

# Do Cigarette Prices Vary by Brand, Neighborhood, and Store Characteristics?

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TRACI L. TOOMEY, PHD<sup>a</sup>  
VINCENT CHEN, PHD<sup>b</sup>  
JEAN L. FORSTER, PHD<sup>a</sup>  
PAM VAN COEVERING, MA<sup>a</sup>  
KATHLEEN M. LENK, MPH<sup>a</sup>

## SYNOPSIS

**Objective.** We assessed the price variability of cigarettes by brand, neighborhood characteristics (racial/ethnic and youth composition, number of schools, and number of stores), and store type.

**Methods.** Trained research staff purchased three different brands of cigarettes (premium, menthol, and discount—all produced by the same company) at 214 stores in one metropolitan area. We assessed associations between price and neighborhood/store characteristics through multivariate regression, using four price variables as dependent variables—the price of each brand of cigarettes and the mean price across the three brands.

**Results.** We found that the price of cigarettes varied by neighborhood and store characteristics, although this variability differed by brand. For the same brand, the maximum price was 1.7 to 1.8 times higher than the lowest price. We found a positive association between the percentage of a neighborhood that was nonwhite and the price of discount and premium cigarettes as well as the overall mean price of cigarettes, but not with the price of the menthol brand. We found a negative association between the percentage of youth in a neighborhood and the price of premium cigarettes as well as the mean price, but not with the price of the other two brands. In addition, we found a greater likelihood of higher discount brand prices at independent vs. chain-operated stores.

**Conclusions.** Our findings showed that cigarette prices do vary by brand, the youth and racial/ethnic composition in a neighborhood, and store type, suggesting that the tobacco industry might vary its marketing strategies based on brand as well as neighborhood and store characteristics.

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<sup>a</sup>University of Minnesota, Division of Epidemiology & Community Health, Minneapolis, MN

<sup>b</sup>University of Texas Health Science Center at Houston, Houston, TX

Address correspondence to: Traci L. Toomey, PhD, 1300 S. Second St., Ste. 300, University of Minnesota, Division of Epidemiology & Community Health, Minneapolis, MN 55454; tel. 612-626-9070; fax 612-624-0315; e-mail <toome001@umn.edu>.

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Many research studies have shown an inverse relationship between the price of cigarettes and the rates of smoking;<sup>1,2</sup> thus, a recommended approach to reducing smoking rates and related harms is to raise the price of cigarettes either through increasing excise taxes or through other means.<sup>3</sup> Conversely, a potentially effective strategy to increase rates of smoking could be for the tobacco industry to lower cigarette prices. More specifically, the tobacco industry could attempt to target specific segments of the population, such as youth or certain racial/ethnic groups, by lowering the price of cigarettes in neighborhoods and communities in which these populations live. Economic theory and empirical studies suggest that some of these groups are particularly price-sensitive.<sup>4-10</sup> Although lowering the price of cigarettes may seem to contradict the tobacco industry's goal of making a profit, by lowering prices within certain markets, the tobacco industry may ultimately increase their profits by enticing new smokers.

Previous studies have shown that industries will differentially market their products to specific subgroups. Altman et al. observed that before the 1998 ban on tobacco billboards, tobacco billboards were significantly more likely to appear in black and Latino neighborhoods than in neighborhoods that were predominantly white or Asian.<sup>11</sup> The types of products marketed and sold may also vary by neighborhood; for example, malt beverages are often marketed and more likely to be sold in African American communities and populations with lower socioeconomic status.<sup>11,12</sup>

We identified no published studies assessing differential pricing of tobacco products across neighborhoods, although one study assessed variability in the prices of alcohol products by community. Harwood et al. observed prices of two brands of regular beer across 160 communities. They found that beer prices did not vary by the proportion of youth or racial/ethnic groups in the neighborhood. However, they suggested that prices of other types of alcohol products (e.g., malt liquor) may be more likely to be lower in African American or Hispanic communities.<sup>13</sup> The price of the targeted beer products did vary by store characteristic, with the highest beer prices found in small stores and gas station/convenience stores.

Although tobacco product marketing is now regulated in many ways (e.g., banning of tobacco billboards and prohibition of tobacco ads on television), the tobacco industry has few restrictions on its pricing strategies. Recent evidence suggests that trade deals between tobacco producers and retailers have significantly increased, giving retailers more flexibility to reduce prices of specific brands at certain times and

potentially increasing the variability in tobacco prices across communities/neighborhoods and different types of stores.<sup>14</sup>

This study assessed the price variability of cigarettes by brand and geographic area, and examined associations between the price of cigarettes and the youth and racial/ethnic composition of these areas. We also assessed whether the prices of cigarette products varied by store type, and by the number of stores and schools in the neighborhood.

## METHODS

We collected data for this study in October 2002 as part of the Minnesota Adolescent Community Cohort (MACC) study, a seven-year study assessing tobacco use among a representative sample of adolescents and young adults located throughout Minnesota. We selected individuals in the MACC cohort through stratified random sampling within geopolitical units (GPUs). We first divided Minnesota into 129 GPUs according to the existing geographic and/or political boundaries, patterns of local tobacco program activities, and number of adolescents residing in an area. Then we selected 60 GPUs through stratified random sampling based on regions of the state and racial/ethnic distribution.

### Study sample

The sample frame was a census of three types of stores that sell tobacco (convenience stores, convenience/gas stations, and gas stations) within the 29 MACC GPUs located in the seven-county Minneapolis–St. Paul metropolitan area. We focused on these three types of stores because youth are more likely to buy tobacco from them than from other types of stores (e.g., grocery stores).<sup>15</sup> We identified 500 stores within the GPUs using the U.S. Standard Industrial Classification system. We randomly selected up to eight stores from each of the 29 GPUs. If a GPU contained fewer than eight of the specified stores, we included all of them in our study. The final sample consisted of 214 stores.

### Data collection and variables

When conceptualizing this study, we did not have clear evidence demonstrating whether valid price data for cigarettes could be obtained via a telephone survey of stores, or if in-store observations were required. Therefore, we conducted a pilot study whereby we collected cigarette price data at a subsample of stores through both in-store observations and a telephone survey, within 24 hours of one another. Although we preferred conducting a telephone survey because it

required fewer resources and allowed us to have a larger sample size, the results of the pilot study showed that the telephone survey method did not provide valid price data. Thus, we decided to use only in-store observations for our final data collection method.

At each store, trained research staff purchased a pack of three different brands of cigarettes (all brands produced by the same company): (1) a light premium brand (premium) that youth often buy, (2) a menthol brand (menthol) often smoked by minority racial/ethnic groups, and (3) a discount brand (discount).<sup>16</sup> Staff retained sales receipts and entered price information on data collection forms immediately following the purchase. Recorded price indicated the actual price paid for the cigarettes, including any taxes or discounts. All purchases were made within a 48-hour period to avoid any significant price variation that might occur during a longer time span (e.g., manufacturer specials). If one of the three brands was not available from a store, we marked that product as missing for that store (i.e., there was no product substitution).

We used four price variables as dependent variables in our analyses—the price of each brand of cigarettes and the mean price across the three brands. For our independent variables, we measured one store characteristic and four neighborhood characteristics. We characterized the stores as either independently operated or part of a chain. For the neighborhood characteristics, we defined the “neighborhood” of each store as the area within a one-mile radius, including every census block group that fell even partially within this radius. We measured the number of convenience stores and gas stations in the neighborhood and the

number of all schools (elementary, junior high, and high schools obtained from the Minnesota Department of Education) within the neighborhood. We also created two neighborhood variables from 2000 U.S. Census data: (1) percent nonwhite and (2) percent youth aged 12–18 years.<sup>17</sup>

### Analyses

We used multivariate regression models to assess the association between our independent and dependent variables. We conducted all analyses using the SAS<sup>®</sup> GENMOD procedure<sup>18</sup> to eliminate the possibility of inflated Type I error rates due to intra-class correlation of cigarette prices among tobacco stores located within the same GPU.

## RESULTS

The price of a single pack of cigarettes varied greatly across the Minneapolis–St. Paul metropolitan area, with the maximum price being 1.7 to 1.8 times higher than the lowest price for the same brand (Table 1). The mean price of a pack of discount cigarettes (\$2.93) was lower than the mean price of menthol and premium cigarettes (\$3.88 and \$3.50, respectively). The most expensive brand, menthol, had the smallest variability in price across neighborhoods. The standard deviations for the other two brands were identical and double the standard deviation for menthol cigarettes. Frequencies for independent variables are also shown in Table 1.

In our multivariate analyses (Table 2), the price of cigarettes varied by neighborhood and store characteristics, although this variability differed by cigarette

**Table 1. Cigarette brand prices and neighborhood/store characteristics in Minneapolis–St. Paul, Minnesota, 2002**

| Variable          | N   | Mean     | SD      | Minimum  | Maximum  |
|-------------------|-----|----------|---------|----------|----------|
| Cigarette price   |     |          |         |          |          |
| Discount brand    | 185 | \$2.9339 | 0.4480  | \$2.3000 | \$4.0800 |
| Menthol brand     | 207 | \$3.8814 | 0.2778  | \$2.7300 | \$4.5100 |
| Premium brand     | 213 | \$3.4955 | 0.4527  | \$2.5800 | \$4.6000 |
| Mean              | 214 | \$3.4860 | 0.3692  | \$2.7433 | \$4.6000 |
| Percent nonwhite  | 214 | 16.7041  | 18.3202 | 1.0967   | 79.5478  |
| Percent youth     | 214 | 11.0041  | 3.4564  | 2.9369   | 21.1299  |
| Number of schools | 214 | 0.7944   | 0.9809  | 0.0000   | 5.0000   |
| Number of stores  | 214 | 2.9065   | 1.5384  | 1.0000   | 8.0000   |
| Store type        |     |          |         |          |          |
| Chain A           |     | 0.1355   |         |          |          |
| Chain B           |     | 0.1449   |         |          |          |
| Chain C           |     | 0.0981   |         |          |          |
| Other chain       |     | 0.3879   |         |          |          |
| Independent       |     | 0.2336   |         |          |          |

SD = standard deviation

**Table 2. Associations between cigarette prices and neighborhood/store characteristics, Minneapolis–St. Paul, Minnesota, 2002**

| Variable                | Model                             |                                  |                                   |                                   |
|-------------------------|-----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
|                         | Discount<br>Coefficient (p-value) | Menthol<br>Coefficient (p-value) | Premium<br>Coefficient (p-value)  | Mean<br>Coefficient (p-value)     |
| Percent nonwhite        | 0.0030<br>(0.0185) <sup>a</sup>   | −0.0008<br>(0.4740)              | 0.0040<br>(0.0005) <sup>a</sup>   | 0.0021<br>(0.0464) <sup>a</sup>   |
| Percent youth           | −0.0087<br>(0.3905)               | −0.0074<br>(0.1850)              | −0.0168<br>(0.0256) <sup>a</sup>  | −0.0148<br>(0.0224) <sup>a</sup>  |
| Number of schools       | −0.0544<br>(0.0312) <sup>a</sup>  | 0.0215<br>(0.3021)               | −0.0214<br>(0.4384)               | −0.0142<br>(0.5575)               |
| Number of stores        | −0.0098<br>(0.6884)               | −0.0263<br>(0.0976)              | −0.0221<br>(0.2037)               | −0.0169<br>(0.3723)               |
| Store type <sup>b</sup> | (0.0181) <sup>a</sup>             | (0.0113) <sup>a</sup>            | (0.0004) <sup>a</sup>             | (0.0011) <sup>a</sup>             |
| Chain A                 | −0.0143<br>(0.9084)               | 0.1939<br>(0.0010) <sup>a</sup>  | 0.2853<br>(<0.0001) <sup>a</sup>  | 0.2774<br>(<0.0001) <sup>a</sup>  |
| Chain B                 | −0.3895<br>(<0.0001) <sup>a</sup> | 0.0430<br>(0.3634)               | −0.4851<br>(<0.0001) <sup>a</sup> | −0.2879<br>(<0.0001) <sup>a</sup> |
| Chain C                 | −0.4706<br>(<0.0001) <sup>a</sup> | −0.0809<br>(0.2151)              | −0.4726<br>(<0.0001) <sup>a</sup> | −0.3605<br>(<0.0001) <sup>a</sup> |
| Other chain             | −0.1843<br>0.0620                 | 0.1543<br>(0.0231) <sup>a</sup>  | 0.0341<br>(0.6330)                | 0.0316<br>(0.6227)                |

<sup>a</sup>Significant at  $p < 0.05$

<sup>b</sup>Independent was used as the reference.

brand. We found a positive association between the percentage of a neighborhood that was nonwhite and the price of discount and premium cigarettes as well as the overall mean price of cigarettes, but not with the price of menthol cigarettes. We found that an increase in the percentage of a neighborhood's nonwhite population had a 1.3 times greater price effect for premium cigarettes than for discount cigarettes. We also discovered a negative association between the percentage of youth in a neighborhood and the price of premium cigarettes as well as the mean price of cigarettes, but not with the price of the other two brands. However, the coefficients for all dependent variables were in the same direction, with a larger youth population associated with lower cigarette prices. The number of schools also had an inverse association with price, but for the discount brand only.

An insignificant association existed between the number of stores in a neighborhood and any of the price-dependent variables. We found consistently lower prices for the discount brand at chain-operated vs. independent stores. One major chain consistently sold cigarettes at a lower price than any other store (with the exception of premium cigarettes being one cent higher than other stores on one occasion).

## DISCUSSION

We found that the price of cigarettes did vary by neighborhood and store characteristics, but the degree of that variability varied by cigarette brand. This finding suggests that marketing and branding strategies may vary by product. The most expensive brand of cigarettes, menthol, had the least amount of variability across the neighborhoods. Variability in the price of both of the other two brands was twice that of menthol.

We found significantly higher prices of cigarettes in neighborhoods that had a higher percentage of nonwhite people; however, we observed this relationship only for the two less expensive brands. This finding suggests that, at least for these three cigarette brands, the tobacco company did not appear to be targeting communities with higher percentages of nonwhite people in terms of lower pricing strategies. One possible explanation for this finding is that if certain minority groups are already smoking, there may be less need to target these populations through price reductions. People who live in minority neighborhoods may not be as mobile as those in other neighborhoods, and thus may be more likely to purchase cigarettes or other products at neighborhood stores despite higher prices. This finding is consistent with other studies showing that

food prices are higher in minority neighborhoods.<sup>19,20</sup> A limitation of our study, however, was that we did not have enough variability across neighborhoods in terms of specific types of minority racial/ethnic groups. It is possible that pricing strategies may be more targeted to certain types of populations of racial/ethnic groups than others (e.g., African American vs. Latino populations), particularly given some studies finding that certain minority racial/ethnic groups are more price-sensitive than others.<sup>21</sup>

We found a greater likelihood of lower-priced cigarettes in neighborhoods with larger numbers of youth—this was particularly true for premium cigarettes. Furthermore, neighborhoods with more schools had lower prices for the discount brand. These findings suggest that at least some cigarette brands may be priced to appeal to youth. Previous studies have shown that youth are price-sensitive, with youth more likely to buy cigarettes when they are cheaper.<sup>1,4,5,10,22</sup> Premium cigarettes are a brand that is already used by youth,<sup>16</sup> and it is possible that pricing has been one of the marketing strategies used for this brand to entice new smokers. It is also possible that discount brands are being priced to appeal to youth.

Interestingly, we found no association between the number of convenience stores/gas stations located in a neighborhood and the prices of cigarettes. This finding suggests that the price of cigarettes may not be influenced by competition from other businesses. However, it is possible that the tobacco outlets in these neighborhoods were not as dense as may be found in other cities.

Chain stores sold discount cigarettes more cheaply than independently operated stores. It is possible that tobacco companies are more likely to offer price specials to chain stores than to independent stores because the companies can negotiate with one corporate office to reach many stores, requiring fewer resources and allowing changes in marketing practices across a large number of stores more quickly.

### Limitations

This study had several limitations. First, we conducted the study only in the Minneapolis–St. Paul metropolitan area, so the results may not be generalizable to other areas. A common criticism of studies conducted in Minnesota is the state's lack of ethnic diversity; however, we conducted this study within the 29 GPUs located in the seven-county Minneapolis–St. Paul metropolitan area, where the mean percentage of nonwhite people per neighborhood in 2000 was 16.7%, ranging from 1.1% to 79.5% across the 214 neighborhoods (as of the 2000 U.S. Census, approximately 24.9% of the U.S. popula-

tion was nonwhite).<sup>17</sup> Second, we instructed our buyers to purchase only single packs of cigarettes; however, prices on multipacks might have produced a lower per-pack price that is not reflected in our study.

Third, we did not collect tobacco price data from other tobacco businesses such as grocery stores and tobacco shops; rather, we focused on the type of businesses where youth are most likely to buy cigarettes (e.g., convenience stores and gas stations).<sup>15</sup> Finally, given previous studies showing specific marketing practices targeting Hispanic and African American communities, we focused our analyses on whether cigarette prices were lower in communities with higher percentages of nonwhite individuals. However, we recommend that future studies examine relationships between price and other area or neighborhood characteristics, such as socioeconomic indicators, and local and state policies. Analyses of the effects of these factors were beyond the scope of this ancillary study.

### CONCLUSIONS

This study contributes substantially to the tobacco prevention field. This is the first published study of which we are aware that explicitly assessed the variability of cigarette prices as determined by actual purchases, and whether cigarette price variability was associated with tobacco brand, store characteristics, and composition of local areas including youth and racial/ethnic makeup. Our findings showed cigarette price variations by brand, type of store, and the youth and racial/ethnic composition of a neighborhood, suggesting that the tobacco industry may vary its marketing strategies based on brand as well as neighborhood and store characteristics. These findings can be useful for community tobacco prevention advocates as well as tobacco prevention researchers.

### REFERENCES

1. Liang L, Chaloupka F, Nichter M, Clayton R. Prices, policies and youth smoking, May 2001. *Addiction* 2003;98 Suppl 1:105-22.
2. Chaloupka FJ, Warner KE. The economics of smoking. In: Culyer AJ, Newhouse JP, editors. *Handbook of health economics*. Amsterdam: North Holland; 2000. p. 1539-627.
3. Department of Health and Human Services (US). *Reducing tobacco use: a report of the Surgeon General*. Atlanta: DHHS, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health (US); 2000.
4. Chaloupka FJ, Grossman M. *Price, tobacco control policies, and youth smoking*. Cambridge (MA): National Bureau of Economic Research; September 1996. NBER Working Paper No. 5740.
5. Ding A. Youth are more sensitive to price changes in cigarettes than adults. *Yale J Biol Med* 2003;76:115-24.
6. Emery S, Ake CF, Navarro AM, Kaplan RM. Simulated effect of tobacco tax variation on Latino health in California. *Am J Prev Med* 2001;21:278-83.

7. Hoch SJ, Kim BD, Montgomery AJ, Rossi PE. Determinants of store-level price elasticity. *J Marketing Research* 1995;32:17-29.
8. Hyland A, Bauer JE, Li Q, Abrams SM, Higbee C, Peppone L, et al. Higher cigarette prices influence cigarette purchase patterns. *Tob Control* 2005;14:86-92.
9. Mulhern FJ, Williams JD, Leone RP. Variability of brand elasticities across retail stores: ethnic, income, and brand determinants. *J Retailing* 1998;74:427-46.
10. Ross H, Chaloupka FJ. The effect of cigarette prices on youth smoking. *Health Econ* 2003;12:217-30.
11. Altman DG, Schooler C, Basil MD. Alcohol and cigarette advertising on billboards. *Health Educ Res* 1991;6:487-90.
12. Bradizza CA, Collins RL, Vincent PC, Falco DL. It does the job: young adults discuss their malt liquor consumption. *Addict Behav* 2006;31:1559-77.
13. Harwood EM, Erickson DJ, Fabian LEA, Jones-Webb R, Slater S, Chaloupka FJ. Effects of communities, neighborhoods and stores on retail pricing and promotion of beer. *J Stud Alcohol* 2003;64:720-6.
14. Bloom PN. Role of slotting fees and trade promotions in shaping how tobacco is marketed in retail stores. *Tob Control* 2001;10:340-4.
15. Youth tobacco surveillance—United States, 2000. *MMWR Surveill Summ* 2001;50(SS-4):1-84.
16. Office of Applied Studies, Department of Health and Human Services (US). 2001 National Household Survey on Drug Abuse: volume I: summary of national findings—prevalence & correlates of alcohol, tobacco, and illegal drug use. Rockville (MD): Substance Abuse and Mental Health Services Administration (US); 2002. DHHS Publication No. SMA 02-3758, NHSDA Series H-17.
17. SAS Institute, Inc. SAS<sup>®</sup>/STAT 9.1: user's guide 1–7. Cary (NC): SAS Institute, Inc.; 2004.
18. Census Bureau (US). 2000 Census data 2007 [cited 2009 Mar 6]. Available from: URL: [http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en)
19. Chung C, Myers SL Jr. Do the poor pay more for food? An analysis of grocery store availability and food price disparities. *J Consumer Affairs* 1999;33:276-96.
20. Morland K, Wing S, Diez Roux A, Poole C. Neighborhood characteristics associated with the location of food stores and food service places. *Am J Prev Med* 2002;22:23-9.
21. Tauras JA. Differential impact of state tobacco control policies among race and ethnic groups. *Addiction* 2007;102(Suppl 2):95-103.
22. Carpenter C, Cook PJ. Cigarette taxes and youth smoking: new evidence from national, state, and local Youth Risk Behavior Surveys. *J Health Econ* 2008;27:287-99.