

Cigarette Price Minimization Strategies Used by Adults

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We used multivariate logistic regressions to analyze data from the 2006 to 2007 Tobacco Use Supplement of the Current Population Survey, a nationally representative sample of adults. We explored use of cigarette price minimization strategies, such as purchasing cartons of cigarettes, purchasing in states with lower after-tax cigarette prices, and purchasing on the Internet. Racial/ethnic minorities and persons with low socioeconomic status used these strategies less frequently at last purchase than did White and high-socioeconomic-status respondents. (*Am J Public Health*. 2012;102:e19–e21. doi:10.2105/AJPH.2012.300861)

Tobacco use remains the leading preventable cause of disease and death in the United States, causing approximately 443 000 deaths each year and 5.1 million lost years of potential life.¹ Increasing cigarette prices through taxes can lead to reductions in smoking prevalence.^{2,3} Unfortunately, smokers may respond to tax increases with compensatory price minimization strategies to continue their usual smoking behaviors,^{2,4–13} thus reducing public health gains. Price minimization strategies are encouraged by large savings attainable from bulk purchases (e.g., purchasing cigarettes by the carton saves \$1 per pack⁸) or purchasing in a jurisdiction with lower taxation. For example, New York residents purchasing cigarettes in Pennsylvania save \$2.75 in state excise taxes per pack.¹⁴ Other price minimization strategies include purchasing discount or deep-discount brands, using coupons, and purchasing cigarettes from Indian reservations, duty-free shops, or black market sources.

METHODS

Our data came from the 2006 to 2007 Tobacco Use Supplement of the Current Population Survey, a nationally representative sample that is described elsewhere.^{8,15–17} We excluded from the analysis individuals who were younger than 18 years, proxy respondents, nonsmokers, and respondents who had not smoked during the past 30 days, had missing data for daily number of cigarettes smoked, or reported outlier prices paid for cigarettes. The final sample comprised 30 397 persons. Additional information on how the data were prepared for analysis is available online at <http://sites.google.com/site/mikepesko>.

We analyzed respondents' use of 3 cigarette price minimization strategies: (1) purchasing cigarettes by the carton to get a lower per-pack price for cigarettes, (2) purchasing cigarettes in a state with lower after-tax cigarette prices,¹⁴ and (3) "some other way," a possible response to the question of where the last cigarettes were purchased, which included Internet purchases and purchases made in other countries. All cigarette price minimization strategies and a composite measure, denoted with an indicator variable equal to 1 or 0, became dependent variables in multivariate logistic regression analysis. We treated missing responses as not being price minimization behavior.

RESULTS

Table 1 provides descriptive analysis of smoking characteristics of the sample. Overall, 28.8% of respondents reported using any price minimization strategy at last purchase. Table 2 provides odds ratios that show that racial/ethnic minorities, low-income individuals, and those who smoked less frequently were less likely to use any of the 3 price minimization strategies. The strategy of purchasing cigarettes in a state with a lower average cigarette price was not sensitive to stratification by industry (white collar, blue collar, and service) for dependent variable mean or coefficient confidence intervals, providing no evidence that work-related travel provides different opportunities for practicing this strategy.

DISCUSSION

Our results on incidence of cigarette price minimization strategies by socioeconomic, demographic, and smoking behavior characteristics generally supported the findings of other research, with a few differences. One study found that individuals with low socioeconomic status were 25% more likely to engage in at least 1 price minimization strategy than were persons of high socioeconomic status, likely because options included discount cigarettes and roll-your-own tobacco.¹¹ We did not investigate these 2 strategies because of data limitations. We also found that a modest proportion of adults (3.2%) bought cheaper cigarettes at last purchase from neighboring states with lower cigarette prices. This finding contrasts with another study, which reported that 25% of smokers purchased less expensive cigarettes from an out-of-state location at any point during the previous year.⁹ This difference is likely attributable to the different time windows used. Our results suggested that few people habitually practice this price minimization strategy.

Data limitations did not allow us to investigate some common price minimization strategies, possibly resulting in an underestimation of the true incidence of such behavior. Also, recent legal changes regarding the sale of cigarettes online^{18,19} may reduce the incidence of Internet cigarette purchases from the time that our data were collected.

Our findings demonstrate that cigarette price minimization strategies are widely used. Passing legislation to offset commonly used price compensation behaviors may discourage smoking. The implementation of a uniform state tax could help to minimize price gap differentials across state lines and reduce state excise tax variation. The implementation of either a bulk tax on cigarette cartons or a law mandating a minimum price per pack might also reduce the wide variation in price per pack by volume purchased. Future work is needed to monitor approaches used by smokers in search of price minimization strategies and to craft appropriate policy responses. ■

TABLE 1—Smoking Characteristics, Price Minimization Strategies, and Purchase Prices: Tobacco Use Supplement of the Current Population Survey, United States, 2006–2007

Cigarette Use and Purchase Behavior	Weighted % or Mean Purchase Price (95% CI)
Smoking frequency	
Every day	80.8 (80.2, 81.3)
Some days	19.2 (18.7, 19.8)
Smoking intensity, cigarettes/d	
< 6	21.7 (21.2, 22.3)
6–14	28.6 (28.0, 29.3)
> 14	49.6 (48.9, 50.3)
Any price minimization strategy ^a	28.8 (28.2, 29.4)
Purchase volume	
Pack	58.3 (57.7, 59.0)
Carton	27.6 (27.0, 28.2)
Both pack and carton	6.7 (6.4, 7.0)
Missing data ^b	7.4 (7.0, 7.7)
Purchase site	
In-state	88.6 (88.2, 89.1)
Different state with lower price	3.2 (3.0, 3.4)
Different state with higher price	0.7 (0.68, 0.73)
Different state (combined)	3.9 (3.6, 4.1)
Both in-state or different state (with higher cigarette price)	89.3 (88.9, 89.8)
Some other way (including Internet) ^c	0.4 (0.3, 0.5)
Missing data ^b	7.1 (6.7, 7.5)
Self-reported purchase price, \$	
Amount paid for last pack	3.99 (3.96, 4.01)
Amount paid for last carton	28.28 (28.05, 28.51)
Carton, price/pack	2.83 (2.81, 2.85)

Note. CI = confidence interval. The sample size was n = 30 397.

^aComposite measure of respondents who used a price minimization strategy, which are purchasing cigarettes by the carton, in a different state with a lower price, or in some other way.

^bMissing data were not considered price minimization strategies.

^cSome other way referred to purchasing cigarettes from some other reduced tax source such as the Internet or another country.

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Note. The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the CDC.

Contributors

M. F. Pesko acquired the data and drafted the article. All authors conceptualized the study, interpreted the data, and critically revised the article.

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Human Participant Protection

Institutional review board approval was not needed for this study because only publically available data were used.

References

- Centers for Disease Control and Prevention. Smoking-attributable mortality, years of potential life lost, and productivity losses—United States, 2000–2004. *MMWR Morb Mortal Wkly Rep*. 2008; 57(45):1226–1228.
- Office on Smoking and Health. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, GA:

Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 2000.

- Campaign for Tobacco Free Kids. Raising cigarette taxes reduces smoking, especially among kids (and the cigarette companies know it). 2011. Available at: <http://www.tobaccofreekids.org/research/factsheets/pdf/0146.pdf>. Accessed June 17, 2012.
- Fong GT, Cummings KM, Borland R, et al. The conceptual framework of the International Tobacco Control (ITC) Policy Evaluation Project. *Tob Control*. 2006;15(suppl 3):iii3–11.
- Frieden TR, Mostashari F, Kerker BD, et al. Adult tobacco use levels after intensive tobacco control measures: New York City, 2002–2003. *Am J Public Health*. 2005;95(6):1016–1023.
- Goolsbee A, Lovenheim MF, Slemrod J. Playing with fire: cigarettes, taxes, and competition from the Internet. *Am Econ J Econ Policy*. 2010;2(1):131–154.
- Hyland A, Higbee C, Bauer JE, Giovino GA, Cummings KM. Cigarette purchasing behaviors when prices are high. *J Public Health Manag Pract*. 2004; 10(6):497–500.
- DeCicca P, Kenkel DS, Liu F. *Who Pays Cigarette Taxes? The Impact of Consumer Price Search*. Cambridge, MA: National Bureau of Economic Research; 2010. NBER Working Paper 15942.
- Hyland A, Bauer JE, Li Q, et al. Higher cigarette prices influence cigarette purchase patterns. *Tob Control*. 2005;14(2):86–92.
- Hyland A, Laux FL, Higbee C, et al. Cigarette purchase patterns in four countries and the relationship with cessation: findings from the International Tobacco Control (ITC) Four Country Survey. *Tob Control*. 2006; 15(suppl 3):iii59–iii64.
- Licht AS, Hyland AJ, O'Connor RJ, et al. Socio-economic variation in price minimizing behaviors: findings from the International Tobacco Control (ITC) Four Country Survey. *Int J Environ Res Public Health*. 2011;8(1):234–252.
- Licht AS, Hyland AJ, O'Connor RJ, et al. How do price minimizing behaviors impact smoking cessation? Findings from the International Tobacco Control (ITC) Four Country Survey. *Int J Environ Res Public Health*. 2011;8(5):1671–1691.
- White VM, Gilpin EA, White MM, Pierce JP. How do smokers control their cigarette expenditures? *Nicotine Tob Res*. 2005;7(4):625–635.
- Tax Burden on Tobacco*. Vol 45. Arlington, VA: Orzechowski and Walker; 2010.
- Hartman A, Willis G, Lawrence D, Marcus S, Gibson JT. The 1998–1999 NCI Tobacco Use Supplement to the Current Population Survey (TUS-CPS): representative survey findings. 2002. Available at: <http://riskfactor.cancer.gov/studies/tus-cps>. Accessed June 17, 2012.
- Ahijevych K, Ford J. The relationships between menthol cigarette preference and state tobacco control policies on smoking behaviors of young adult smokers in the 2006–07 Tobacco Use Supplements to the Current Population Surveys (TUS CPS). *Addiction*. 2010;105 (suppl 1):46–54.

TABLE 2—Multivariate Logistic Regression of Cigarette Price Minimization Strategies by Socioeconomic, Demographic, and Smoking Behavior Characteristics: Tobacco Use Supplement of the Current Population Survey, United States, 2006–2007

Characteristic	Price Minimization Strategy		
	Purchase in Different State With Lower Price, OR (95% CI)	Usually Purchase Cartons, OR (95% CI)	Any Strategy, OR (95% CI)
Gender			
Men (Ref)	1.0	1.0	1.0
Women	1.1 (0.9, 1.3)	1.4* (1.3, 1.5)	1.4* (1.3, 1.5)
Age, y			
18–24 (Ref)	1.0	1.0	1.0
25–44	1.5* (1.1, 2.2)	1.9* (1.6, 2.2)	1.8* (1.5, 2.1)
45–64	2.2* (1.5, 3.2)	3.9* (3.4, 4.6)	3.6* (3.1, 4.2)
≥ 65	2.7* (1.8, 4.2)	7.1* (5.8, 8.8)	6.3* (5.1, 7.8)
Race/ethnicity			
White, non-Hispanic (Ref)	1.0	1.0	1.0
Black, non-Hispanic	0.5* (0.3, 0.7)	0.2* (0.2, 0.3)	0.3* (0.2, 0.3)
Hispanic	0.9 (0.6, 1.5)	0.4* (0.3, 0.5)	0.4* (0.3, 0.5)
Other race, non-Hispanic	1.4 (1.0, 2.0)	0.9 (0.8, 1.1)	1.0 (0.8, 1.2)
Education			
< high school degree (Ref)	1.0	1.0	1.0
High school degree	1.2 (0.9, 1.5)	1.1 (1.0, 1.2)	1.1 (1.0, 1.2)
> high school	1.3 (1.0, 1.6)	1.1 (1.0, 1.2)	1.1 (1.0, 1.3)
Employment status			
Employed (Ref)	1.0	1.0	1.0
Unemployed	1.0 (0.7, 1.5)	0.8* (0.7, 0.9)	0.8 (0.7, 1.0)
Student/homemaker	1.1 (0.9, 1.5)	1.0 (0.9, 1.2)	1.0 (0.9, 1.2)
Other (not in labor force)	1.2 (0.9, 1.4)	1.3* (1.2, 1.5)	1.3* (1.2, 1.5)
Annual family income, \$			
< 25 000 (Ref)	1.0	1.0	1.0
25 000–49 999	1.3 (1.0, 1.7)	1.2* (1.1, 1.4)	1.3* (1.1, 1.4)
50 000–74 999	1.3 (1.0, 1.7)	1.4* (1.3, 1.6)	1.4* (1.3, 1.6)
> 74 999	1.5* (1.1, 2.0)	1.6* (1.4, 1.8)	1.6* (1.4, 1.8)
Missing data	1.1 (0.8, 1.6)	1.2 (1.0, 1.3)	1.2 (1.0, 1.3)
Smoking frequency			
Every day (Ref)	1.0	1.0	1.0
Some days	0.9 (0.6, 1.2)	0.3* (0.2, 0.3)	0.4* (0.3, 0.4)
Smoking intensity, cigarettes/d			
< 6 (Ref)	1.0	1.0	1.0
6–14	1.1 (0.9, 1.4)	2.4* (2.1, 2.8)	2.1* (1.8, 2.4)
> 14	1.5* (1.1, 1.9)	4.9* (4.2, 5.7)	4.2* (3.7, 4.8)

Note. CI = confidence interval; OR = odds ratio. The sample size was n = 30 397. Self-report interview weights and replicate weights were used in the regression analysis. In all regressions, average cigarette price data were included to control for different cigarette prices within states and cigarette price differences between states. State fixed effects were included to control for additional state-varying characteristics. Month fixed effects were included to control for seasonal time-varying effects of smoking behaviors. Because only 112 respondents reported purchasing cigarettes from some other reduced-tax source, it was not possible to differentiate between characteristics of this population by using logistic regression.

*P < .05.

17. Siahpush M, Singh GK, Jones PR, Timsina LR. Racial/ethnic and socioeconomic variations in duration of smoking: results from 2003, 2006 and 2007 Tobacco Use Supplement of the Current Population Survey. *J Public Health (Oxf)*. 2010;32(2):210–218.

18. Campaign for Tobacco Free Kids. State, local, and tribal government benefits from the Pact Act. 2010. Available at: <http://www.tobaccofreekids.org/research/factsheets/pdf/0292.pdf>. Accessed June 17, 2012.

19. Ribisl KM, Williams RS, Gizlice Z, Herring AH. Effectiveness of state and federal government agreements with major credit card and shipping companies to block illegal Internet cigarette sales. *PLoS One*. 2011; 6(2):e16754.