Purchasing Patterns and Smoking Behaviors After a Large Tobacco Tax Increase: A Study of Chinese Americans Living in New York City

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SYNOPSIS

Objectives. Tobacco taxes are one of the most effective policy interventions to reduce tobacco use. Tax avoidance, however, lessens the public health benefits of higher-priced cigarettes. Few studies examine responses to cigarette tax policies, particularly among high-risk minority populations. This study examined the prevalence and correlates of tax avoidance and changes in smoking behaviors among Chinese American smokers in New York City after a large tax increase.

Methods. We conducted a cross-sectional study with data for 614 male smokers from in-person and telephone interviews using a comprehensive household-based survey of 2,537 adults aged 18–74 years. Interviews were conducted in multiple Chinese dialects.

Results. A total of 54.7% of respondents reported engaging in at least one low- or no-tax strategy after the New York City and New York State tax increases. The more common strategies for tax avoidance were purchasing cigarettes from a private supplier/importer and purchasing duty free/overseas. Higher consumption, younger age, and number of years in the U.S. were consistently associated with engaging in tax avoidance. Younger and heavier continuing smokers were less likely to make a change in smoking behavior in response to the tax increase. Despite high levels of tax avoidance and varying prices, nearly half of continuing smokers made a positive change in smoking behavior after the tax increase.

Conclusions. Expanded legislation and enforcement must be directed toward minimizing the availability of legal and illegal low- or no-tax cigarette outlets. Public education and cessation assistance customized for the Chinese American community is key to maximizing the effectiveness of tobacco tax policies in this population.

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Tobacco taxes are one of the most effective policy interventions to reduce tobacco use. Numerous studies show that higher cigarette prices due to increased taxes reduce smoking prevalence and consumption.[1] Since 2000, 43 states have increased cigarettes taxes.[2] Yet geographic difference in prices and new sources of cigarettes with low or no taxes may create incentives for smokers to change their purchasing patterns rather than quit. An analysis of cigarette purchasing patterns among a large sample of smokers from 20 U.S. communities found that 34% of smokers purchased their cigarettes from low- or no-tax venues.[3] A growing body of evidence suggests that tax-avoidance opportunities may decrease smokers' incentives to reduce consumption or quit in response to high prices.[4–6]

Moreover, increases in the price of cigarettes have differential effects on smokers of different gender, income, age, and race/ethnicity. Those most likely to reduce consumption or quit as a result of a price increase include women, young adults, low-income smokers, African Americans, and Hispanic people.[7] Engaging in low- or no-tax strategies is associated with higher daily cigarette consumption, older age, non-Hispanic race/ethnicity, and easier access to lower-priced products.[3,4,6,8–11]

In April 2002, New York State (NYS) increased the cigarette tax from $1.11 to $1.50 per pack. In addition to this state tax increase, in July 2002 New York City (NYC) increased its local excise tax from $.08 to $1.50, for a total tax of $3.00/pack. The increases resulted in retail prices averaging $6.85/pack. According to the 2003 NYC Department of Health and Mental Hygiene's Community Health Survey (CHS), 21.0% of smokers reported reduced consumption following the tax increases, 10.6% tried to quit, and 5.7% reported quitting. The survey also found an 89.0% increase in cigarettes purchased through alternative sales channels. Of cigarettes purchased elsewhere, 29.0% were bought in NYS outside NYC, 21.7% in a different state, 18.1% online, and 12.4% from another person.[8]

The present study examined the impact of the combined NYC and NYS tax increases on Chinese immigrants living in NYC. Asian American and Pacific Islanders (AAPIs) are the fastest-growing ethnic population in the U.S., increasing by 72% from more than 7 million in 1990 to 11.3 million in 2000.[12] Chinese Americans are the largest AAPI subgroup in the U.S., with a population of more than 2.4 million in 2000.[13] In NYC, Chinese Americans number almost 400,000, 75% of whom are foreign-born.[14] This immigrant group is at particularly high risk for excess tobacco-related morbidity and mortality, with smoking prevalence ranging from 29% to 34% among Chinese American men.[15–23]

While not focusing on Chinese Americans specifically, the NYC CHS found that 48% of AAPI smokers made a cessation-related behavior change in response to the 2002 taxes (unpublished data, NYC Department of Health and Mental Hygiene, 2003). Yet the study also found activities related to price avoidance. In particular, AAPI smokers in NYC were more likely than white smokers to purchase nontaxed cigarettes from another person and less likely to purchase from the Internet.[8] Recent news reports have noted a growing problem with the illicit cigarette trade in Chinese communities in NYC, although reliable data on the volume of the trade are not available.[24]

While there is growing evidence that tax avoidance mitigates the public health benefits of higher-priced cigarettes,[4–6] there are few individual-level studies that examine the response to cigarette tax policies, particularly among high-risk minority populations. Indeed, there are no studies that specifically examine the impact of tax increases on purchasing patterns and changes in smoking behavior among AAPI subpopulations, such as Chinese Americans. In 2002, the authors conducted a population-based survey of Chinese Americans living in NYC subsequent to the implementation of the NYC and NYS tax increases. This study used data from that survey to examine the prevalence and correlates of tax avoidance, and changes in smoking behaviors in response to the tax increases among this immigrant population.

METHODS

Study design

The study design was cross-sectional and used data from a multistage probability sample of Chinese American residents in two communities in NYC.

Data sources and sample selection

From September 2002 to February 2003, in-person, household-based and telephone interviews were conducted with 2,537 representative adults aged 18–74 from two NYC communities with 100% increases in their Chinese population over the past decade: Sunset Park in Brooklyn and Flushing in Queens. Seventy-seven percent of the surveys were completed as in-person interviews and 23% by telephone. Trained bilingual interviewers from the community used a comprehensive questionnaire to conduct interviews in English, Mandarin, Cantonese, Fukinese, and other dialects. Questionnaire development was informed by

focus groups. Questions were adapted from validated national tobacco and health survey instruments, translated into Chinese, back-translated, and piloted among 50 Chinese Americans.[25]

The sampling frame consisted of 12,279 Chinese surname telephone numbers for Flushing and 16,298 for Sunset Park. Eligible households were obtained from the communities' white pages using a list of 867 unique Chinese spellings from 622 Chinese surnames identified in consultation with Chinese linguists. The Wade-Giles (e.g., Hsiao) and pinyin (e.g., Xiao) representations of the original Chinese characters were used because both are represented in the white page listings. The final sample selection and baseline survey were implemented in three stages. First, the list of Chinese surnames was ordered by zip code and by street name within zip code for the targeted communities. (Seven zip codes were chosen for sample selection in consultation with the NYC Department of Health: 11354, 11355, 11204, 11214, 11219, 11220, and 11223.) A stratified systematic sampling procedure was applied by zip code to all listed households, resulting in a sample frame of households representative of each Chinese American community.

Second, a representative sample cohort of Chinese American households was identified through a screening questionnaire, which gathered data on the age, gender, and smoking habits of all adults within the selected households. Third, individual respondents were disproportionately sampled based on gender and smoking status. Three sample groups of adults aged 18–64 years were selected for an extended interview: current male smokers, male nonsmokers, and women. The ratio of the three subgroups varied according to the presence or absence of smoking males within each household to meet the analytical requirements of the broader study. Up to two people were selected per eligible household, with no more than one person from each of the three subgroups of interest.

The data have been weighted to account for unequal probabilities of sample selection and nonresponse. The overall response rate was 46.3%, computed as a product of the screener response rate (59%) and the extended interview response rate (76%). The prevalence rates of current smoking among the 1,581 men and 956 women were 30.3% (n=614) and 2.2% (n=23), respectively. Prevalence rates were similar to other population-based studies examining tobacco use among Chinese Americans.[17–23] This study focuses on male current smokers. Women were excluded due to low smoking prevalence.

Measures

Smoking status and behavior. Smokers were identified by a positive response to two questions: "Have you smoked at least 100 cigarettes in your entire life?" and "Do you now smoke cigarettes every day, some days, or not at all?"[26] Nicotine dependence was assessed by two questions. First, smokers were asked about their smoking level (nondaily, daily <15 cigarettes, daily ≥15 cigarettes). Second, smokers were asked the time to their first cigarette in the morning (<30 minutes or ≥30 minutes).[27,28]

Purchasing behaviors. Smokers were asked what brand they usually smoke and how much they usually pay for a pack or carton. The price per pack for carton buyers was calculated by dividing the reported carton price by 10. Smokers were also asked whether the price they paid currently was more, less, or about the same as one year ago (i.e., prior to the tax increases). Strategies for purchasing low- or no-tax cigarettes were assessed based on two separate questions. One question asked smokers whether they usually bought cigarettes in NYC, in NYS (but outside NYC), or in another state. Those who answered that they usually bought cigarettes in another state or city were considered to be purchasing low- or no-tax cigarettes.

A second question asked smokers how often they bought cigarettes at a neighborhood store, online, at a duty-free store/overseas, at an Indian reservation, or from a private supplier/importer. Answers to this particular question were not mutually exclusive. Individuals who answered that they bought cigarettes over the Internet, duty free/overseas, at an Indian reservation, or from a private supplier/importer (with a frequency of all, most, or some of the time) were considered to be low- or no-tax purchasers. Individuals who usually purchased cigarettes in NYC and who did not purchase from any of the other four low- or no-tax outlets were considered to be paying all taxes.

Changes in smoking behavior. Responses to the tax increases were assessed with a question that asked if smokers changed their smoking habit when cigarette prices increased. Positive response options for changes in smoking behaviors included smoking fewer cigarettes, thinking seriously about quitting, and trying to quit. Individuals who answered affirmatively to at least one of these options were considered to have changed their smoking behavior; individuals who answered negatively to all three options were considered to have made no changes in their behavior. Additionally, those who answered that they smoked fewer cigarettes were asked how much they had reduced their smoking.

Demographics. Additional independent variables included age, educational attainment, employment status, income, number of years in the U.S., and acculturation. Acculturation was measured by a composite of two categorical variables: speaks English in the home or reads English newspapers most or every day.

Analysis

We used Stata 9.2[29] with methods appropriate to a complex survey design. All percentages reported are weighted to account for this design. Weighted descriptive statistics were used to summarize demographics, smoking behaviors, tax-avoidance strategies, and mean prices. Multiple linear regression analyses were used to determine whether the use of various low- or no-tax strategies was related to the mean reported price paid per pack, adjusting for demographics and smoking characteristics. Multiple logistic regressions were conducted to examine associations between demographics and smoking characteristics on the use of various low- or no-tax avoidance strategies. Independent variables were included if they were consistently significant across multiple tax-avoidance strategies at a p-value of 0.05 or less in bivariate analyses. Multiple logistic regression analysis was also used to examine the relationship between demographic and other predictors of change on categorical smoking behavior outcomes in response to the tobacco taxes. Independent variables were included if they were significant at $p<0.05$ in bivariate analyses. Analyses are not adjusted for multiple comparisons. Individuals with missing data were excluded from the analyses.

RESULTS

Characteristics of study sample

Table 1 shows descriptive characteristics of current male smokers, their purchasing patterns, and reported changes in smoking behavior after the tobacco tax went into effect. Of the 614 respondents, 596 (97.4%, weighted) were foreign-born, with an average of 11.3 years in the U.S. More than three-quarters of respondents (76.2%) smoked Marlboros, with 4.9% using another American or British premium brand, 5.4% smoking a discount brand, and less than 2% smoking Chinese cigarettes. A large majority of smokers (84.6%) usually purchased in NYC, with only 15.4% traveling outside the state or city for cigarettes. The most common venue for purchasing cigarettes was a neighborhood store, with nearly 90% of smokers buying from this venue all, most, or some of the time. Purchasing from a private supplier/importer and buying duty free/overseas at least some of the time were

Table 1. Demographic characteristics, purchasing patterns, and smoking behaviors of male smokers after the tax increase

Characteristic	*Unweighted* N	*Total weighted percent (95% CI)*
Overall	614	
Age (years)		
<35	132	25.2 (21.0, 29.4)
≥35	482	74.8 (70.6, 79.0)
Education		
<High school	275	46.7 (41.9, 51.5)
High school graduate or more	337	53.3 (48.5, 58.1)
Unemployed		
No	508	82.1 (78.4, 85.8)
Yes	102	17.9 (14.2, 21.6)
Income		
<$20,000	247	49.9 (44.7, 55.1)
≥$20,000	268	50.1 (44.9, 55.3)
Foreign-born		
No	17	2.59 (1.15, 4.04)
Yes	596	97.4 (96.0, 98.9)
Acculturated[a]		
No	507	83.4 (80.0, 86.9)
Yes	107	16.6 (13.1, 20.0)
Years of residence in the U.S.		
<5	137	20.7 (17.1, 24.3)
6–15	301	53.3 (48.5, 58.0)
≥16	149	26.0 (21.7, 30.4)
Smoking level		
Nondaily	106	20.0 (15.8, 24.2)
Daily <15 CPD	254	40.1 (35.8, 44.4)
Daily ≥15 CPD	241	39.9 (35.4, 44.4)
Time to first cigarette		
Within 30 minutes	271	46.7 (42.0 51.4)
After 30 minutes	320	53.3 (48.6 57.9)
Brand type		
Marlboro	451	76.2 (72.4, 79.9)
Other premium	32	4.9 (2.88, 6.85)
Discount	37	5.4 (3.52, 7.26)
Chinese brand	12	1.6 (0.61, 2.63)
Other or no usual brand	75	11.9 (9.17, 14.70)
Purchasing patterns[b]		
Usually buy		
New York City	511	84.6 (81.0, 88.3)
Another state	57	10.6 (7.51, 13.80)
Another city within New York State	24	4.8 (2.78, 6.69)
Buy all, most, or some of the time		
Neighborhood store	525	89.7 (86.8, 92.6)
Private supplier/ importer	143	26.1 (22.0, 30.2)
Duty free/overseas	132	23.5 (19.5, 27.5)
Internet	64	12.8 (8.8, 16.9)
Indian reservation	45	8.3 (5.48, 11.20)

continued on p. 139

Table 1 (continued). Demographic characteristics, purchasing patterns, and smoking behaviors of male smokers after the tax increase

Characteristic	Unweighted N	Total weighted percent (95% CI)
Changed smoking behavior in response to tax increase[c]		
Any smoking behavior change	216	41.6 (37.0, 46.3)
Smoked fewer cigarettes	195	37.8 (33.2, 42.4)
Thought seriously about quitting	165	31.9 (27.5, 36.4)
Tried to quit	153	29.4 (25.0, 33.8)

NOTE: Missing data and refusals not included, so certain subgroups may not total 614. Missing rates were negligible or 0 for all variables except income (14%).

[a]Acculturated is a composite of two categorical variables regarding language and media: speaks English in the home or reads English newspapers most or all days.

[b]Purchasing patterns were assessed with two different questions: One question asked, "Where do you usually buy cigarettes? In New York City, in another state, in another city within New York State." Responses to this question were mutually exclusive. A second question asked, "How often do you buy cigarettes from a neighborhood store, Internet, duty-free store/overseas, Indian reservation, or from a private supplier/importer?" Respondents answered all, most, some, or none of the time for each option.

[c]Change in smoking behavior includes respondents who reported that they changed smoking behaviors in response to the tax increase in terms of smoking fewer cigarettes, thinking seriously about quitting, or trying to quit. Categories are not mutually exclusive.

CI = confidence interval

CPD = cigarettes per day

the most frequently reported tax-avoidance strategies, while traveling to an Indian reservation was the least frequently reported. Overall, 54.7% of respondents engaged in at least one tax-avoidance strategy (data not shown). Among the 216 continuing smokers who reported changes in smoking behavior in response to the tax increases, the most common strategy was smoking fewer cigarettes, with an average reduction of 6.3 cigarettes per day (data not shown).

Price effect

Smokers overall paid a mean of $5.38 for a pack of cigarettes. Smokers who did not purchase from any low- or no-tax venue (usually bought in NYC and did not engage in any of the other tax-avoidance strategies) usually paid a mean of $6.01/pack, and those who engaged in at least one such strategy (usually bought outside the state or city, or engaged in any of the other low- or no-tax strategies) had a mean of $4.82/pack. Among the 614 smokers, a majority (84%) reported paying more after the tax increases, 4% paid less, and approximately 12% paid the same. There were significant differences ($p<0.001$), however, in the proportion of smokers who paid more, less, or the same depending on whether they avoided taxes. Among those who engaged in any tax-avoidance strategy, 78% paid more and 22% paid less or the same. Among those who did not engage in any tax-avoidance strategy, 91% paid more and 9% paid less or the same (data not shown).

Table 2 shows the adjusted mean reported price paid per pack among smokers who used or did not use each low- or no-tax strategy. Here we considered the mean

Table 2. Adjusted mean price paid per pack and savings from using various no-tax or low-tax outlets

No- or low-tax strategy[a]	Price/pack (in dollars)		Savings (in dollars)
	Strategy used	Strategy not used	
Usually buy			
Other state	3.54	5.39	1.85[b]
Other city in New York State	4.98	5.42	0.44
Buy all/most/some of the time[a]			
Internet	3.99	5.06	1.07[b]
Duty free/overseas	4.59	5.07	0.48[c]
Indian reservation	4.30	5.03	0.73[c]
Private supplier/importer	4.13	5.37	1.24[b]

NOTE: Table entries for price are weighted least square means from multiple regression analyses of reported price paid/pack, adjusting for demographic and smoking-related characteristics.

[a]For Internet, duty free/overseas, Indian reservation, and private supplier/importer, full savings may not be reflected due to smokers' use of that outlet only some of the time.

[b]$p<0.001$

[c]$p<0.05$

adjusted price for people using each strategy, regardless of whether or not a respondent also used other strategies. In other words, estimated prices may be higher or lower depending on the use of additional strategies in each category (i.e., strategy used, strategy not used). Thus, calculated savings are rough estimates. These estimated prices and savings varied depending on outlet type. Savings per pack for each strategy ranged from $0.44 for those usually buying cigarettes in another city within NYS—an insignificant difference—to $1.85 for those who usually traveled to another state for purchases. Individuals who purchased from the latter four outlets listed in Table 2 also garnered significant savings ranging from $0.48 for duty-free/overseas sales to $1.24 for private supplier/imported purchases.

Tax avoidance

Table 3 shows the results of multivariate logistic regression analyses examining associations between the use of separate low- or no-tax strategies (dependent variables) and demographic and smoking-related characteristics (independent variables). Respondents aged 35 years or older were significantly less likely than younger smokers to engage in any tax avoidance ($p<0.05$), in particular buying from the Internet and from another state or city in NYS ($p<0.001$). Smokers with a high school degree or greater were significantly more likely to buy from the Internet, duty free or overseas, or from an Indian reservation ($p<0.05$). Higher-educated smokers were less likely, however, to buy from a private supplier or importer ($p<0.05$).

Employment showed contrasting patterns as well. Unemployed smokers were significantly less likely to buy online or from a private supplier or importer ($p<0.05$) but more likely to buy duty free or overseas ($p<0.001$). Daily smokers were more likely to engage in each of the tax-avoidance strategies compared with nondaily smokers, although this trend only reached significance with buying online and from a private supplier or importer ($p<0.05$). Moderate-to-heavy daily smokers (≥15 cigarettes/day) were more than twice as likely to engage in any low- or no-tax strategy compared with nondaily smokers and lighter daily smokers ($p<0.05$). Those living in the U.S. longer were more likely to buy duty free or overseas and from an Indian reservation ($p<0.05$).

Changes in smoking behavior

Table 4 presents results from the final multivariate logistic regression that explores correlates of smoking-related behavior change among continuing smokers in response to the tax increases. A smoking-related behavior change was defined as smoking fewer cigarettes, thinking about quitting, or trying to quit. Older continuing smokers were more than twice as likely to make a smoking-related behavior change in response to the tax increases compared with younger smokers ($p<0.05$), while individuals who consumed at least 15 cigarettes per day were less than half as likely to make a change vs. nondaily smokers ($p<0.05$). Each additional year in the U.S. increased the likelihood of making a change in smoking behavior in response to the tax increases by 3% ($p<0.05$).

DISCUSSION

Results show that after the NYS and NYC tobacco tax increases, more than half of Chinese American respondents were engaging in at least one low- or no-tax strategy (54.7%). This is similar to findings among the general population of NYC. According to data from the 2004 NYS Adult Tobacco Survey, 49% of NYC residents purchased cigarettes from a low or untaxed source at least once in the previous 12 months.[4] Despite high levels of tax avoidance and varying prices, nearly half of Chinese American continuing smokers made a positive change in their smoking behavior after the tax increases, including smoking fewer cigarettes, thinking seriously about quitting, or trying to quit.

Two of the more common strategies for tax avoidance were purchasing cigarettes from a private supplier or importer and purchasing duty free/overseas. Twenty-six percent of respondents purchased from a private supplier/importer. According to community respondents, these purchases refer to smuggled interstate, international, and counterfeit cigarettes available through unlicensed retailers. The availability of these cigarettes in the community may be linked to underground interstate and international smuggling networks. Duty-free purchases refer to legal untaxed cigarettes available at specified locations in amounts that are allowable under customs regulations. The NYS Adult Tobacco Survey found that 13.2% of NYC residents purchased from a duty-free shop at least once in the previous 12 months, compared with 23.5% of respondents in this study who reported purchasing duty free or overseas at least some of the time.[4] The extent of duty-free sales often depends on the level of international travel;[30] the higher prevalence of duty-free/overseas purchases may reflect the ease of obtaining cigarettes through travel and existing transnational social networks among Chinese American residents in NYC, the majority of whom are foreign-born. Residents may have regular contact with friends or relatives in China or other individuals who travel overseas frequently, which would facilitate these purchasing patterns.

Table 3. Results of multiple logistic regression analyses examining associations between the use of low- or no-tax strategies and demographics and smoking-related characteristics

Characteristic	*Buys from other state or other city in New York State*[a] *(n=467)* Odds ratio (95% CI)	*Buys from Internet*[b] *(n=449)* Odds ratio (95% CI)	*Buys duty free or overseas*[b] *(n=448)* Odds ratio (95% CI)	*Buys from Indian reservation*[b] *(n=445)* Odds ratio (95% CI)	*Buys from private supplier or importer*[b] *(n=446)* Odds ratio (95% CI)	*Uses at least one low- or no-tax strategy*[c] *(n=450)* Odds ratio (95% CI)
Age (years)						
<35	1.0	1.0	1.0	1.0	1.0	1.0
≥35	0.4 (0.18, 0.80)[d]	0.3 (0.13, 0.59)[d]	0.9 (0.43, 1.78)	0.7 (0.24, 2.29)	1.2 (0.61, 2.52)	0.6 (0.33, 1.00)[e]
Education						
<High school	1.0	1.0	1.0	1.0	1.0	1.0
≥High school	1.3 (0.69, 2.30)	3.6 (1.56, 8.16)[e]	1.7 (1.02, 2.90)[e]	2.4 (1.01, 5.96)[e]	0.5 (0.33, 0.89)[e]	1.4 (0.91, 2.16)
Income						
<$20,000/year	1.0	1.0	1.0	1.0	1.0	1.0
≥$20,000/year	1.4 (0.78, 2.45)	1.9 (0.87, 4.12)	1.7 (1.00, 2.90)	2.1 (0.85, 5.20)	0.8 (0.47, 1.35)	1.3 (0.82, 2.06)
Employment						
Employed	1.0	1.0	1.0	1.0	1.0	1.0
Not employed	0.6 (0.25, 1.62)	0.3 (0.09, 0.97)[e]	3.3 (1.76, 6.07)[d]	1.3 (0.45, 3.95)	0.3 (0.13, 0.79)[e]	1.0 (0.55, 1.85)
Smoking level						
Nondaily	1.0	1.0	1.0	1.0	1.0	1.0
Daily <15 CPD	1.1 (0.43, 2.70)	3.3 (1.06, 10.4)[e]	1.3 (0.60, 2.72)	1.3 (0.37, 4.89)	3.1 (1.25, 7.52)[e]	1.4 (0.76, 2.57)
Daily ≥15 CPD	1.6 (0.65, 4.04)	4.7 (1.47, 14.8)[e]	1.6 (0.75, 3.33)	1.5 (0.44, 5.36)	4.1 (1.65, 10.3)[e]	2.6 (1.43, 4.79)[e]
Acculturation						
Not acculturated	1.0	1.0	1.0	1.0	1.0	1.0
Acculturated	0.5 (0.19, 1.23)	0.9 (0.36, 2.15)	0.9 (0.50, 1.90)	0.5 (0.17, 1.61)	1.3 (0.62, 2.87)	1.0 (0.52, 1.95)
Years in U.S.[f]	1.0 (0.96, 1.05)	1.0 (0.97, 1.06)	1.03 (1.01, 1.07)[e]	1.05 (1.01, 1.10)[e]	1.0 (0.94, 1.01)	1.0 (0.98, 1.03)

[a]Based on the question, "Where do you usually buy cigarettes? In New York City, in New York State (but outside New York City), or in another state?" Buying in another city or another state are grouped together and coded as 1.

[b]Based on the question, "How often do you buy cigarettes from… Internet, duty free/overseas, an Indian reservation, a private supplier/importer? All, most, some, or none of the time." Answers were not mutually exclusive. For each separate tax-avoidance strategy, buying cigarettes all, most, or some of the time is coded as 1.

[c]Smokers who usually bought in another state or city, or who engaged in any of the other tax-avoidance strategies (Internet, duty free/overseas, Indian reservation, private supplier/importer) are coded as 1.

[d]$p<0.001$

[e]$p<0.05$

[f]Continuous

CI = confidence interval

CPD = cigarettes per day

Table 4. Results of multiple logistic regression analysis examining associations between a smoking-related behavior change in response to the tax increases and demographic variables

	Smoking-related behavior change in response to tax increases[a] (n=414)
Characteristic	*Odds ratio (95% CI)*
Age (years)	
<35	1.0
≥35	2.2 (1.10, 4.26)[b]
Income	
<$20,000/year	1.0
≥$20,000/year	0.8 (0.51, 1.27)
Employment	
Employed	1.0
Not employed	1.9 (0.98, 3.77)
Smoking level	
Nondaily	1.0
Daily <15 CPD	0.9 (0.47, 1.70)
Daily ≥15 CPD	0.4 (0.22, 0.84)[b]
Years in U.S.[c]	1.03 (1.01, 1.06)[b]

[a]Based on the question, "Did you change your smoking habit when cigarette prices went up?" Those who responded "yes" and engaged in only smoking behavior changes (smoking fewer cigarettes, thinking seriously about quitting, and trying to quit) were coded as 1.

[b]$p<0.05$

[c]Continuous

CPD = cigarettes per day

Similar to other studies, the use of tax-avoidance strategies and changes in smoking behavior varied by level of cigarette consumption.[3,4,8,9,11] Daily smokers were more likely to engage in tax-avoidance strategies overall compared with nondaily smokers, suggesting that individuals with a higher smoking-related financial burden may have a stronger incentive to minimize costs through low- or no-tax purchasing.[4] Further moderate-to-heavy smokers (≥15 cigarettes/day) were less than half as likely as nondaily smokers to make a cessation-related change after the tax increases. Our findings suggest that, among those who continued to smoke after the 2002 price increases, level of addiction as assessed by amount smoked may be a significant barrier to cessation, even as prices continue to rise. Heavier smokers may need additional intensive assistance designed to help them move toward cessation, including customized tobacco dependence treatment and services such as pharmacotherapy and counseling.

In striking contrast to other research,[3,9,11] younger Chinese American smokers were more likely than older adults to avoid taxes overall, particularly for Internet and out-of-state or out-of-city purchases. Higher-educated individuals also had a higher likelihood of purchasing from the Internet or Indian reservations for cigarettes. Each of these strategies calls for a certain level of resources, either for Internet access or traveling out of state or city or to reservations.[4,6] Indian reservations and the Internet also usually require purchases by the carton only, mandating the ability to manage upfront costs. These patterns suggest that younger educated smokers may have the resources to utilize these venues as effective strategies to minimize costs. Internet purchases in particular may be a growing concern given increasing rates of Web availability and use for obtaining low-cost cigarettes.[9,31–33]

Young adults who continued to smoke were also significantly less likely than older continuing smokers to make a change in smoking behavior with the rise in cigarette prices. This finding differs from evidence of price-related behavior change among smokers of other races and ethnicities. Prior economic simulations have indicated that smokers younger than age 40 are five to six times more price responsive than older adults, with half of the price response due to quitting and half to reduced consumption. This finding was consistent across subgroups of white, Hispanic, and African American smokers.[7] Young Chinese American continuing smokers were unlikely to reduce consumption or make another cessation-related behavior change. To the extent that tax avoidance undermines cessation-related behavior, as evidence suggests,[4–6] education and cessation assistance may be needed to ensure the full effectiveness of tax policy among young adult Chinese Americans.

We also found that the longer the respondent lived in the U.S., the more likely he was to engage in some tax-evasion behaviors, including buying duty free or overseas and purchasing at Indian reservations. This behavior may be due to an increasing familiarity with the availability of low- and no-tax outlets with length of residence. Movement toward cessation-related behavior in response to higher prices was also positively associated with the number of years spent living in the U.S. Such change corresponds with evidence demonstrating shifts in health risk behaviors among immigrants groups as they adapt to U.S. culture and social structures.[16,34,35] Research indicates that traditional Chinese values support smoking among foreign-born Chinese American men. In China, smoking among men is highly valued and viewed as an important form of social and business etiquette.[36,37] In contrast, each additional year in the U.S. intensifies Chinese American immigrants' exposure to American social norms around tobacco,

which differ from those in China and, for male immigrants, tend to reinforce attitudes more favorable to smoking cessation.[37] Increasing adoption of U.S. norms that discourage smoking may be a key factor in ensuring that tobacco taxes are effective in moving male smokers toward cessation-related behavior change despite access to low- or no-tax cigarettes.

The overall mean price of $5.38/pack reported in this study is similar to the mean price per pack of $5.48 reported by Davis et al. among the general population of NYC smokers after the tax increases. Further, we found that Chinese Americans who used at least one low- or no-tax venue paid a mean of $4.82/pack, again similar to the $4.51/pack reported by NYC smokers surveyed after the tax increases who used alternative sales venues.[4] After taking tax avoidance into consideration, Frieden et al. estimated a mean effective price in NYC of $5.50/pack in 2002, a 20% increase from the previous year and, again, similar to the mean price found in this study.[8] In the absence of tax evasion, NYC's cigarette prices would have increased by 32% to an effective price of $6.85/pack.

It is important to note, however, that despite the apparent savings associated with purchasing cigarettes from alternative sources, most smokers reported paying higher prices after the tax increases. This may be due to two factors. One, given the extent of the tax increases in NYC in 2002, which totaled $3.00, tax-avoidance strategies may not completely blunt the effect of a 20% or higher price increase. While smokers may have garnered significant savings on occasion by engaging in low- or no-tax strategies, mean savings were most likely curtailed by paying full prices at city retail outlets at other times. Secondly, sellers who traffic in illegal tobacco products (e.g., private suppliers) may increase their prices to maximize profits while continuing to undersell licensed local stores. Higher mean prices, even in the context of tax avoidance, may explain why nearly half of continuing smokers reported a change in their smoking behavior after the tax increases.

It is worth noting that, overall, 80% of Chinese American men in this study smoked American or British premium brand cigarettes, while less than 7% smoked American discount or Chinese brands. This suggests that few smokers switched to cheaper brands to minimize costs after the tax increases, indicating strong brand loyalty. Further, most of the premium brand users smoked Marlboros. Ninety-seven percent of respondents in this study emigrated from areas (e.g., China, Taiwan, and Hong Kong) where Western-brand cigarettes were previously only available legally at high prices or illegally and less expensively through the black market. Western cigarettes, Marlboros in particular, have long been a symbol of affluence and sophistication in Asian markets.[38–40] Evidence suggests that foreign advertising in China has not only familiarized the public with Western cigarettes but has also influenced brand preferences and future buying patterns.[40] Smokers in this study may have begun smoking Marlboros and other Western cigarettes when they arrived in the U.S., or they may have smoked these cigarettes—at high prices or smuggled—in their own country and arrived in the U.S. with established brand preferences. Regardless, respondents' apparent brand loyalty points to the success of the tobacco industry's marketing efforts targeted toward this population, despite advertising restrictions in immigrants' home countries and in the U.S.

Limitations

There are several limitations to this study. First, the data are based on self-report, which introduces the possibility of social desirability and recall biases. Social desirability bias may have led to underestimates of the illegal forms of tax avoidance (e.g., purchasing from a private supplier) and overestimates of smoking behavior change in response to price increases. Recall bias may have contributed to inaccurate reports of cigarette prices. Further, we cannot be sure if savings due to tax avoidance were accounted for in the prices reported by smokers. Yet prices varied as expected and were similar to prices reported in other studies of NYC residents after the tax increase.[4,8]

Secondly, rates of purchasing cigarettes outside the state or the city are not directly comparable to rates of purchases from private supplier/importers, the Internet, Indian reservations, and duty free/overseas because the questions used to assess these tax-avoidance behaviors were different. Further, *p*-values from the analyses of tax-avoidance strategies and associated predictors were not adjusted for multiple hypotheses tests; therefore, these results might present a risk of false positives (i.e., type 1 error). Extensive debate exists, however, over the need to adjust for multiple testing,[41–47] particularly in observational studies such as this. The authors believe such an adjustment is unnecessarily conservative, given the exploratory nature of the research questions presented here and the associated risk of making a type II error.

This article focuses on purchasing patterns and changes in smoking behavior among continuing male smokers after a large tax increase; we did not ask recent quitters if the tax increase influenced their decision to quit and, therefore, were unable to examine cessation in response to tobacco taxes. We were also unable to examine the influence of tobacco taxes among Chi-

nese American women, as the sample size of female smokers was too low to yield any meaningful analysis. Lastly, because analogous data prior to the 2002 tobacco taxes were not available, we were not able to compare tax-avoidance patterns before and after the tax increases.

CONCLUSIONS

Findings from this study point to two sets of strategies designed to maximize the benefit of tobacco tax policies among this population. First, expanded legislation and enforcement must be directed toward minimizing the availability of both legal and illegal low- and no-tax outlets. Recent increases in tobacco taxes in nearby states will help reduce price differentials. Yet varying state policies are no substitute for a national cigarette tax to reduce price differentials across state and reservation borders,[3] as well as federal legislation to restrict untaxed Internet and cross-border tobacco sales.[48] The effectiveness of recent NYS legislation that prohibits common mail carriers such as FedEx and DHL to deliver cigarettes to residential addresses in the state remains to be seen given the exclusion of the U.S. Postal Service from the regulations.[49] Although NYC has actively worked to collect back taxes from city residents who buy cigarettes from out-of-state websites,[50] increased education for consumers on tax liabilities would further reduce incentives for Internet purchases. This is particularly important for young adults, who were more likely to buy cigarettes from the Internet.

Beyond local, state, and national policy measures, the patterns of tax avoidance identified in this study call for an international approach to the elimination of low- and no-tax venues for cheap cigarettes. Ratification of the Framework Convention on Tobacco Control and international efforts to develop and adopt a rigorous smuggling protocol to the convention could begin to address both legal and illegal tax evasion related to duty-free and illegally imported or counterfeit cigarettes. While duty-free and overseas sales are legal if purchased within specified quantities, the existence of a large volume of duty-free tobacco products in international commerce creates opportunities for smuggling. The elimination of duty-free markets would both remove consumers' incentives to purchase these cigarettes when traveling and also reduce the availability of these markets for smuggling. Measures for the development of an international tracking system that would allow authorities to monitor the movement of tobacco products across borders and mandatory counterfeit-proof markings and codes would begin to address international cigarette smuggling.[51] Lastly, increased penalties for the counterfeiting of and contraband in tobacco products are key to deterring illicit trade.[51,52]

A second set of strategies to maximize the effectiveness of tobacco tax policies includes public education and cessation assistance customized for the Chinese American community. Several studies have identified language-specific health education as a key to smoking prevention and cessation among this population.[16,17,35,36] Further evidence suggests that Chinese American men are eager and willing to adhere to smoking rules and regulations.[37] Educational approaches that build upon cultural values of respecting social rules and customs may prove useful in informing smokers of the potential drawbacks of utilizing low- and no-tax venues to access cheap cigarettes. Additionally, innovative campaigns that take into account social norms stressing the importance of family, community, and society[37,53] can be effective in moving continuing smokers toward cessation. Focused education on the harms of both legal and illegal tax avoidance as well as customized cessation assistance may be needed for both younger and heavier continuing smokers, both of whom were more likely to avoid taxes and less likely to make a cessation-related behavior change in response to taxes.

The 1998 Surgeon General's report called for enhanced research to improve our understanding of smoking patterns among racial and ethnic minorities.[23] Given the exponential growth of Chinese Americans in NYC and nationally, it is critical to understand how this ethnic group may respond to tax and other tobacco policies so as to develop effective programs to reduce a major health risk among Chinese American men. This study is the first to examine purchasing patterns and smoking behaviors among this population after a large tobacco tax increase. Research indicates that immigrant Asian American smokers respond favorably to targeted outreach efforts.[54,55] Findings from this study provide information for policy makers on strategic tobacco-control opportunities for intervening with Chinese American smokers. Continued research is needed on the ways in which tobacco-control policies and other tobacco-control interventions affect immigrant populations.

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