pack in Shenyang to 7.33¥ (about US\$ 1.08) per pack in Shanghai. There are several possible interpretations for the huge differences among cities. The first one is the differences in city economy. As shown in table 2, the residents in the six cities differed in disposable

Table 4 Results of multivariate logistic regression examining factors associated with purchasing less expensive cigarettes

	N	Percentage who bought less expensive cigarettes*	OR	95% CI
Gender				
Male	4487	35.4	Reference	
Female	232	57.1	1.37	0.80 to 2.34
Age in years				
18–34	470	23.0	Reference	
35–44	1153	25.2	0.82	0.58 to 1.16
45–54	1624	32.4	1.08	0.79 to 1.48
55 or older	1463	53.1	2.61	1.90 to 3.59
Ethnic group				
Han	4484	33.3	Reference	
Others	235	36.4	1.01	0.66 to 1.56
Highest level of education				
Low	607	64.1	Reference	
Medium	3092	36.7	0.58	0.44 to 0.78
High	1014	16.3	0.28	0.20 to 0.39
Household income per month				
Low	911	57.4	Reference	
Medium	2120	39.6	0.50	0.39 to 0.64
High	1344	18.2	0.21	0.16 to 0.28
Don't know/cannot say	340	29.9	0.34	0.22 to 0.51
Number of cigarettes smoked per day				
1–10	1631	32.8	Reference	
11–20	2316	36.3	1.23	1.03 to 1.46
21–30	400	45.9	1.74	1.28 to 2.35
31 or more	344	40.7	1.32	0.95 to 1.83
Think about the money spent on smoking in the last month				
Never	3130	32.7	Reference	
Occasionally	961	36.8	1.18	0.95 to 1.45
Often	571	54.9	2.10	1.62 to 2.71
Don't know/cannot say	53	34.5	0.90	0.42 to 1.94
Index of knowledge about the adverse health effects of smoking				
0–1	928	44.2	Reference	
2–3	1110	37.5	0.92	0.68 to 1.24
4–5	1419	33.7	0.89	0.70 to 1.12
6–8	1234	31.3	0.77	0.59 to 1.01

City was not included in this model because we used the lowest tertile of cigarette price paid in each city as the cut-off for less expensive cigarettes, thus the percentage of smokers who bought less expensive cigarettes is the same across cities (1/3).

*Refers to the last purchase.

income and consumption expenditure in 2006. Shanghai was the most affluent city, and this may partly interpret the high cigarette price and low use rate of less expensive cigarettes. However, the city economies cannot explain all the huge differences between cities. For example, Beijing and Shanghai residents had similar income and expenditure in 2006, but Beijing had 6 times higher less expensive cigarette use rates than Shanghai. The second possible interpretation is the difference in the supply of less expensive cigarettes. Because the profit margin of low-level cigarettes is very low, local tobacco companies are inactive in producing these cigarettes, which results in shortages in less expensive cigarette supply.¹⁹ One article from Guangzhou Tobacco Company clearly stated, ‘...the major reason for the decrease in low-level cigarette sales is the shortage in supply’.²⁰ If the supply of low-level cigarettes in some cities is not enough, it's possible that less expensive cigarette smokers in these cities cannot find their usual brands and have to switch to more expensive cigarettes. The third possible interpretation might be the cultural differences among cities, which is unclear and needs further research.

Table 5 Results of multivariate logistic regression examining factors associated with any intention to quit smoking

	Percentage intending to quit	OR	95% CI
City			
Beijing	29.1	Reference	
Shenyang	32.4	1.13	0.61 to 2.09
Shanghai	16.5	0.50	0.27 to 0.92
Changsha	25.2	0.99	0.58 to 1.69
Guangzhou	14.8	0.54	0.31 to 0.96
Yinchuan	28.3	0.88	0.50 to 1.55
Gender			
Male	24.3	Reference	
Female	25.3	0.92	0.53 to 1.61
Age in years			
18–34	25.3	Reference	
35–44	25.4	1.13	0.79 to 1.61
45–54	24.5	1.19	0.80 to 1.76
55 or older	23.2	1.21	0.83 to 1.77
Ethnic group			
Han	26.9	Reference	
Others	24.3	0.92	0.59 to 1.43
Highest education			
Low	19.1	Reference	
Medium	24.7	1.16	0.85 to 1.58
High	27.3	1.10	0.72 to 1.67
Household income per month			
Low	22.8	Reference	
Medium	25.6	1.13	0.85 to 1.51
High	25.5	1.27	0.91 to 1.77
Don't know/cannot say	16.6	0.85	0.52 to 1.39
Number of cigarettes smoked per day			
1–10	30.5	Reference	
11–20	22.6	0.71	0.60 to 0.84
21–30	15.7	0.50	0.36 to 0.70
31 or more	15.6	0.49	0.33 to 0.72
Think about the money spent on smoking in the last month			
Never	19.6	Reference	
Occasionally	29.6	1.61	1.26 to 2.05
Often	42.2	2.78	2.17 to 3.57
Don't know/cannot say	12.4	0.85	0.35 to 2.02
Buy less expensive cigarettes at the last purchase			
No	26.2	Reference	
Yes	21.0	0.75	0.58 to 0.96
Index of knowledge about the adverse health effects of smoking			
0–1	11.8	Reference	
2–3	17.1	1.49	1.09 to 2.04
4–5	27.5	2.56	1.95 to 3.35
6–8	37.8	3.69	2.59 to 5.23

In this study, the price differential among brands is large. The self-reported cigarette price ranged from 0.70¥/pack to 100¥/pack, which gives smokers more choices in the price of cigarettes. In other words, Chinese smokers have more flexibility in choosing different prices of cigarettes than most Western smokers.

Older, heavier smokers and smokers with lower SES were more likely to buy less expensive cigarettes. These findings are consistent with previous studies.^{12–14} Poorer smokers bear more financial burden from smoking.^{2–21} In this study, about 20% of smokers reported that their household income was less than 1000¥ per month. Even if these smokers smoked cigarettes priced at 2.5¥ per pack, a one pack per day smoker would spend 75¥ per month on smoking, which is about 7.5% of their household income. Thus, although tobacco companies have claimed that low-level cigarettes may decrease the

financial burden on low-income smokers, poorer smokers still spend a fair amount of their income on smoking. In comparison, raising cigarette prices may help poor smokers to quit smoking, which would decrease their smoking expenditure to 0 and also would help them lower the risk of getting smoking-related diseases.

Smokers who reported buying less expensive cigarettes at the last purchase were less likely to intend to quit, which is consistent with Cummings *et al.*'s study conducted in the US. This suggests that the existence of less expensive cigarettes may deter smoking cessation. In the 1980s and 1990s, US tobacco companies used discount and generic cigarettes to retain price sensitive smokers and to slow the decline of tobacco use rates among US adults.¹⁴ The China National Tobacco Company seems to be doing the same thing. In a paper published in the journal of China Tobacco in 2006, the authors from the China National Tobacco Company stated, 'if we abandon the market of low-level cigarettes, we will lose consumers as well as the basis for the continuing development of the tobacco industry...'.²² This finding has important policy relevance. The WHO FCTC requires party countries adopt price and tax policies to reduce tobacco consumption. However, when cigarette prices are increased in China, some smokers may easily find a less expensive cigarette brand to substitute for their old brand, which may damage the effects of price and tax policies. Therefore, if China is to adopt price and tax policies as suggested in WHO FCTC, accompanying measures should be taken to reduce the price differential among brands. One option is to set a minimum price for cigarettes, another possible option is to change the current two-tier tax structure and apply the same amount of specific tax to each pack of cigarettes and eliminate the two-tier ad valorem tax, as suggested by Hu *et al.*²³

Another interesting finding is that smokers who were more knowledgeable about the adverse health effects of smoking had more intent to quit smoking. The clear policy implication is that raising smokers' health knowledge may be an effective way to increase cessation in China. Health education or other interventions are needed to educate Chinese smokers about the specific effects on health of smoking.

The advantages of this study included the large sample size, rigorous study design and the ability to do comparisons among cities. However, there were some limitations in this study. The first limitation is the use of self-reported price. Smokers may not be willing to report buying less expensive cigarettes in a face-to-face survey. However, for most respondents, we asked them to show the interviewers their cigarette pack, which may have

lowered such possibility. The second limitation is that we used the lowest tertile of cigarette price paid at the last purchase to classify cigarettes as less expensive in each city. As shown in table 1, the cut-off of the lowest tertile was different across cities. However, this method may reflect the relative price within each city. The third limitation is the use of cross-sectional data, which restricts our ability to explore causal relationships. This issue will be addressed when the next wave of data is available. Fourth, we measured the price of the last brand of cigarettes purchased. However, the last brand purchased may not be smokers' primary brand of cigarettes. Fifth, this study used self-reported data and may be subject to social desirability bias, namely respondents might tell the interviewer what they think he/she wants to hear. To minimise the social desirability bias, all the field interviewers were trained to be objective when administering the survey, although this may not have completely solved the problem.

In summary, there is a wide variation in the price of cigarettes in China. Smokers of less expensive cigarettes tend to be older, heavier smokers, to have lower education and income, and to think more about the money spent on smoking in the last month. Smokers who bought less expensive cigarettes who were less knowledgeable about the health harms of smoking at the last purchase were less likely to intend to quit smoking. Measures need to be taken to minimise the price differential among cigarette brands and to increase smokers' health knowledge, which may in turn increase their intentions to quit.

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Competing interests None.

Patient consent Obtained.

Ethics approval This study was conducted with the approval of the All materials and procedures used in the ITC China Survey were reviewed and cleared for ethics by the Office of Research at the University of Waterloo (Waterloo, Canada) and the Institutional Review Boards at: Roswell Park Cancer Institute (Buffalo, USA), the Cancer Council Victoria (Victoria, Australia) and the China National Centers for Disease Control and Prevention (Beijing, China).

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What this paper adds

- ▶ China is home to one-third of the world's smokers. The prices of Chinese cigarettes differ dramatically. Studies from Western countries suggest that use of less expensive cigarettes may deter smoking cessation. However, little is known about the effects of less expensive cigarettes on smoking cessation in China.
- ▶ This paper suggests that Chinese smokers who use less expensive cigarettes and who are less knowledgeable about the health harms of smoking have weaker intention to quit smoking.
- ▶ Measures need to be taken to minimise the price differential among cigarette brands and to increase smokers' health knowledge, which may in turn increase their intentions to quit.

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中国六城市对低价卷烟的使用情况： 国际烟草控制（ITC）中国调查结果

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摘要

目的：低价卷烟在中国的存在会对中国的公共卫生起到破坏作用。本研究的目的就是为了调查低价卷烟在中国六城市的使用情况。

方法：本研究数据来自国际烟草控制（ITC）中国调查的基线调查数据。ITC中国调查于2006年4月至8月开展，覆盖中国六个城市4815名成年城市吸烟者。我们计算了每个城市自报最后一次购烟价格的中位数，使用复杂样本多元Logistic回归模型确定与低价烟（每个城市卷烟价格最低的三分位数）使用有关的因素，并探讨使用低价烟与戒烟意图之间的联系。

结果：报告最后一次购烟时购买了低价烟的吸烟者更倾向于年龄较大、吸烟量较大、教育水平较低、收入水平较低，以及过去一个月内更多考虑吸烟的花费的人群。最后一次购烟时购买低价烟的吸烟者和对于吸烟健康危害认知水平较差的吸烟者打算戒烟的可能性更小。

结论：应采取相应措施，尽量减少不同卷烟之间的价格差异，并增加吸烟者的健康知识，从而提高他们的戒烟打算。

背景

提高卷烟价格是公认的减少卷烟消费量最有效的方法。^{1,2} 西方国家开展的大多数经济学研究得出的卷烟需求价格弹性估计水平在-0.3到-0.5之间，^{1,3,4,7}也就是说，卷烟价格上涨10%可以导致卷烟消费量降低3%到5%。世界卫生组织《烟草控制框架公约》（WHO FCTC）是世界上第一份全球性的公共卫生条约，其中第6条要求各成员国提高烟草产品的价格和税率。

经济学家曾经认为发展中国家的卷烟价格弹性要比发达国家高。^{1,8} 但多项研究显示，中国的卷烟价格弹性可能比西方国家还低。譬如，Lance等人估计，中国的卷烟价格弹性指数为-0.082⁹，而Mao等人得出的中国卷烟价格弹性为-0.15。¹⁰ Mao等人认为可能的一种解释是中国吸烟者从高价卷烟转吸低价卷烟的品牌转换行为导致了价格弹性较低。¹⁰

如图1所示，吸烟者在烟价上涨时会做出不同的反应。除了戒烟和减少消费量以外，一些吸烟者可能转向价格更便宜的品牌或者参与避税行为^{11,12}，另一些吸烟者可能改从烟草折扣店

等其它类型的零售点买烟¹³，还有一些吸烟者则可能采取代偿行为，譬如改吸焦油和尼古丁含量更高的卷烟。¹³ 本次研究关注的是中国吸烟者对于低价卷烟的使用情况。

同大多数商品一样，不同品牌的卷烟价格也不同，例如美国（高级、折扣和普通）¹⁴和澳大利亚（高级、主流和超值）¹⁵的三级烟价体系。中国是世界上最大的烟草生产国，不同品牌之间的价格差异很大。2006年，中国共有40家烟草企业，生产国产品牌200余种，¹⁶而在各品牌系列下又还有多个不同品种。中国卷烟根据其烟叶品质和成品价格分为不同等级。如表1所示，根据中国国家烟草公司的分类标准，中国卷烟共分五个等级，其中一类烟的出厂价格是五类烟价格的至少六倍以上。此外，中国对于卷烟采取的是两级税收制度，即高级卷烟的税率高于低档卷烟，这一差异又进一步加大了不同等级卷烟之间的价格差距。

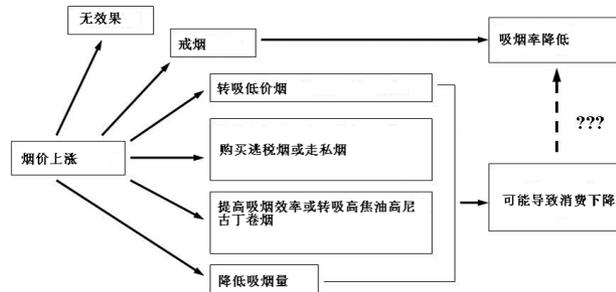
中国的烟草垄断制度下设置了多项政策，保证低档（四类和五类）卷烟的供应。中国国家烟草公司要求各地烟草企业每年要生产一定数量的低档烟，并对其提供相应的补贴，弥补其相对较低的利润率。因此，中国低价烟的生产和销售是根据中国国家烟草公司制定的目标进行维持的。譬如，2006年中国24.9%（5039亿支）的卷烟产量和24.7%（5006亿支）的销售量都来自于低档烟。¹⁶ 中国烟草公司宣称生产低档烟有助于满足低收入人群的需要。

据Cummings等人报道，美国吸折扣或者普通品牌卷烟的多是白人，这些吸烟者烟瘾更大，收入较低。¹⁴ 同时多项研究也显示，贫困且吸烟量大的吸烟者对与烟价变化更敏感，也更可能参与避税行为。¹² 研究者提出，低价烟可能破坏价格和税收政策的公共卫生效果。^{14,17} 理论上讲，当烟价上涨时，吸烟者可能会改吸价格更便宜的卷烟，以便最大限度降低其经济负担，同时维持其吸烟习惯。如图1所示，在烟价上涨之后转吸低价烟的吸烟者，可能不会有额外的经济负担，也可能不会选择戒烟或是减少消费量。鉴于中国不同等级卷烟之间存在的巨大价差，探讨低价烟的使用问题就显得十分重要，因为中国吸烟者更可能选择转向价格较低的卷烟。本次研究的目的在于确定低价烟吸烟者的主要特征，以及使用低价烟是否会导致较低的戒烟打算。

6 解锁

本论文按照BMJ杂志解锁办法可在网上免费下载，详见：<http://tobaccocontrol.bmj.com/site/about/unlocked.xhtml>

图1: 卷烟价格效应的补偿模型



来源: International Tobacco Control Policy Survey Overview, Geoffrey Fong, PhD, 2002.

方法

国际烟草控制 (ITC) 中国调查

ITC中国调查是一项针对中国六个城市的前瞻性人群研究, 包括北京、上海、广州、沈阳、长沙和银川。这六个城市是依据其城市规模、地理位置和经济发展水平选择。表2是2006年六城市户籍人口数、国民生产总值 (GDP)、人均可支配年收入和消费支出数据。ITC中国调查第一轮调查于2006年4-8月进行。每轮调查在每个城市约访谈800名吸烟者和200名非吸烟者。本研究分析了完成第一轮调查的4815名吸烟者。有关该研究的设计, Wu等人的文章有详尽的描述。¹⁸ 简言之, ITC中国调查在每个城市采用多阶段整群抽样法抽取具有代表性的成年城市吸烟者和非吸烟者。ITC中国调查采用的是面对面访谈方式。第一轮的合作率从约80.0% (北京、广州) 到95.0% (长沙) 之间不等, 应答率从39.4% (银川) 到66.0% (广州) 之间不等。ITC中国调查所使用的所有材料和程序均经过滑铁卢大学 (加拿大滑铁卢) 研究办公室和罗斯威尔帕克癌症研究所 (美国布法罗)、维多利亚癌症委员会 (澳大利亚维多利亚) 和中国疾病预防控制中心 (中国北京) 的机构评审委员会的伦理学审批。本研究仅使用其中的现在吸烟者数据。

变量指标

因变量

购买低价烟

我们请吸烟者提供关于他们的卷烟费用信息: “你上次买烟, 平均每盒多少钱?” 对于记不起每盒烟价格的吸烟者则根据其对面两个问题的回答计算价格: (1) “你上次共买了多少盒烟?” (2) “你上次买烟, 共花费多少钱?” 在本研

表1: 2006年中国不同等级卷烟出厂价

卷烟等级	增值税前每条卷烟价格 (元)	从价税率
1	50-	45%
2	30-49	30%
3	15-30	30%
4	10-14	30%
5	<10	30%

注: 4类及5类烟为“低档烟”, 1类及2类烟为“高档烟”, 3类烟为“中档烟”。

究中, 低价烟是指价格处于各城市报告支付价格最低三分位的卷烟 (编码: 1), 报告支付价格处于中间或者最高三分位的定义为普通卷烟 (编码: 0)。

戒烟打算

我们询问现在吸烟者: “你打算戒烟吗?” 回答“下个月之内”、“接下来的6个月中”或者“6个月后的某一天”的吸烟者被认为有戒烟打算 (编码: 1), 而回答“不打算戒烟”或者“不知道/无法回答”的吸烟者被认为“无戒烟打算或其它” (编码: 0)。

自变量

本研究所涉及的主要自变量包括:

- ▶ 城市 (北京、沈阳、上海、长沙、广州、银川)
- ▶ 性别 (男性、女性)
- ▶ 年龄 (18-34岁、35-44岁、45-54岁、55岁或以上)
- ▶ 最高受教育程度 (低=未受过教育或小学文化程度; 中=初中或中学/中专文化程度; 高=大学或更高)
- ▶ 每月家庭收入 (低: <1000元/月; 中: 1000到2999元/月; 高: 3000元/月及以上; 不知道/无法回答)
- ▶ 民族 (汉族、其他)
- ▶ 每日吸烟支数 (1-10、11-20、21-30、30+)
- ▶ 在过去的一个月里, 你考虑吸烟的花费的频率 (从不、偶尔、经常、不知道/无法回答)

表2: 2006年城市人口、国民生产总值 (GDP)、人均可支配年收入和消费支出数据*

城市	户籍居民 (百万)	GDP	年人均可支配收入	年人均消费支出
北京	11	7720	19978	†
广州	5	6068	19851	15445
上海	13	10297	20668	14762
长沙	2	1791	13924	10680
沈阳	6	2483	11651	8670
银川	1	335	10068	8288

*: 数据来源于2006年各城市经济与社会发展统计报告。

†: 2006年北京未报告数据。

关于吸烟健康危害的知识：这一指标是根据吸烟者对下列问题的回答得出：“你认为吸烟是否会引引起以下疾病：（1）中风；（2）阳痿；（3）吸烟者患肺癌；（4）肺气肿；（5）牙齿发黄；（6）加速衰老；（7）被动吸烟者患肺癌；（8）冠心病”。答案选项包括：“是”（编码：1），“否”（编码：0），“不知道/无法回答”（编码：0）。该指标通过对所有8个问题的得分求和计算。

加权程序

对样本进行加权，从而得出最可能的流行率估计值。对男性和女性成年吸烟者分别进行加权。第一轮调查权重通过计算样本选择的四个级别得出，包括：街道、居委会、家庭和个体。每个样本的最终权重为该样本所代表的该城市中该个人所在采样类别的人口数。对加权方法的详细介绍请参见：<http://www.itcproject.org>。

统计学分析

描述性分析

所有分析均采用Windows系统下的SPSS V.17.0 (SPSS, Chicago, Illinois, USA) 软件。对每个城市计算其支付烟价的中位数和四分位数间距。

与购买低价烟有关的因素

建立复杂样本多元Logistic回归模型以研究与购买低价烟相关的因素。其中因变量为购买低价烟，自变量代入模型。所有分类变量在代入模型前全部转化为哑变量

与戒烟打算有关的因素

建立复杂样本多元Logistic回归模型，研究使用低价烟是否与低戒烟打算相关。因变量为戒烟意图，主要涉及的自变量为购买低价烟。所有类别变量在代入模型前全部转化为哑变量。

表3：六城市支付烟价（每包）的中位数、四分位数间距和最低三分位

城市	有效样本量	中位数	四分位数间距	卷烟购买价格最低三分位数（元）
北京	761	4.00	2.20	3.00 (US\$ 0.44)
沈阳	740	3.70	2.50	2.80 (US\$ 0.41)
上海	783	7.50	1.50	7.33 (US\$ 1.08)
长沙	793	4.40	1.00	4.00 (US\$ 0.59)
广州	777	4.00	3.70	3.50 (US\$ 0.51)
银川	784	5.00	3.50	4.00 (US\$ 0.59)

结果

本研究调查对象的人口学特征详见Wu等人文章。¹⁸

每个城市的卷烟价格

表3是分城市上次购烟支付烟价（每包）的中位数、四分位数间距和最低三分位数据。总体来讲，卷烟的每包自报支付价格范围从0.70元到100元不等。每包支付价格中位数最高的是上海（7.50元），其次是银川（5.00元）、长沙（4.40元）、广州（4.00元）、北京（4.00元）和沈阳

（3.70元）。上次购烟支付烟价（每包）最低三分位分别为：北京：3.00，沈阳：2.80，上海：7.33，长沙：4.00，广州：3.50，和银川：4.00。

与购买低价烟有关的因素

表4是对与购买低价烟有关的因素的复杂样本多元Logistic回归分析结果。上次购烟购买低价烟的吸烟者多为年龄较大、吸烟量较大的吸烟者，其受教育程度和收入水平较低，每日吸烟量较高，同时上个月内会更多地考虑吸烟的花费问题。

与戒烟打算有关的因素

表5是对与戒烟打算有关的因素的复杂样本多元Logistic回归分析结果。报告上次购烟购买低价烟的吸烟者更倾向于没有戒烟打算（OR=0.75, 95% CI: 0.58-0.96）。与北京吸烟者相比，上海（OR=0.50, 95% CI: 0.27=0.92）和广州（OR=0.54, 95% CI: 0.31=0.96）的吸烟者有戒烟打算的比例较低。其它与戒烟打算低相关的因素包括每日吸烟量大、对吸烟危害知识水平较低和上个月内更多考虑吸烟花费。

讨论

在本次研究中，支付烟价的中位数范围从沈阳的每包3.70元（约合0.54美元）到上海的7.50元（约合1.10美元）不等。支付烟价的最低三分位范围从沈阳的每包2.80元（约合0.41美元）到上海的每包7.33元（约合1.08美元）。对于城市间的巨大差异有几种可能的解释。第一是城市间的经济差异，如表2所示，2006年各城市居民的可支配收入和消费支出存在差异，上海是各城市中最富裕的，这也可以部分解释上海的高卷烟价格。然而，城市经济上的差异并不能完全解释各城市之间烟价的巨大差异。例如，2006年北京和上海居民的收入和支出水平差不多，但北京的低价烟使用却比上海高。第二个可能的解释是低价烟供应的差异。由于低价烟的利润率非常低，因此地方烟草企业对于生产低价烟并不积极，这就使得低价烟的供应存在短缺。¹⁹ 广州烟草公司的一篇文章明确指出：“.....低档烟销售下降的主要原因是由于供应不足”。²⁰ 如果部分城市低价卷烟供应不足，那么就可能出现这些城市的低价烟吸烟者无法找到他们平时常吸的品牌，而不得不改吸价格比较高的卷烟。第三个可能的解释是各城市间的文化差异，这一方面的情况尚不明确，有待开展进一步的研究。

在本次研究中，各种品牌卷烟之间的价格差异很大。自报烟价范围从0.70元/包到100元/包不等，这就给了吸烟者更多的价格选择空间。换言之，中国吸烟者在选择不同价格的卷烟问题上比西方国家的吸烟者有更大的灵活性。

年龄较大、吸烟量较大和SES较低的吸烟者更可能购买低价卷烟。这些结果与以往研究的结果是一致的。¹²⁻¹⁴ 贫困吸烟者承担的吸烟经济负担更大。²⁻²¹ 在本次研究当中，大约20%的吸烟者称其每月家庭收入不到1000元。即便是这些吸烟者吸的卷烟价格在2.5元每包，每天吸一包也意味着每月吸烟需要花费75元，约占其家庭收入的7.5%。因此，即使烟草企业宣称低价烟可以降低低收入吸烟者的经济负担，但贫困吸烟者仍然将其收入的相当一部分花费在了吸烟上。相反，提高卷烟价格可能有助于贫困吸烟者戒烟，将他们的吸烟开支降低到0，同时还可以帮助他们降低患各种吸烟相关疾病的风险。

报告上次购烟时购买低价烟的吸烟者具有戒烟打算的可能性更小，这和Cummings等人在美国开展的研究结果是

表4 与购买低价卷烟有关的因素：多元Logistic回归分析结果

	样本量	购买低价烟%	OR	95% C.I.
性别				
男性	4487	35.4	对照	
女性	232	57.1	1.37	0.80-2.34
年龄 (岁)				
18-34	470	23.0	对照	
35-44	1153	25.2	0.82	0.58-1.16
45-54	1624	32.4	1.08	0.79-1.48
55岁及以上	1463	53.1	2.61	1.90-3.59
民族				
汉族	4484	33.3	对照	
其他	235	36.4	1.01	0.66-1.56
教育程度				
低	607	64.1	对照	
中	3092	36.7	0.58	0.44-0.78
高	1014	16.3	0.28	0.20-0.39
家庭月收入				
低	911	57.4	对照	
中	2120	39.6	0.50	0.39-0.64
高	1344	18.2	0.21	0.16-0.28
不知道/无法回答	340	29.9	0.34	0.22-0.51
每日吸烟量				
1-10	1631	32.8	对照	
11-20	2316	36.3	1.23	1.03-1.46
21-30	400	45.9	1.74	1.28-2.35
31支及以上	344	40.7	1.32	0.95-1.83
过去一个月内考虑吸烟花费				
从不	3130	32.7	对照	
偶尔	961	36.8	1.18	0.95-1.45
经常	571	54.9	2.10	1.62-2.71
不知道/无法回答	53	34.5	0.90	0.42-1.94
吸烟危害健康知识得分				
0-1	928	44.2	对照	
2-3	1110	37.5	0.92	0.68-1.24
4-5	1419	33.7	0.89	0.70-1.12
6-8	1234	31.3	0.77	0.59-1.01

城市未纳入模型，因各城市购买低价烟均为1/3。

一致的。这表明，低价烟的存在可能阻碍戒烟。上世纪80年代和90年代，美国烟草企业采用折扣卷烟和普通卷烟的策略来维持那些对烟价敏感的吸烟者，同时减缓美国成年人中烟草使用率的降低速度。¹⁴ 而现在中国国家烟草公司也在做同样的事。《中国烟草》杂志2006年刊载的一篇中国国家烟草公司的文章指出：“如果我们放弃低档烟市场，那么我们在失去顾客的同时还会失去烟草产业发展的基础.....”²² 这一结论具有十分重要的政策相关性。WHO FCTC要求成员国采取价格和税收政策降低烟草消费量。然而，当中国卷烟价格上涨时，部分吸烟者可以很容易地找到另一种比较便宜的品牌替代之前吸的老品牌，这就影响了价格和税

表5：与戒烟意愿有关的因素：多元Logistic回归结果

	有戒烟意愿 (%)	OR	95% C.I.
城市			
北京	29.1	对照	
沈阳	32.4	1.13	0.61-2.09
上海	16.5	0.50	0.27-0.92
长沙	25.2	0.99	0.58-1.69
广州	14.8	0.54	0.31-0.96
银川	28.3	0.88	0.50-1.55
性别			
男性	24.3	对照	
女性	25.3	0.92	0.53-1.61
年龄 (岁)			
18-34	25.3	对照	
35-44	25.4	1.13	0.79-1.61
45-54	24.5	1.19	0.80-1.76
55岁及以上	23.2	1.21	0.83-1.77
民族			
汉族	26.9	对照	
其他	24.3	0.92	0.59-1.43
教育程度			
低	19.1	对照	
中	24.7	1.16	0.85-1.58
高	27.3	1.10	0.72-1.67
家庭月收入			
低	22.8	对照	
中	25.6	1.13	0.85-1.51
高	25.5	1.27	0.91-1.77
不知道/无法回答	16.6	0.85	0.52-1.39
每日吸烟量			
1-10	30.5	对照	
11-20	22.6	0.71	0.60-0.84
21-30	15.7	0.50	0.36-0.70
31支及以上	15.6	0.49	0.33-0.72
过去一个月内考虑吸烟花费			
从不	19.6	对照	
偶尔	29.6	1.61	1.26-2.05
经常	42.2	2.78	2.17-3.57
不知道/无法回答	12.4	0.85	0.35-2.02
上次购烟时是否购买低价烟			
否	26.2	对照	
是	21.0	0.75	0.58-0.96
吸烟危害健康知识得分			
0-1	11.8	对照	
2-3	17.1	1.49	1.09-2.04
4-5	27.5	2.56	1.95-3.35
6-8	37.8	3.69	2.59-5.23

收政策的效果。因此，如果中国要按照WHO FCTC 的建议采取价格和税收政策，那么同时就还要采取措施缩小各种卷烟品牌间的价格差距。其中一个可能的办法是设置一个卷烟最低价格，另一个可能的办法是改变当前的两级税收制度，对

所有卷烟都征收同等金额的从量税，取消卷烟的两级从价税（Hu等人）。²³

本研究另一个有趣的发现是，对吸烟健康危害认知水平较高的吸烟者，其戒烟意图也更强。这中间的政策意义十分明显，即提高中国吸烟者的健康认知水平可以有效提高戒烟率。需要采取健康教育和其它干预手段教育中国吸烟者，让他们了解吸烟引起的具体健康危害。

本研究的优势包括样本量大、研究设计严谨和能够进行城市间的比较。然而，本研究也存在一定的局限性。第一是我们采用的是自报价格。吸烟者可能不愿意在面对面调查当中报告购买了低价烟。不过，对于大多数调查对象，我们都要求他们向访谈者展示其烟盒，这样就可以降低上述情况发生的可能性。第二个局限性是我们使用的是上次购烟支付烟价最低三分位来确定各个城市的低价烟。正如表1所示，各城市最低三分位的取舍点是不一样的。不过，这种方法可以反映每个城市内部的相对价格。第三个局限性体现在对横断

研究贡献

- ▶ 中国吸烟者占全球吸烟者总人数的三分之一。中国不同卷烟之间的价格差距十分巨大。西方国家的研究结果显示，低价卷烟的使用可能阻碍戒烟。然而，关于中国低价烟使用对戒烟影响的数据还极为缺乏。
- ▶ 本文指出，使用低价烟和对吸烟健康危害认知水平较差的中国吸烟者戒烟打算也较低。
- ▶ 需要采取措施，尽可能缩小不同香烟品牌之间的价格差距，提高吸烟者的健康认知水平，从而提高他们的戒烟打算。

面数据的使用上，这种方式限制了我们探讨因果关系的能力。这个问题可以在得到下一轮随访调查数据时得以解决。第四，我们测量的是上次购买的一个香烟品牌的价格。但上次购买的并不一定是吸烟者所吸的主要品牌。第五，本研究采用自报数据，这就可能出现社会期望偏倚，即调查对象告诉访谈者的答案可能是他们认为访谈者希望听到的答案。为了最大限度减少这种偏倚，对所有现场访谈人员都进行了培训，以便在实施调查时务求客观，尽管，这样并不一定能完全解决这一问题。

总之，中国不同卷烟的价格差异很大。使用低价烟的多为年龄大、吸烟量较大，教育程度、收入水平较低，上个月内更多考虑吸烟花费的吸烟者。购买低价烟的吸烟者和对吸烟健康危害认知水平较差的吸烟者具有戒烟打算的可能性更低。要采取措施尽量缩小不同香烟品牌之间的价格差距，提高吸烟者的健康认知水平，从而提高其戒烟打算。

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来源与同行评价：未开展；已经外部同行评价。

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