Journal of Humanities and Social Sciences, Vol. 5, No. 1, pp. 1-9 (2009)

Factors Influencing Smokers' Decisions to Consume Light Cigarettes

JIE-MIN LEE[1], HUI-CHENG WANG[2] and SHENG-HUNG CHEN[3]

[1] *Department of Logistics Management, National Kaohsiung Marine University*

No.142, Haijhuan Rd., Nanzih District, Kaohsiung City, Taiwan 81143 R.O.C.

[2] *Department of Applied Economics, National Chung Hsing University*

No. 250, Kuo Kuang Rd, Taichung, Taiwan 402 R.O.C.

[3] *Department of Finance, Nan Hua University*

No. 32, Chung Keng Li, Dalin, Chiayi, Taiwan 622 R.O.C.

ABSTRACT

Objectives: The primary goal of this study was to investigate the factors influencing smokers' decisions to consume light cigarettes. The results can help public health authorities draft appropriate anti-smoking policies for light cigarettes. Methods: In this study we created a probit model using data on 3,939 smokers drawn from a survey compiled in 2000 by the Bureau of Health Promotion, Department of Health, Executive Yuan in Taiwan. Results: We found several important factors influencing smokers' decisions to consume light cigarettes, including age, gender, educational level, income level, percentage intending to quit smoking, and price. Most importantly, we found that smokers who are concerned about their health are most likely to consume light cigarettes. Conclusions: Our results indicate that most smokers are unaware of the serious health threats posed by light cigarettes. Therefore, we recommend that the ROC government develop education programs targeted toward the typical light cigarette smoker, especially women and those who want to stop smoking. We also recommend that the government increase the tax on light cigarettes and restrict the right of cigarette manufacturers to include such words as "light" or "low-tar" on the labels of their products.

***Key Words*:** light cigarettes, health threats, smoker's decisions

影響淡菸吸菸決策因素之研究

李家銘[1]　王惠正[2]　陳昇鴻[3]

[1]國立高雄海洋科技大學運籌管理學系

高雄市楠梓區海專路 142 號

[2]國立中興大學應用經濟學系

台中市南區國光路 250 號

[3]南華大學財務金融學系

嘉義縣大林鎮中坑里 32 號

摘　要

目標：本研究主要目的在認定影響吸菸者抽淡菸的決策因素。研究結果有助於台灣衛生主管機關制定相關淡菸之菸害防制政策。方法：建立 Probit 模型使用衛生署國民健康局 2002 年 3,939 位吸菸者的調查資料進行分析。結果：研究發現年齡、性別、教育水準、所得水準、戒菸意願及菸價都會對淡菸吸菸決策產生影響。最重要地，發現認知抽淡菸較健康之吸菸者愈會去抽淡菸。結論：我們發現吸菸者未察覺淡菸對身體健康所產生之嚴重威脅。因此，政府可針對淡菸吸菸族群設計教育之宣導預防介入方案，特別是女性及有戒菸意願吸菸者。我們也建議政府對淡菸提高菸稅及限制香菸製造商在香菸包裝盒上使用「淡」或「低」焦油的文字。

關鍵詞：淡菸，認知安全，吸菸決策

I. INTRODUCTION

Survey data published by the World Health Organization (WHO) indicates that smoking causes more than five million deaths worldwide each year. If no progress is made in easing consumption, WHO estimates that roughly ten million people will die annually of smoking-related causes by the year 2020.

In Taiwan, tobacco control has become an extremely urgent public health issue. According to statistics issued by the National Health Research Institute's health care policy research section, close to 20,000 Taiwanese die annually due to smoking-related causes; in spite of this, the overall number of smokers is five million and growing. In addition, the annual cost of treating smoking-related diseases is now in excess of NT$16.5 billion. In fact, the total economic and medical cost of smoking exceeds NT$50 billion each year. As a result, the Taiwanese government has made the management of tobacco products and the control of smoking one of its highest priorities– especially since its accession to the World Trade Organization on January 1, 2002.

In the early 1950s, as scientists began to find a link between smoking and lung cancer, the cigarette industry began to feel increasingly threatened (Kluger, 1996). Obviously, a reduction in smokers due to serious health risks would reduce their sales. In the 1970s, they responded to this threat by developing supposedly safer low-tar and low-nicotine cigarettes (Kozlowski, Goldberg, & Yost, 1998; Maxwell, 1996; U.S. Department of Health and Human Services [USDHHS], 1989; Warner & Slade, 1992). Thanks to extremely effective advertising campaigns, the belief that such cigarettes were safer led to a significant increase in the number of people smoking them. In Taiwan, the market share of light cigarettes rose from 8.9% in 1974 to 56.0% in 1989 (Federal Trade Commission [FTC], 1994).

Unfortunately, research has shown that smokers take in roughly the same amount of tar and nicotine with either variety; in fact, light cigarettes may actually be more hazardous to smokers' health than regular cigarettes (Shiffman, Pillitteri, Burton, Rohay, & Gitchell, 2001; Cohen, 1996; Gori, 1990). This is because people who smoke them may inhale more deeply, take more puffs per cigarette, smoke more cigarettes, or use their lips or fingers to block the holes of the filter in order to render it ineffective (Djordjevic, Stellman, & Zang, 2000; Scherer, 1999). Research has also shown that the deep inhalation of light cigarettes may actually increase the risk of lung cancer (Benowitz, Hall, Herning, Jacob, Jones, & Osman, 1983; Kuller, Ockene, Meilahn, Wentworth, Svendsen, & Neaton, 1991; Ockene, Kuller, Svendsen, & Meilahn, 1990; Thun, Lally, Flannery, Calle, Flanders, & Heath, 1997; Richard, Rebecca, Brian, Larry, Michael, & William, 2007; Ronald, Sonia, Tricia, Wild, & Jennifer, 2007; Russell, Jarvis, Iyer, White, Sweeney, & Pillitteri, 1980).

II. MATERIALS AND METHODS

Taking 3,939 current and former smokers in Taiwan as its sample, this study used socioeconomic background and smoking-associated data to establish a probit model with which to investigate light cigarette smoking decisions. The following explains the data source and variables and summarizes the light probit model settings for cigarette smoking decision-making.

1. Explanation of the Data Source and Variables

As a source of data, our study used the "Survey of the Health Promotion Knowledge, Attitudes, and Behavior of Taiwan Citizens." Issued in 2002 by the Bureau of Health Promotion, Department of Health, Executive Yuan, the project surveyed people 15 years of age and older (born no later than June 30, 1987) from all of Taiwan's counties and cities. The project adopts systematic random sampling to sample and the sample is 32,660 people altogether. The investigation period is from October 2002 to March 2003 and the visiting rate is 81.9% to finish 26,755 cases. Therefore, the data not only have representativeness of samples, but also match the demand for this research on the suitability of the materials.

Our study used survey data regarding the socioeconomic backgrounds and related factors of 3,939 smokers, defined as those who have smoked at least 100 cigarettes in their lifetime. By "related factors," we mean the behavioral variables of demographics, economics, health status, degree of tobacco addiction, intention to quit, reason for smoking light cigarettes, and use of other addictive products such as alcoholic beverages and betel nuts.

Demographic factors consisted of the smoker's gender, age, and level of education. Economic factors consisted of the smoker's personal monthly income, as well as the retail price per pack of cigarettes. Degree of addiction consisted of the number of packs smoked per day in accordance with Okubo, Miyamoto, Suwazono, Kobayashi, & Nogawa (2002). We classified people who smoke less than one pack per day as light smokers; those who smoke more than one, but less than two, packs per day as moderate smokers; and those who smoke two or more packs per day as heavy smokers.

Intention to quit referred to whether or not smokers wished to quit smoking. The survey options consisted of intending to quit smoking and not intending to quit smoking. Health status referred to the smoker's current state of health; options consisted of very good, good, adequate, not very good, and very bad. Reasons for smoking light cigarettes consisted of good taste, better for health, and other (i.e., preparing to quit smoking, nice brand packaging, and good advertising). Use of betel nut referred to consumption of betel nuts within the previous six months. Drinking referred to drinking alcohol at least occasionally or in social situations. See Table 1 for detailed definitions of the variables.

2. Reliability and Validity Analysis

A. Reliability analysis

The definition of reliability is straightforward to a measurement is reliable if it reflects the proportion of true score variability that is captured across subjects or respondents, relative to the total observed variability. Or, equivalently, one minus the ratio of the variation of the error score and the variation of the observed score:

$$r_{xx'} = \frac{S_T^2}{S_X^2} = 1 - \frac{S_E^2}{S_X^2} \qquad (1)$$

where $r_{xx'}$ is the symbol for the reliability of the observed score, X; S_X^2, S_T^2 and S_E^2 are the variances on the measured, true and error scores respectively. Unfortunately, there is no way to directly observe or calculate the true score, so a variety of methods are used to estimate the reliability of a test.

Cronbach' a is the common statistics that are used to estimate the reliability of a sum scale (Cronbach, 1951). Cuieford (1965) think that if Cronbach' a coefficient is more than 0.7, that means it is high reliability.

Cronbach's a is defined as,

$$\mathrm{a} = \frac{N}{N-1}\left(\frac{S_X^2 - \sum_{i=1}^{N} S_{Y_i}^2}{S_X^2}\right) \qquad (2)$$

where N is the number of components (items or testlets), S_X^2 is the variance of the observed total test scores, and $S_{Y_i}^2$ is the variance of component i. Alternatively, the standardized Cronbach's a can also be defined as

$$\mathrm{a} = \frac{N \cdot \bar{r}}{(\bar{v} + (N-1) \cdot \bar{r})} \qquad (3)$$

where N is the number of components (items or testlets), $\bar{r}$ equals the average variance and $\bar{r}$ is the average of all (Pearson) correlation coefficients between the components.

B. Validity analysis

Validity refers to the appropriateness of that measurement (Gajendra & Kanka, 1999). Typically, establishing the validity of a test requires professional judgment. There are various types of validity. The most common of these are content, concurrent, construct, and predictive validity (Gajendra & Kanka). Content validity draws an inference from test scores to a large domain of items similar to those on the test. Content validity is concerned with sample-population representativeness. i.e. the knowledge and skills covered by the test items should be representative to the larger domain of knowledge and skills. Content validity is usually established by content experts. Construct validity draws an inference form test scores to a psychological construct. Because it is concerned with abstract and theoretical construct, construct validity is also known as theoretical construct. Predictive validity refers to the degree to which the operationalization can predict (or correlate with) with other measures of the same construct that are measured at some time in the future. Again, with the selection test example, this would mean that the tests are administered to applicants, all applicants are hired, their performance is reviewed at a later time, and then their scores on the two measures are correlated.

Table 1. The definition of variables and their explanations

Variable	Definition	Explanation
Dependent variable		
Light cigarette smokers	A smoker who currently smokes low tar/nicotine cigarettes or cigarettes whose packaging bears the words “light” or “mild”	If smoker currently smokes light cigarettes, dummy=1, otherwise dummy=0
Independent variables		
Demographic factors		
Female	Female smoker	If smoker is female, dummy= 1, otherwise dummy=0
Age	Smoker’s age	Continuous value
Level of education		
University or above	The smoker has attended university or above	If smoker attended university or above, dummy=1, otherwise dummy=0
High school	The smoker has attended high school	If smoker attended high school, dummy=1, otherwise dummy=0
Junior high school	The smoker has attended junior high school	If smoker attended junior high school, dummy=1, otherwise dummy=0
Economic factors		
Cigarette price	Retail prices of major brands	Continuous value
Personal monthly income (NT$1000)	The smoker’s monthly personal income	Continuous value
Health status		
Good health	Smoker generally feels his or her health status is very good, good, or adequate	If smoker feels his or her health is very good, good, or adequate, dummy=1, otherwise dummy=0
Smoking characteristics		
Degree of addiction		
Light smoker	The smoker smokes less than one pack per day	If smoker smokes less than one pack per day, dummy=1, otherwise dummy=0
Moderate smoker	The smoker smokes 1-2 packs per day	If smoker smokes 1-2 packs per day, dummy=1, otherwise dummy=0
Reason for smoking light cigarettes		
Good taste	Smokes light cigarettes due to their good taste	If smoker smokes light cigarettes due to good taste, dummy=1, otherwise dummy=0
Relatively small health hazard	Smokes light cigarettes due to their relatively small health hazard	If smoker smokes light cigarettes due to smaller health hazard, dummy=1, otherwise dummy=0
Intention to quit smoking		
Yes	The smoker intends to quit smoking	If smoker intends to quit smoking, dummy=1, otherwise dummy=0
Use of addictive products		
Use of betel nut	The smoker has used betel nut in the last six months	If smoker uses betel nut, dummy=1, otherwise dummy=0
Use of alcohol	The smoker drinks at least occasionally or in social situations	If smoker regularly drinks, dummy=1, otherwise dummy=0

3. Probit Model of Decision to Smoke Llight Cigarettes

In statistics, a probit model is a popular specification of a generalized linear model, using the probit link function. Probit models were introduced by Chester Ittner Bliss in 1935. We used the following model to describe the decision to smoke light cigarettes:

$$I_{1i}^{*} = b' X_i + e_i \quad (4)$$

$$E(e_i) = 0, Var(e_i) = 1 \quad (5)$$

Here, I_{1i}^{*} is the unobservable personal utility index. X_i is a $K\times1$ explanatory variable matrix, b is a $K\times1$ unknown

parameter matrix, and the assumed e_i follows a standard normal distribution. Although we could not obtain the personal utility index, we did observe individuals' final decisions. Similarly, with regard to light cigarette smoking decisions, we used X_{ji} to explain variables regarding individual background characteristics, such as education, income and age. We also used X_{ji} to explain behavioral variables, such as the reason for using light cigarettes, smoking status and habits, intention to quit smoking, health status, and use of betel nut and alcohol.

Because of this, the dichotomous variable I expressing smoking decisions can be defined as: I_{1i}=1 if $I_{1i}^{*}>0$ then coreside=1, the respondent currently smokes light cigarettes; I_{1i}=0 if $I_{1i}^{*}\leq 0$ then coreside=0, the respondent currently does not smoke light cigarettes (smokes ordinary cigarettes).

We first derive the probability density function of decision (I_{1i}=1):

$$\begin{aligned}\Pr ob\left(I_{1i}^{*}>0\right) &= \Pr ob\left(b' X_i + e_i > 0\right)\\ &= Pr\, ob\left(e_i > -b' X_i\right)\\ &= Pr\, ob\left(e_i < b' X_i\right)\\ &= F\left(b' X_i\right) \qquad (6)\end{aligned}$$

We then use the probability density function to derive the likelihood function:

$$L=\prod_{i=1}^{n}[F(b' X_i)]^{Ii}\left[1-F\left(b' X_i\right)\right]^{1-Ii} \qquad (7)$$

So that the logarithmic likelihood function is:

$$\log L=\sum_{i=1}^{n}\left\{I_i \log F\left(b' X_i\right)+(1-I_i)\log\left[1-F(b' X_i)\right]\right\} \qquad (8)$$

By using the logarithmic likelihood function to obtain first-order conditions, we can then derive estimates for the parameters.

III. RESULTS

When we analyze the descriptive statistics in Table 2 concerning the factors that influence whether a smoker chooses ordinary or light cigarettes, we can observe several patterns. For example, 35.35% of smokers in the sample indicated that good taste was their major reason for choosing light cigarettes; this group is 53.22% more likely to smoke light cigarettes than are those who give other reasons. Fully 57.07% of smokers in the sample indicated that health was their major reason for choosing light cigarettes; this group is 69.69% more likely to smoke light cigarettes than are those who give other reasons. This indicates that a majority of light cigarette smokers feels that light cigarettes are better for their health than regular cigarettes.

The percentage of light cigarette smokers who intend to quit (49.08%) is higher than the percentage of ordinary cigarette smokers who intend to quit (41.76%); this group is 8.85% more likely to smoke light cigarettes than are those who have no intention of quitting.

Among smokers who use betel nut, 30.37% choose regular cigarettes, while 22.13% choose light cigarettes. In other words, smokers who use betel nut are 4.86% less likely to smoke light cigarettes. Approximately 65% of both light cigarette and ordinary cigarette smokers drink regularly. Finally, women are 10.13% more likely to smoke light cigarettes than men.

1. Reliability and Validity Analysis

A. Reliability analysis

Reliability of the benchmark scale was determined by computation of Chronbach's alpha. The standardized alpha for the total-item scale was 0.752, indicating a high degree of internal consistency, as depicted in Table 2.

B. Validity analysis

Our study used survey data regarding the socioeconomic backgrounds (education, income and age) and related factors (the reason for using light cigarettes, smoking status and habits, intention to quit smoking, health status, and use of betel nut and alcohol) from "Survey of the Health Promotion Knowledge, Attitudes, and Behavior of Taiwan Citizens." Because the necessity to the questionnaire item which expert proposed to measure important factors influencing smokers' decisions to consume light cigarettes, content validity is to be proved.

2. Statistical Influence of the Variables

This study used socioeconomic background and smoking-associated data (Table 1) to establish a probit model with which to investigate light cigarette smoking decisions. We can see from the probit model estimation results in Table 3 that the variables of female, cigarette price, good taste of light cigarettes, less health impact, and intention to quit smoking achieve a statistical significance (5%) in accordance with asymptotic *t* ratio. Due to estimated coefficients, cigarette price especially has negative influence on smokers' decisions regarding light cigarettes. On the whole, estimation results have very good fitness (McFadden R^2=0.657). Other variables did not achieve statistical significance in accordance with asymptotic *t* ratio, however, and therefore have little influence on smokers' decisions regarding light cigarettes.

Table 2. Descriptive information of smokers

Explanatory variables	*Ordinary cigarettes smokers* (N=1,935) %	*Light cigarettes smokers* (N=2,004) %
Demographic factors		
Gender		
Female	7.58	9.48
Male	92.42	90.52
Age (mean)	39.65	42.19
Level of education		
University or above	15.79	23.31
High school	41.12	36.63
Junior high school	23.74	19.42
Preliminary or lower	19.34	20.75
Economic factors		
Cigarette price (mean)	44.83	43.55
Personal monthly income (NT$1000) (mean)	25.63	30.34
Health status		
Good health	89.14	90.93
Not good health	10.86	9.07
Smoking characteristics		
Degree of addiction		
Light smoker	86.27	88.27
Moderate smoker	11.92	10.60
Reason for smoking light cigarettes		
Good taste	-	35.35
Relatively small health hazard	-	57.07
Other reasons (preparing to quit smoking, nice brand packaging, and good advertisements.)	-	19.21
Intention to quit smoking		
Yes	41.76	49.08
No	58.24	50.92
Use of addictive products		
Use of betel nut		
Yes	30.37	22.13
No	69.63	77.87
Use of alcohol		
Yes	65.45	65.47
No	34.55	34.53
Reliability Statistics		
Cronbach's Alpha	0.694	
Cronbach's Alpha Based on Standardized Items	0.752	

Note: "—" indicates data unavailable for analysis.

Positive correlations exist between smoking light cigarettes and the smoker's age, good state of health, light degree of addiction, and high personal income in accordance with marginal effects. On the other hand, negative correlations exist between smoking light cigarettes and high levels of education, moderate degree of addiction, and concurrent betel nut and alcohol use in terms of marginal effects.

The study found the expected negative/positive correlations between most variables and smoking light cigarettes, as in a smoker's age (the older a smoker, the more likely to smoke light cigarettes) and level of education (the higher the educational level, the less likely to smoke light cigarettes). However, this finding is opposite to previous study that indicated the positive relationship between the education level and light cigarette smoking (Kelbsch, Meyer, Rumpf, John, & Hapke, 2005).

In sum, the study found that the age, percentage of women, percentage of smokers with a university education or higher, personal income level, and percentage intending to quit smoking are all higher for smokers of light cigarettes than for smokers of ordinary cigarettes. It also found that smokers who are concerned about their health and believe that light cigarettes

Table 3. Probit model estimation results for decision to smoke light cigarettes

Explanatory variable	*Light cigarettes versus ordinary cigarettes*		
	Estimated coefficient	Asymptotic *t* ratio	Marginal effect
Constant	0.6970	1.167**	0.2448
Economic factors			
Ln cigarette price (NT$)	-1.4098	-3.917**	-0.4952
Ln personal monthly income (NT$)	0.0206	0.956	0.0072
Demographic factors			
Female	0.3113	2.734**	0.1013
Age	0.0103	1.426	0.0036
Level of education			
University or above	-0.2517	-0.786	-0.0914
High school	-0.2077	-1.179	-0.0737
Junior high school	-0.1149	-0.950	-0.0410
Health status			
Good health	0.0572	0.527	0.0203
Smoking characteristics			
Degree of addiction			
Light smoker	0.0643	0.489	0.0226
Moderate smoker	-0.0416	-0.317	-0.0146
Reason for smoking light cigarettes			
Good taste	3.2365	23.555**	0.5322
Relatively small health hazard	3.5106	25.910**	0.6969
Intention to quit smoking			
Yes	0.2541	3.824**	0.0885
Use of addictive products			
Use of betel nut	-0.1364	-1.707*	-0.0486
Use of alcohol	-0.0279	-0.365	-0.0098
Log-likelihood		-911.623	
MacFadden R^2		0.6573	

Note: ** and * denote 5% and 10% levels of significant, respectively.

are less hazardous than ordinary cigarettes are much more likely to smoke them.

3. The Implications of this Study

Our results indicate that smokers lack correct information concerning the health threats posed by light cigarettes. Therefore, it is urgent that the government draft education and awareness programs aimed at the typical light cigarette smoker. Furthermore, this study's estimation results indicate that an increase in cigarette prices will reduce the light cigarette smoking rate. If we examine the marginal effect of statistically significant variables on the likelihood of smoking light cigarettes, we find that a 10% increase in the price of cigarettes will reduce the likelihood that smokers smoke light cigarettes by 4.952%.

The increased cigarette tax revenue could be used to fund the implementation of anti-smoking campaigns on both the city and county level. It could also be used to cover financial shortfalls in the health insurance system. The government should therefore continue to use the health contribution on cigarettes as an anti-smoking policy tool; this yields a win-win outcome for the country and for smokers.

IV. DISCUSSIONS

Cigarette advertising campaigns invariably boast about the lower levels of tar and nicotine in light cigarettes. Due to the success of such promotional efforts, more and more smokers wrongly believe that light cigarettes are less harmful than ordinary ones. Smokers who are concerned about their health, as well as those who want to quit altogether (70% of Taiwanese smokers would like to quit, but not many actually succeed in doing so provided by Bureau of Health Promotion, Department of Health, R.O.C), now choose light cigarettes as a better alternative to regular cigarettes or as a transitional stage in the process of quitting. As a result, light cigarettes have become mainstream choices. Today, based on "Survey of the Health Promotion Knowledge, Attitudes, and Behavior of Taiwan Citizens, over 50% of Taiwan's 4.9 million smokers consumes them (Bureau of Health Promotion, 2002).

To assess the factors that influence a smoker's decision

to buy light cigarettes instead of regular ones, this study compared the magnitude of various marginal effects. The results indicate that the most important factors are the perception that such cigarettes taste good and have a relatively low impact on health. The last factor has an especially strong influence on women, who are 10.13% more likely to smoke light cigarettes than men are.

In recent years, the smoking rate among Taiwanese women has begun to rise, with serious consequences. For example, women who smoke now experience higher rates of lung cancer than men do. Such consequences not only have individual repercussions, but also societal ones because women bear children and are closely involved in their care. It is therefore imperative that the government draft appropriate education and awareness programs directed specifically at women. The government should also ensure that such programs clearly address women's preferences for light cigarettes.

The fact that betel nut users are less likely to smoke light cigarettes than non-users suggests that a replacement relationship exists between light cigarettes and betel nuts. The imposition of a health contribution on cigarettes has caused cigarette consumption to fall, but it may have actually caused betel nut consumption to rise.

The incidence of oral cancer in Taiwan has increased by more than 40% during the last five years, and it now ranks fourth among the ten leading causes of death. Today, Taiwan has the world's highest incidence of oral cancer, and 90% of such cases can be linked to betel nut use.

V. CONCLUSIONS

The main purpose of this study was to analyze the factors involved in smokers' decisions to consume light cigarettes. Results found that these decisions are most influenced by the belief that light cigarettes have a relatively small health hazard, a positive response to good taste of light cigarettes, the female smoker, the intention to quit smoking, and a negative response to the cigarette price.

Because research has shown that light cigarettes are just as– if not more than– detrimental to smokers' health as regular cigarettes, it is imperative that government health agencies educate citizens about their health hazards. The agencies should also develop a tobacco management policy that limits cigarette manufacturers' ability to apply such words as "light or "low-tar" to this product. Finally, they should coordinate the use of taxes as an anti-smoking policy tool with betel nut control policy so as to curb the rapid growth in betel nut consumption as well as in cigarette consumption.

ACKNOWLEDGEMENTS

This study is based on data from the "Survey of the Health Promotion Knowledge, Attitudes, and Behavior of Taiwan Citizens" provided by the Bureau of Health Promotion, Department of Health, R.O.C. (Taiwan). Neither the descriptions nor the conclusions herein represent the viewpoint of the Bureau.

REFERENCES

Benowitz, N. L., Hall, S. M., Herning, R. I., Jacob, P., Jones, R. T., & Osman, A. L. (1983). Smokers of low-yield cigarettes do not consume less nicotine**.** *The New England Journal of Medicine, 309*, 139-142.

Bureau of Health Promotion, Department of Health. (2002). *Survey of the health promotion knowledge, attitudes, and behavior of Taiwan citizens*. Taipei: Author.

Cohen, J. B. (1996). Smokers' knowledge and understanding of advertised tar numbers: Health policy implications**.** *American Journal of Public Health, 86*, 18-24.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*, 297-334.

Cuieford, J. P. (1965). *Fundamental statistics in psychology and education* (4th ed.). New York: Mcgraw-Hill.

Djordjevic, M. V., Stellman, S. D., & Zang, E. (2000). Doses of nicotine and lung carcinogens delivered to cigarette smokers. *Journal of the National Cancer Institute*, 92, 106-111.

Federal Trade Commission [FTC] (1994). *Report to congress for 1994 pursuant to the Federal Cigarette Labeling and Advertisement Act*. Washington, D.C.: Author.

Gajendra, K. V., & Kanka, M. (1999). *Researching education: Perspectives and techniques*. London: Falmer press.

Gori, G. B. (1990). Consumer perception of cigarette yields: Is the message relevant? *Regulatory Toxicology and Pharmacology*, *12*, 64-68.

Kelbsch, J., Meyer, C., Rumpf, H. J., John, U., & Hapke, U. (2005). Stages of change and other factors in "light" cigarette smokers. *European Journal of Public Health*, *15*, 46-51.

Kluger, R. (1996). *Ashes to ashes: America's hundred-year cigarette war, the public health, and the unabashed triumph of Philip Morris*. New York: Alfred A. Knopf.

Kozlowski, L. T., Goldberg, M. E., & Yost, B. A. (1998). Smokers' misperceptions of light and ultra-light cigarettes may keep them smoking. *American Journal of Preventive Medicine*, *15*, 9-16.

Kuller, L. H., Ockene, J. K., Meilahn, E., Wentworth, D. N., Svendsen, K. H., & Neaton, J. D. (1991). Cigarette

smoking and mortality, MRFIT Research Group. *Preventive Medicine*, *29*, 638-654.

Maxwell, J. C. (1996). Marlboro dominates. *Tobacco Reporter*, *23*, 19-21.

Ockene, J. K., Kuller, L. H., Svendsen, K. H., & Meilahn, E. (1990). The relationship of smoking cessation to coronary heart disease and lung cancer in the multiple risk factor intervention trial (MRFIT). *American Journal of Public Health*, *80*, 954-958.

Okubo,Y., Miyamoto, T., Suwazono, Y., Kobayashi, E., & Nogawa, K. (2002). An association between smoking habits and blood pressure in normotensive Japanese men. *Journal of Human Hypertension*, *16*, *91*-96.

Richard, J. O., Rebecca, L. A., Brian, V. F., Larry, W. H., Michael, C., & William, C. S. (2007). College students' expectancies for light cigarettes and potential reduced exposure. *American Journal of Health Behavior*, *31*, 402-410.

Ronald, C. P., Sonia, L., Tricia, P., Wild, C. T., & Jennifer, E. B. (2007). Demographic, health, and behavioral factors associated with smoking in adults with type 1 or type 2 diabetes. *American Journal of Health Behavior*, *31*, 13-23.

Russell, M. A., Jarvis, M., Iyer, R., White, E. L., Sweeney, C. T., & Pillitteri, J. L. (1980). Relation of nicotine yield of cigarettes to blood nicotine concentrations in smokers. *British Medicine Journal*, *280*, 972-976.

Scherer, G. (1999). Smoking behavior and compensation: A review of the literature. *Psychopharmacology*, *145*, 1-20.

Shiffman, S., Pillitteri, J. L., Burton, S. L., Rohay, J. M., & Gitchell, J. G. (2001). Smokers' beliefs about "Light" and "Ultra Light" cigarettes. *Tobacco Control*, *10*, 17-23.

Thun, M. J., Lally, C. A., Flannery, J. T., Calle, E. E., Flanders, W. D., & Heath, C. W. Jr. (1997). Cigarette smoking and changes in the histopathology of lung cancer. *Journal of the National Cancer Institute*, *89*, 1580-1586.

US Department of Health and Human Services [USDHHS] (1989). Reducing the health consequences of smoking: 25 years of progress. A report of the Surgeon General, US Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Rockville, Maryland [DHHS Publication No (CDC). 89-8411].

Warner, K. E., & Slade, J. (1992). Low tar, high toll. *American Journal of Public Health*, *82*, 17-18.

收件：97.02.19　修正：97.08.20　接受：97.10.02