

# Is Every Smoker Interested in Price Promotions? An Evaluation of Price-Related Discounts by Cigarette Brands

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**Context:** Raising unit price is one of the most effective ways of reducing cigarette consumption. A large proportion of US adult smokers use generic brands or price discounts in response to higher prices, which may mitigate the public health impacts of raising unit price. **Objective:** The main purpose of this study was to evaluate the retail price impact and the determinants of price-related discount use among US adult smokers by their most commonly used cigarette brand types. **Methods:** Data from the 2009-2010 National Adult Tobacco Survey, a telephone survey of US adults 18 years or older, was used to assess price-related discount use by cigarette brands. Price-related discounts included coupons, rebates, buy 1 get 1 free, 2 for 1, or any other special promotions. Multivariate logistic regression was used to assess sociodemographic and tobacco use determinants of discount use by cigarette brands. **Results:** Discount use was most common among premium brand users (22.1%), followed by generic (13.3%) and other brand (10.8%) users. Among premium brand users, those who smoked 10 to 20 cigarettes per day were more likely to use discounts, whereas elderly smokers, non-Hispanic blacks, those with greater annual household income, dual users of cigarettes and other combustible tobacco products, and those who had no quit intentions were less likely to do so. Among generic brand users, those who had no quit intentions and those who smoked first cigarette within 60 minutes after waking were more likely to use discounts. **Conclusions:** Frequent use of discounts varies between smokers of premium and generic cigarette brands. Setting a high minimum price, together with limiting the use of coupons and promotions, may uphold the effect of cigarette excise taxes to reduce smoking prevalence.

**KEY WORDS:** cigarette brand, cigarette price, price promotions

Increasing cigarette unit price is one of the most effective population-based strategies to reduce cigarette consumption, prevent smoking initiation, and increase rates of successful quitting.<sup>1-5</sup> However, cigarette manufacturers have developed a wide range of pricing strategies, including lower priced generic brands and price-related discounts, to counteract the effect of tobacco control strategies to increase price.<sup>6-9</sup> In 2011, the major manufacturers spent \$8.37 billion on cigarette advertising and promotion, among which \$7.75 billion (or 92.7%) went to price-related discounts or promotional allowances to reduce retail prices.<sup>10</sup> Cigarette manufacturers also use pricing strategies when offering price discounts. Manufacturers of brands with low market share often target younger individuals with price discounts to encourage brand switching, whereas those of leading brands often target older smokers to encourage them to continue purchasing the major

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brand and to discourage quitting.<sup>7-9</sup> Besides, cigarette manufacturers have introduced generic brands since 1980s to create a multitiered pricing system to keep price-sensitive smokers.<sup>11-13</sup> As a result, a large proportion of US adult smokers (18%-49%) today have used multipack discounts, rebates, and coupons during purchases to reduce the costs of cigarettes, whereas another increasing fraction of US adult smokers (10%-34%) have used generic cigarette brands.<sup>7,12-20</sup> The use of these strategies may mitigate the public health impacts of raising unit price of cigarettes, as studies have shown that smokers who used these pricing strategies are less likely to make quit attempts and to succeed in quitting in the future.<sup>7,21,22</sup>

To identify smokers who were more responsive to these pricing strategies, studies have independently assessed sociodemographic characteristics and other tobacco use behaviors of cigarette smokers who used generic brands and price-related discounts.<sup>7,12-18</sup> However, cigarette manufactures do not uniformly distribute their price-related discounts across all brands.<sup>8,23</sup> Rather, their price discount strategies and associated price reductions are primarily focused on a few of the most popular brands. This might partly explain why a previous study failed to identify significant price reductions associated with promotional offers, as the results may partly depend on the cigarette brands used by respondents.<sup>14</sup>

While studies have shown that smokers of generic and premium brands may be different, little is known about the use of price-related discounts among smokers who use these respective products. This is a critical issue to investigate, as both generic brands and price-related discounts are marketing strategies that can be used by cigarette manufacturers to reduce retail prices of their products and to mitigate the public health impacts of raising unit price of cigarettes on their sales. In addition, policy makers need to better understand potential impacts or subpopulation reaches of policies that can ban coupons and/or other types of price discounts before potential implementation. To fill this research gap, this study evaluated the retail price impact and the determinants of price-related discount use among US adult smokers by their most commonly used cigarette brand types. To our knowledge, this is the first analysis to assess the use of price-related discounts stratified by premium and generic brand users based on a national representative sample of US adult smokers.

## ● Methods

### Data

This analysis used data from the 2009-2010 National Adult Tobacco Survey (NATS), a stratified national

landline and cellular telephone survey of noninstitutionalized US adults 18 years or older residing in the 50 US states and the District of Columbia. The survey sample is designed to yield both state and nationally representative estimates.

In total, 118 581 NATS interviews were conducted between October 2009 and June 2010. This analysis focused on current smokers and thus nonsmokers were excluded ( $n = 102\,039$ ). Current smokers were defined as respondents who reported smoking at least 100 cigarettes in their entire life time and currently smoked every day or some days at the time of survey. Current smokers with missing values on key variables were excluded, including those who did not report a brand name that they smoked most often during the past 30 days ( $n = 523$ ) and those who did not report whether they used price-related discounts during their latest cigarette purchase ( $n = 397$ ). Finally, respondents who smoked the cigarette "brand," Forsyth, were excluded ( $n = 4$ ), as Forsyth is a manufacturer and it was not possible to distinguish the specific brand. Because of the limited sample size, respondents with missing data for variables with fewer than 30 missing observations were excluded from the analysis, including respondents who failed to provide answers to gender ( $n = 26$ ), employment status ( $n = 29$ ), whether or not they had used smokeless tobacco in the past 30 days ( $n = 17$ ), or whether or not they purchased cigarettes over the Internet in the past 12 months ( $n = 10$ ), whereas missing categories were created for respondents for whom there were missing values for all other variables. Consequently, the final sample size for this analysis was 15 536. Sensitivity analysis was performed to assess the impact of missing data on the results. We replicated the analysis by only including data on NATS respondents with complete information. These results suggested little difference in the determinants of discount use among smokers of premium or generic brands, except non-Hispanic black smokers of generic brands became less likely to use discounts.

Since samples used for this analysis contain only de-identified data, this analysis is research that does not involve human participants as defined by Title 45 Code of Federal Regulations, Part 46, and institutional review board approval was not required.

## Measures

### *Brands (generic and premium)*

Cigarette brand information came from the NATS question on the brand of cigarettes that the respondent smoked most often during the past 30 days. A total of 17 brand options were listed. These brand names, except the options of Forsyth and "other" brands, were categorized as either premium brands or generic

brands. The 9 premium brands included Camel, Kool, Marlboro, Newport, Pall Mall, Parliament, Salem, Virginia Slims, and Winston. The 6 generic brands were Basic, Doral, GPC, Misty, Sonoma, and USA Gold.

### ***Cigarette price and price-related discounts***

Current smokers who bought cigarettes by the pack at their last purchase were asked to report price paid per pack (after discounts or coupons) in US dollars, whereas those who bought cigarettes by cartons were asked to report price paid per carton. Price per carton was then divided by 10 to obtain a consistent measure of price paid per pack.

Current smokers were also asked whether they used coupons, rebates, buy 1 get 1 free, 2 for 1, or any other special promotions for cigarettes at their last purchase. Respondents who provided positive responses were classified as having used price-related discounts.

### ***Sociodemographic and other tobacco use characteristics***

Assessed respondents' sociodemographic characteristics included gender (male or female); age group (18-24, 25-44, 45-64, and 65+ years), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic Asian, non-Hispanic Native Hawaiian/Pacific Islander, non-Hispanic American Indian/Alaska Native, and non-Hispanic "Other"), education (less than high school, high school graduate or equivalent, some college, and college degree or higher), marital status (married or cohabitate; widowed, divorced, or separated; and not currently in a relationship), employment (employed or unemployed), and annual household income (< \$30 000, \$30 000-\$49 000, \$50 000-\$99 999, and  $\geq$ \$100 000).

Assessed tobacco use variables included number of cigarettes smoked per day (<10, 10-20, >20); time to first cigarette after waking (<5, 6-30, 31-60, >60 minutes); smoking days (daily or nondaily); quit attempt within the past 12 months (yes or no); use of smokeless tobacco, including chewing tobacco, snuff, dip, or snus, in the past 30 days (yes or no); use of other combustible tobacco products, including cigars, cigarillos, water pipes, or other tobacco, in the past 30 days (yes or no); and carton purchase during the latest cigarette purchase (yes or no).

### ***State-level tobacco-related variables***

Three state tobacco-related policy variables were generated: monthly state excise tax rates; tobacco control funding per capita; and strength of smoke-free air laws. Monthly excise tax rates from 2009 to 2010 came from the 2013 Tax Burden on Tobacco.<sup>24</sup> Data on 2009 and 2010 state tobacco control funding and smoke-free air laws were from the ImpacTeen project

(<http://www.impactteen.org>). State population data were obtained from State Intercensal Estimates administered by US Census Bureau. Smoke-free air laws had 3 components: state smoking bans at bars, restaurants, and private workplaces. Smoking ban information from these components (3 scales in each component: 0 for no policy in place, 1 for some restrictions, and 2 for complete ban) were combined into 1 variable (on a scale of 0-6) to indicate the strength of smoke-free air laws in each state. The variable was then recoded into 3 categories: 0 being no smoke-free air laws; 1-5 being noncomprehensive smoke-free air laws; and 6 being comprehensive smoke-free air laws.

### **Statistical analysis**

To evaluate the independent price reduction associated with the use of price-related discounts by brand, multivariate linear regression models were used to adjust the possibility of using multiple price minimization strategies during the latest cigarette purchase. The dependent variable in these models was price paid per pack, whereas the key variable of interest was the use of price-related discounts during the most recent purchase. In addition to demographic characteristics (age, race/ethnicity, gender, education, marital status, employment status, and income), 3 types of other price minimization strategies were also included in the model: (1) bought cigarettes on an Indian reservation in the past 12 months; (2) bought cigarettes over the Internet in the past 12 months; and (3) bought cigarettes by cartons in the last purchase. Tobacco use characteristics were also included as controls primarily because they may be correlated with omitted variables that influence both price minimization strategies and price paid, for example, other price minimization strategies that are not captured in the 2009-2010 NATS, such as using cigarettes purchased from another state or country or on the black market with lower prices or cigarettes produced by commercial roll your-own machines because of the federal tax disparity.<sup>25-28</sup> Studies have shown that, in particular, time to first cigarette was associated with the use of price minimization strategies, independent of respondents' smoking characteristics.<sup>12,21</sup> Therefore, the estimated constant term in this model can be interpreted as the average per pack price paid before using any price minimization strategies.

To adjust for state tobacco control environments, 3 variables were included: tobacco control program funding per capita; the strength of smoke-free air laws; and monthly cigarette excise tax rates. In addition, state dummy indicators were included to adjust for unobservable characteristics across states.

To examine determinants of the use of price-related discounts by brand, multivariate logistic regression

models were used separately for premium brand and generic brand users. Odds ratios (ORs) and 95% confidence intervals (CIs) were reported for these models. Poststratification sampling weights were incorporated in all analyses to account for the complex survey design of the 2009-2010 NATS and nonresponse. All analyses were performed using STATA (version 13) in 2013.

## ● Results

The majority of current smokers (75.7%) used premium brand cigarettes (Table 1), 9.0% used generic brands, and another 15.4% used other brands (not listed). The overall prevalence of using price-related discounts among all smokers was 19.6%, whereas the prevalence was higher among premium brand users (22.1%) than among generic brand users (13.3%). Discount use was associated with a 5.9% (or 28 cents per pack) reduction in the average price among all current smokers, although it was associated with a 6.8% (or 32 cents per pack) reduction in the average price of premium brand users. In contrast, discount use was not associated with significant price reductions among generic brand smokers.

Table 2 compares unadjusted demographic and tobacco use characteristics between discount and nondiscount users by cigarette brand type. Among the overall sample, smokers 65 years or older (10.8%), smokers who had a college education or higher (14.62%), smokers whose annual household income was above \$100 000 (14.4%), nondaily smokers (15.0%), smokers who smoked fewer than 10 cigarettes per day (15.4%), smokers whose time to first cigarette was more than 60 minutes after waking (16.4%), or dual users of

cigarettes and smokeless tobacco products (19.0%) reported lower level of discount use than those in the corresponding comparison categories.

Among premium brand smokers, almost all sociodemographic characteristics were significantly different between discount and nondiscount users ( $P < .05$ ), except for education, marital status, employment status, past year quit attempts, and whether smoked other combustible tobacco products in the last 30 day. Specifically, the prevalence of discount use was significantly lower among smokers 65 years or older (11.1%) than among other age groups (18-24 years: 22.5%; 25-44 years: 22.3%; and 45-64 years: 23.2%). By race/ethnicity, the prevalence of discount use was highest among non-Hispanic Native Hawaiians/Pacific Islanders (34.4%) whereas it was much lower among non-Hispanic Asians (15.6%), non-Hispanic blacks (16.3%), and Hispanics (17.5%). A higher proportion of females (24.1%) used discounts than males (20.6%). Discount use was lower among smokers with more than \$100 000 annual household income (15.3%) than among smokers in lower-income categories. Nondaily smokers (16.2%) and smokers who smoked fewer than 10 cigarettes per day (16.8%) had a lower prevalence of discount use than daily smokers (24.0%) and smokers who smoked more than 10 cigarettes per day (10-20: 25.2%; and >20: = 23.8%). Smokers whose time to first cigarette was within 5 minutes after waking (26.8%) reported the highest prevalence of discount use compared with those whose time to first cigarette was more than 5 minutes. Dual users of cigarettes and smokeless tobacco products (21.5%) used discounts less than cigarette-only users (27.2%). Finally, smokers who purchased cigarettes by carton reported a higher level of discount use (25.0%) than those who did not (21.4%).

**TABLE 1 ● Use of Coupon or Other Price-Related Discounts by Most Commonly Purchased Cigarette Brand Types Among US Adult Current Cigarette Smokers, 2009-2010 NATS<sup>a</sup>**

By Brand Category	Premium Brands (n = 10 555)	Generic Brands (n = 1911)	All Brands (N = 15 536)
Prevalence of use	75.7%	9.0%	100%
Prevalence of discounts use	22.1%	13.3%	19.6%
Price reduction per pack, \$	-0.32 <sup>b</sup>	-0.11	-0.28 <sup>b</sup>
Adjusted average price, \$	4.73	3.00	3.73
Discount rendered as % of the retail price <sup>c</sup>	6.8%	3.7%	5.9%

Abbreviation: NATS, National Adult Tobacco Survey.

<sup>a</sup>Unweighted sample sizes are in parentheses. The self-reported use of coupons or other price-related discounts reflects only direct-to-consumer discounts from the industry. Therefore, industry's promotional allowances directly paid to retailers or wholesalers are not included.

<sup>b</sup>Significance level:  $P < .05$ .

<sup>c</sup>Percentage of discounts was calculated using price reduction divided by the adjusted average price. All estimates were weighted with NATS poststratification weights. In regressions of estimating price discounts, the dependent variable is self-reported purchasing price, the independent variable of interest is the use of price-related discounts in the latest purchase. Because of the missing on self-reported per pack price paid, additional 605 observations were automatically dropped from the regression analyses here. In the regressions, other covariates include demographic characteristics (race, age, gender, education, marital status, employment status, and income level), state tobacco control program funding per capita, smoke-free air laws, cigarette excise tax rates, state dummy variables, whether the respondent was a daily smoker, the amount of cigarette consumed on smoking days, time to first cigarette since wake up, and other price minimization behaviors: purchase of cartons, purchase on Indian reservation, and purchase through the Internet. "All brands" includes premium, generic, and other brand users. Adjusted average prices were constants obtained from price discount regressions.

**TABLE 2 • Prevalence of Discount Use and Nondiscount Use Among US Adult Cigarette Smokers, by Most Commonly Purchased Cigarette Brand Type, 2009-2010 NATS<sup>a</sup>**

	Premium Brands		Generic Brands		All Brands	
	Nondiscounts (n = 8342; 77.9%)	Discounts (n = 2213; 22.1%)	Nondiscounts (n = 1705; 86.7%)	Discounts (n = 206; 13.3%)	Nondiscounts (N = 12 873; 80.4%)	Discounts (N = 2663; 19.6%)
Age, y						
18-24	77.6%	22.5%	77.0%	23.0%	77.67%	22.33%
25-44	77.7%	22.3%	84.0%	16.1%	79.64%	20.36%
45-64	76.8%	23.2%	89.7%	10.3%	80.99%	19.01%
65+	88.9%	11.1%	84.7%	15.3%	89.22%	10.78%
Unknown	72.5%	27.5%	93.1%	6.9%	79.08%	20.92%
<i>P</i>	.01		.20		.001	
Race/ethnicity						
Non-Hispanic white	76.0%	24.0%	86.2%	13.9%	79.33%	20.67%
Non-Hispanic black	83.7%	16.3%	94.5%	5.5%	85.20%	14.80%
Hispanic	82.5%	17.5%	72.7%	27.3%	83.17%	16.83%
Non-Hispanic Asian	84.4%	15.6%	94.2%	5.8%	85.69%	14.31%
Native Hawaiian/Pacific	65.6%	34.4%	100.0%	0.0%	74.98%	25.02%
Islander						
American Indian/Alaska Native	73.0%	27.1%	95.8%	4.2%	76.31%	23.69%
Others	74.8%	25.2%	81.1%	18.9%	75.87%	24.13%
Unknown	82.5%	17.5%	96.9%	3.1%	83.27%	16.73%
<i>P</i>	.01		.03		.07	
Gender						
Male	79.4%	20.6%	88.3%	11.7%	81.41%	18.59%
Female	75.9%	24.1%	85.5%	14.5%	79.23%	20.77%
<i>P</i>	.03		.39		.09	
Education						
Less than high school	76.8%	23.2%	83.7%	16.3%	78.73%	21.27%
High school or equivalent	78.1%	22.0%	87.2%	12.8%	80.93%	19.07%
Some college	76.8%	23.2%	87.8%	12.2%	79.52%	20.48%
College or higher	83.4%	16.6%	91.5%	8.5%	85.38%	14.62%
Unknown	94.2%	5.8%	100.0%	0.0%	94.62%	5.38%
<i>P</i>	.09		.46		.03	
Marital status						
Married or cohabitate	78.0%	22.0%	88.6%	11.5%	80.62%	19.38%
Widowed, divorced, or separated	76.2%	23.8%	85.5%	14.5%	80.35%	19.65%
Never married	79.0%	21.0%	80.5%	19.5%	80.35%	19.65%
Unknown	75.4%	24.6%	93.4%	6.6%	70.30%	29.70%
<i>P</i>	.60		.29		.70	
Employed						
Yes	78.1%	21.9%	89.6%	10.5%	80.57%	19.43%
No	77.6%	22.4%	84.0%	16.0%	80.26%	19.74%
<i>P</i>	.78		.07		.81	
Annual household income						
<\$30 000	75.1%	24.9%	84.8%	15.2%	78.62%	21.38%
\$30 000-\$49 999	78.0%	22.0%	87.0%	13.0%	80.66%	19.34%
\$50 000-\$99 999	77.0%	23.0%	90.5%	9.5%	80.02%	19.98%
\$100 000+	84.7%	15.3%	87.9%	12.1%	85.57%	14.43%
Unknown	82.2%	17.8%	85.6%	14.5%	82.89%	17.11%
<i>P</i>	.005		.71		.04	

(continues)

**TABLE 2 ● Prevalence of Discount Use and Nondiscount Use Among US Adult Cigarette Smokers, by Most Commonly Purchased Cigarette Brand Type, 2009-2010 NATS<sup>a</sup> (Continues)**

	Premium Brands		Generic Brands		All Brands	
	Nondiscounts (n = 8342; 77.9%)	Discounts (n = 2213; 22.1%)	Nondiscounts (n = 1705; 86.7%)	Discounts (n = 206; 13.3%)	Nondiscounts (N = 12 873; 80.4%)	Discounts (N = 2663; 19.6%)
Smoking days						
Daily	76.0%	24.0%	86.8%	13.2%	79.08%	20.92%
Nondaily	83.8%	16.2%	85.8%	14.2%	85.03%	14.97%
<i>P</i>	.001		.79		.001	
No. of cigarettes per day						
<10	83.2%	16.8%	87.6%	12.4%	84.56%	15.44%
10-20	75.0%	25.0%	87.0%	13.0%	78.29%	21.71%
>20	75.0%	25.0%	84.0%	16.0%	78.90%	21.10%
Unknown	83.7%	16.3%	94.2%	5.8%	86.57%	13.43%
<i>P</i>	.001		.62		.001	
Past year quit attempts						
Yes	76.5%	23.5%	90.6%	9.5%	79.54%	20.46%
No	78.9%	21.2%	83.7%	16.3%	80.89%	19.11%
Unknown	82.5%	17.5%	86.5%	13.5%	84.45%	15.55%
<i>P</i>	.13		.03		.21	
Time to first cigarette, min						
≤5	73.2%	26.8%	81.8%	18.3%	76.92%	23.08%
6-60	77.2%	22.8%	87.9%	12.2%	80.03%	19.97%
>60	81.9%	18.1%	91.0%	9.0%	83.63%	16.37%
Unknown	80.3%	19.7%	93.7%	6.3%	83.44%	16.56%
<i>P</i>	.001		.09		.001	
Use of smokeless tobacco in the last 30 d						
Yes	78.6%	21.5%	87.2%	12.8%	80.99%	19.01%
No	72.8%	27.2%	81.0%	19.0%	76.08%	23.92%
<i>P</i>	.02		.38		.01	
Smoked other combustible tobacco products in the last 30 d						
Yes	78.2%	21.8%	86.5%	13.5%	80.54%	19.46%
No	71.0%	29.0%	91.4%	8.6%	76.65%	23.35%
Unknown	83.7%	16.3%	100.0%	0.0%	89.97%	10.03%
<i>P</i>	.11		.54		.20	
Purchase by carton						
Yes	75.0%	25.0%	86.6%	13.4%	80.12%	19.88%
No	78.6%	21.4%	86.8%	13.2%	80.53%	19.47%
<i>P</i>	.04			.94	.75	
Cigarettes brands smoked most often in the last 30 d						
Premium					77.91%	22.09%
Generic					86.70%	13.30%
Other brands					89.19%	10.81%
<i>P</i>			.001			

Abbreviation: NATS, National Adult Tobacco Survey.

<sup>a</sup>Unweighted sample sizes and weighted percentages are in parentheses. Chi-square tests were used to test the statistical differences in variables by discount use. Smokeless tobacco includes chewing tobacco, snuff, dip, or snus; and combustible products include cigars, cigarillos, water pipe, or other tobacco. All estimates were weighted with NATS poststratification weights. "All brands" includes premium, generic, and other brand users.

In contrast, among generic brand users, only Hispanics (27.3%) and smokers who had no quit attempts during the past 12 months (16.3%) reported a higher level of discount use than smokers in the corresponding comparison categories.

Among all current smokers, after adjusting for other sociodemographic and tobacco use characteristics, those who were 65 years or older (OR = 0.5; 95% CI, 0.3-0.7), who were non-Hispanic blacks (OR = 0.7; 95% CI, 0.5-0.9), and whose annual household income was above \$100 000 (OR = 0.6; 95% CI, 0.4-0.8) were less likely to use discounts (these logistic regression results are shown in Supplemental Digital Content Appendix Table 1, available at: <http://links.lww.com/JPHMP/A127>). Besides, smokers who had a college degree or higher (OR = 0.7; 95% CI, 0.5-1.0) and who smoked cigarettes of generic (OR = 0.5; 95% CI, 0.3-0.6) or other brands (OR = 0.4; 95% CI, 0.3-0.5) most often in the past 30 days were also less likely to use discounts. Female smokers (OR = 1.2; 95% CI, 1.0-1.4) and smokers who smoked 10 to 20 cigarettes per day (OR = 1.4; 95% CI, 1.1-1.7), in contrast, were more likely to use discounts.

Among premium brand users, smokers who were 65 years or older (OR = 0.4; 95% CI, 0.2-0.6), who were non-Hispanic blacks (OR = 0.7; 95% CI 0.5-1.0), whose annual household income was above \$100 000 (OR = 0.6; 95% CI, 0.4-0.9), and who had no quit attempts in the past 12 months (OR = 0.8; 95% CI, 0.7-1.0) were less likely to use discounts. In contrast, smokers who smoke 10 to 20 cigarettes per day (OR = 1.4; 95% CI, 1.1-1.8) and smokers who did not use other combustible tobacco products (OR = 1.6; 95% CI, 1.0-2.4) were more likely to use discounts.

Among generic brand users, smokers whose time to first cigarette was more than 60 minutes after waking (OR = 0.4; 95% CI, 0.2-0.9) had a lower odds of using discounts. In contrast, smoker who had no quit attempt in the past 12 months (OR = 1.8; 95% CI, 1.1-3.1) had a greater odds.

## ● Discussion

The findings from this study indicate that approximately 3 of 4 US adult cigarette smokers were frequent users of premium brands during 2009-2010. This finding is consistent with existing evidence from studies conducted at the state and national levels with less robust sample sizes.<sup>7,12,14,16-18</sup> The study also found that more than 1 of 5 premium brand users used price-related discounts in their last cigarette purchases whereas discount use was much less common among generic brand users. Although discounts rendered sizeable average price reductions to premium brand users, we do not find that discounts significantly reduced

the average per pack prices paid for generic brands. This may be partly because cigarette manufactures of generic brands are less likely to provide promotional offers on top of their discounted prices.

This analysis is unique in that we are able to assess the extent to which price-sensitive smokers, who were more likely to take advantage of discounts, differ with regard to the most recently purchased cigarette brand type. Our findings suggest that, largely consistent with existing evidence on the characteristics of discount users overall, discount users of premium brands were less likely to be smokers 65 years or older, non-Hispanic blacks, those with annual household income of more than \$100 000, and those who had no quit attempts in the past 12 months but more likely to be those who smoked 10 to 20 cigarettes per day.<sup>12,13,15,16,18</sup> In addition, current dual users of cigarettes and other combustible tobacco products were much less likely to use price-related discounts when purchasing cigarettes. One potential reason is that these smokers are less interested in cigarette price discounts because of their use of other combustible alternatives. Some of them may have received discounted prices for other combustible tobacco products, partly because state tax disparity between cigarettes and cigars or cigarillos, and thus less interested in cigarette discounts. These findings imply that potential policies that prohibit promotions or couponing may have disproportionately stronger impacts on certain subpopulations of premium brand smokers but less likely to affect smoking behaviors of other subpopulations, such as non-Hispanic blacks and dual users.

In contrast, our findings also indicate that discount users of generic brands were not remarkably different from nonusers with respect to their sociodemographic characteristics. Tobacco use status, however, seems to be closely related to the likelihood of using price-related discounts among smokers of generic brands. Those who smoked first cigarettes more than 60 minutes after waking were less likely to use price-related discounts during their most recent cigarette purchases. This is probably because those who smoked their first cigarettes within 60 minutes after waking are more likely to be heavy smokers and thus have greater financial incentive to find resources of cheaper cigarettes.

In addition, while premium brand smokers with no quit intentions were *less likely* to use discounts, generic brand smokers with no quit intentions were *more likely* to use them. This phenomenon may be associated with 2 potential explanations. First, generic brand smokers are not a random sample. They are more likely to be more addicted and price-sensitive smokers.<sup>23</sup> Therefore, those with no quit intentions within this group are more likely to use any types of discounts available. On the contrary, studies have shown that a substantial fraction of smokers use pack purchase as a self-control

mechanism so as to ration the amount of cigarettes they consume.<sup>14</sup> It is plausible that this strategy is more prevalent among premium brand smokers with quit intentions, as they are more likely to purchase cigarettes by pack.<sup>23</sup> These smokers may be less interested in using price-related discounts while self-rationing their cigarette consumptions.

Other smoking characteristics that are related to the discount use among premium brand users, such as the number of cigarettes smoked per day and the use of other combustible tobacco products, do not vary between discount users and nonusers of generic brands. These findings are not surprising, as generic brand users themselves are price-sensitive smokers and thus they are much like discount users in many aspects.

Several limitations should be noted. First, since data collected in the 2009-2010 NATS are self-reported and the survey instrument on discount use may not capture all forms of promotions provided by the industry, respondents' responses may be subject to potential recall and self-response bias. However, both key variables used in the analysis, per pack prices paid and the use of price-related discounts, were collected for the latest purchase, which alleviates potential recall biases. In addition, existing evidence indicates that the average of self-reported prices per pack in the 2009-2010 NATS was in line with the corresponding 2009 national average price reported in the Tax Burden on Tobacco report.<sup>19</sup> Second, the NATS questionnaire included only 17 cigarette brand choices. As a result, some premium or generic brand users had to choose the "other" category. However, according to the Maxwell<sup>29</sup> report, the top 7 leading brands included in the survey (Marlboro, Camel, Doral, Kool, Newport, Pall Mall, and Winston) represented more than 71% of all cigarette sales in the United States in 2011. Moreover, the estimated market share of PM, RJR, and Lorillard were 43.2%, 23.3%, and 14.7%, respectively, in the 2009-2010 NATS. These estimates are very close to the 2010 year-end market shares reported by the Maxwell<sup>29</sup> report, which were 46.4%, 25.5%, 12.3%, respectively. Evidence indicates that the NATS provides a reasonable representation of cigarette use in the United States for the time period and thus the bias, if exists, is likely to be small. Third, NATS questions assessed the most recent cigarette brand purchase and thus may not necessarily reflect smokers overall purchasing behaviors, who may switch between generic and premium brands depending on the discounts offered by manufactures.<sup>13,20</sup> Since smokers' self-reported use of price-related discounts in the 2009-2010 NATS reflects only direct-to-consumer discounts from the industry, the discount measure in the analysis does not include tobacco industry's promotional allowances directly paid to cigarette retailers or wholesalers. Finally, the NATS is a cross-sectional

survey; therefore, causal or temporal relationships cannot be established. Additional research using longitudinal designs are needed to better understand smoking behaviors and the use of price-related discounts. In contrast, the benefit of this analysis includes the large nationally representative sample of smokers, as well as the detail of purchase patterns and cigarette brands collected by the survey.

In sum, our findings indicate that cigarette manufacturers have effectively reached price-sensitive smokers of premium brands by using price-related discounts. A substantial proportion of such smokers have become users of industry discounts. However, discount users were not alike among smokers of premium and generic brands, particularly in terms of demographic characteristics. Therefore, although policies that ban coupons and/or other types of price promotions are more likely to reduce cigarette consumptions in general and particularly the consumptions among young and more addicted smokers, it may be relatively less effective to address racial and income disparities in smoking.<sup>12-14,16-18,30,31</sup> In particular, our findings have implied that low socioeconomic status smokers, who were much more likely to use cigarettes of generic brands,<sup>12-14,16-18</sup> might be less likely to be affected by the policies.

Although we cannot differentiate generic brand users from premium brand users among smokers of other brands, both lower average per pack price and insignificant price reduction associated with discounts (results not shown) suggest that such impacts are likely to be nominal for these cigarette smokers. Generic brand users and potentially a large fraction of smokers of other brands are also price-sensitive smokers and might have quit without product options within their budget. Therefore, population-level strategies that can reduce price differentials among cigarette brands, such as setting a high minimum price for cigarettes, together with a set of policies that can prohibit promotions or couponing, limit manufactures' promotional allowances directly paid to retailers or wholesalers, and reduce tax disparity across different tobacco products, would likely be effective in reducing cigarette use and increasing cessation among smokers of both premium and generic brands.<sup>32-34</sup>

## REFERENCES

1. Chaloupka FJ, Straif K, Leon ME. Effectiveness of tax and price policies in tobacco control. *Tob Control*. 2011;20(3): 235-238.
2. Davis KC, Grimshaw V, Merriman D, et al. Cigarette trafficking in five northeastern US cities [published online ahead of print December 11, 2013]. *Tob Control*. 2014;23:e62-e68. doi:10.1136/tobaccocontrol-2013-051244.



3. Chaloupka FJ, Warner KE. The economics of smoking. In: *Handbook of Health Economics*. Oxford, UK: Elsevier press; 2000:1539-1627.
4. Hopkins DP, Husten CG, Fielding JE, Rosenquist JN, Westphal LL. Evidence reviews and recommendations on interventions to reduce tobacco use and exposure to environmental tobacco smoke: a summary of selected guidelines. *Am J Prev Med*. 2001;20(2)(suppl):67-87.
5. Huang J, Chaloupka FJ IV. *The Impact of the 2009 Federal Tobacco Excise Tax Increase on Youth Tobacco Use*. Cambridge, MA: National Bureau of Economic Research; 2012. NBER Working Paper No. 18026.
6. Chaloupka FJ, Cummings KM, Morley CP, Horan JK. Tax, price and cigarette smoking: evidence from the tobacco documents and implications for tobacco company marketing strategies. *Tob Control*. 2002;11(suppl 1):i62-i72.
7. Choi K, Hennrikus DJ, Forster JL, Moilanen M. Receipt and redemption of cigarette coupons, perceptions of cigarette companies and smoking cessation. *Tob Control*. 2013;22(6):418-422.
8. Sfekas A, Lillard DR. *Do Firms Use Coupons and In-store Discounts to Strategically Market Experience Goods Over the Consumption Life-Cycle? The Case of Cigarettes*. Cambridge, MA: National Bureau of Economic Research; 2013. NBER Working Paper No. 19310.
9. Tessman GK, Caraballo RS, Corey CG, Xu X, Chang CM. Exposure to tobacco coupons among US middle and high school students. *Am J Prev Med*. 2014;47(2):S61-S68.
10. Federal Trade Commission. *Federal Trade Commission Cigarette Report for 2011*. Washington, DC: Federal Trade Commission; 2013.
11. Cavin SW, Pierce JP. Low-cost cigarettes and smoking behavior in California, 1990-1993. *Am J Prev Med*. 1995;12(1):17-21.
12. Hyland A, Bauer JE, Li Q, et al. Higher cigarette prices influence cigarette purchase patterns. *Tob Control*. 2005;14(2):86-92.
13. Cornelius ME, Driezen P, Fong GT, et al. Trends in the use of premium and discount cigarette brands: findings from the ITC US Surveys (2002-2011). *Tob Control*. 2014;23(suppl 1):i48-i53.
14. White VM, Gilpin EA, White MM, Pierce JP. How do smokers control their cigarette expenditures? *Nicotine Tob Res*. 2005;7(4):625-635.
15. White VM, White MM, Freeman K, Gilpin EA, Pierce JP. Cigarette promotional offers: who takes advantage? *Am J Prev Med*. 2006;30(3):225-231.
16. Choi K, Hennrikus D, Forster J, Claire AWS. Use of price-minimizing strategies by smokers and their effects on subsequent smoking behaviors. *Nicotine Tob Res*. 2012;14(7):864-870.
17. 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.
18. Cummings KM, Hyland A, Lewit E, Shopland D. Use of discount cigarettes by smokers in 20 communities in the United States, 1988-1993. *Tob Control*. 1997;6(suppl 2):S25.
19. Xu X, Pesko MF, Tynan MA, Gerzoff RB, Malarcher AM, Pechacek TF. Cigarette price-minimization strategies by U.S. smokers. *Am J Prev Med*. 2013;44(5):472-476.
20. Cornelius ME, Cummings KM, Fong GT, et al. The prevalence of brand switching among adult smokers in the USA, 2006-2011: findings from the ITC US surveys [published online ahead of print September 26, 2014]. *Tob Control*. doi:10.1136/tobaccocontrol-2014-051765.
21. 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.
22. 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.
23. Xu X, Malarcher A, O'Halloran A, Kruger J. Does every US smoker bear the same cigarette tax? *Addiction*. 2014;109(10):1741-1749.
24. Orzechowski & Walker. *The Tax Burden on Tobacco. Historical Compilation*. Vol 48. Arlington, VA: Orzechowski & Walker; 2013.
25. DeCicca P, Kenkel D, Liu F. Excise tax avoidance: the case of state cigarette taxes. *J Health Econ*. 2013;32(6):1130-1141.
26. Stehr M. Cigarette tax avoidance and evasion. *J Health Econ*. 2005;24(2):277-297.
27. Ayers JW, Ribisl K, Brownstein JS. Using search query surveillance to monitor tax avoidance and smoking cessation following the United States' 2009 "SCHIP" cigarette tax increase. *PLoS One*. 2011;6(3):e16777.
28. Morris DS, Tynan MA. Fiscal and policy implications of selling pipe tobacco for roll-your-own cigarettes in the United States. *PLoS One*. 2012;7(5):e36487.
29. Maxwell JCJ. *The Maxwell Report: Year-end & Fourth Quarter 2011 Sales Estimates for the Cigarette Industry*. Richmond, VA: John Maxwell Company; 2012.
30. Agaku IT, King BA, Husten CG, et al. Tobacco product use among adults—United States, 2012-2013. *MMWR Morb Mortal Wkly Rep*. 2014;63(25):542-547.
31. Agaku IT, King BA, Dube SR. Current cigarette smoking among adults—United States, 2005-2012. *MMWR Morb Mortal Wkly Rep*. 2014;63(2):29-34.
32. Chaloupka FJ. Commentary on Ross et al. (2011). Beyond cigarette taxes—the need for research on other cigarette pricing policies. *Addiction*. 2011;106(3):620-621.
33. Feighery EC, Ribisl KM, Schleicher NC, Zellers L, Wellington N. How do minimum cigarette price laws affect cigarette prices at the retail level? *Tob Control*. 2005;14(2):80-85.
34. Tynan MA, Ribisl KM, Loomis BR. Impact of cigarette minimum price laws on the retail price of cigarettes in the USA. *Tob Control*. 2013;22(e1):e78-e85.