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

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SYNOPSIS

Objective—Our objective was to assess price variability of cigarettes by brand, neighborhood characteristics (ethnic and youth composition, number of schools, number of stores) and store type.

Method—Trained research staff purchased three different brands of cigarettes (Premium, Menthol and Discount—all produced by the same company) across 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 average price across the three brands.

Results—We found that price of cigarettes varied by neighborhood and store characteristics, although this variability differed by brand. For the same brand, the maximum price was 1.7–1.8 times greater than the lowest price. We found that percentage of a neighborhood that is non-white was positively associated with price of Discount and Premium cigarettes and the overall average price of cigarettes, but not with price of the Menthol brand. Percentage of youth in a neighborhood was negatively associated with the price of Premium cigarettes and the average price but not with the price of the other two brands. In addition, price of the Discount brand was more likely to be higher at independent versus chain-operated stores.

Conclusions—Our findings show that cigarette price does vary by brand, the youth/ethnic composition in a neighborhood, and store type, suggesting that the tobacco industry may vary their marketing strategies based on brand as well as by neighborhood and store characteristics.

INTRODUCTION

Many research studies have shown an inverse relationship between the price of cigarettes and rates of smoking;[1–2] 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.[3] Conversely, a potentially effective strategy for the tobacco industry to increase rates of smoking could be to lower cigarettes prices. More specifically, the tobacco industry could attempt to target specific segments of the population, such as youth or certain 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.[4–10] Although lowering the price of cigarettes may seem to contradict the tobacco industry's goal of making a profit, by lowering prices within certain

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markets, the tobacco industry may ultimately increase their profits by enticing and addicting new smokers.

Previous studies have shown that industries will differentially market their products to specific subgroups. Altman and associates 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.[11] Types of product marketed and sold may also vary by neighborhood; for example, malt beverages are often marketed and more likely to be sold in communities of color and lower socioeconomic status.[11–12]

We identified no published studies assessing differential pricing of tobacco products across neighborhoods, although one study assessed variability in prices of *alcohol* products by community. Harwood and associates 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 ethnic/racial groups in the neighborhood; however, prices of other types of alcohol products (e.g., malt liquor) were more likely to be lower in communities of color.[13] The price of the targeted beer products did vary by store characteristics, with highest beer prices found in small stores and gas station/convenience stores.

Although marketing of tobacco products is now regulated in many ways (e.g., banning of tobacco billboards, prohibition of tobacco advertising 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.[14]

The primary goals of this study were to assess price variability of cigarettes by brand and geographic areas, and determine whether price of cigarettes was associated with the youth and race/ethnicity composition of these areas. We also assessed whether prices of cigarette products varied by store type, and by the number of stores and schools in the neighborhood.

METHODS

Data for this study were collected in October 2002 as part of the Minnesota Adolescent Community Cohort (MACC) study, a 7-year study assessing tobacco use among a representative sample of adolescents and young adults located throughout Minnesota. Individuals in the MACC cohort were selected through stratified random sampling within geo-political units (GPUs). Minnesota was first divided into 129 GPUs according to the existing geographic and/or political boundaries, patterns of local tobacco program activities, and number of adolescent residing in an area. Sixty GPUs were then selected through stratified random sampling based on regions of the state and race/ethnicity distribution.

Study Sample

The sample frame was a census of three types of stores that sell tobacco (convenience stores, convenience/gas stations, 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 other types of stores such as grocery stores.[15] Five hundred stores were identified within the GPUs using the U.S. Standard Industrial Classification. 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 about whether valid price data for cigarettes could be obtained via a telephone survey of stores, or if in-store observations were required. Hence, we conducted a pilot study where we collected cigarette price data at a sub-sample of stores through both in-store observations and a telephone survey, within 24 hours of one another. Although we preferred to conduct a telephone survey because it would require fewer resources and allow 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 and thus we decided to use only in-store observations as our final data collection method.

At each store, trained research staff purchased a pack of three different brands of cigarettes (all brands are produced by the same company): (1) a light premium brand (Premium) that youth often buy, (2) a menthol brand (Menthol) often smoked by minorities/ethnic groups, and (3) a discount brand (Discount).[16] Staff retained sales receipts and entered price information on data collection forms immediately following the purchase. Recorded price was 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, that product was marked 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 average price across the three brands. For our independent variables, we measured one store characteristic and four neighborhood characteristics. The store characteristic was whether the store was independently operated versus 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 U.S. 2000 Census data: (1) percent non-white, and (2) percent youth aged 12 to 18.

Analyses

We used multivariate regression models to assess the association between our independent and dependent variables. We conducted all analyses using the SAS GENMOD procedure to eliminate the possibility of inflated Type I error rates due to intraclass 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 1.7–1.8 times greater than the lowest price for the same brand (Table 1). The average price of a pack of Discount cigarettes ($2.93) was lower than the average price of Menthol and Premium cigarettes ($3.88 and $3.50, respectively). Variability in price across neighborhoods was smallest for the most expensive brand, Menthol. 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), price of cigarettes varied by neighborhood and store characteristics, although this variability differed by brand of cigarettes. We found that percentage of a neighborhood that is non-white was positively associated with price of Discount

and Premium cigarettes and the overall average price of cigarettes, but not with price of Menthol cigarettes. An increase in the percent of a neighborhood's non-white population would have a 1.3 times larger price effect for Premium cigarettes than Discount cigarettes. Percentage of youth in a neighborhood was negatively associated with the price of Premium cigarettes and the average price of cigarettes but not with 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. Number of schools was also inversely associated with price, but for the Discount brand only.

Number of stores in a neighborhood was not significantly associated with any of the price dependent variables. For the Discount brand, prices were consistently lower at chain-operated stores than 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 brand of cigarettes. This 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 price of both of the other two brands was twice that of Menthol.

Prices of cigarettes were significantly higher in neighborhoods that had a higher percentage of nonwhites; however, this relationship was observed only for the two less expensive brands. This suggests that, at least for these three brands of cigarettes, the tobacco company did not appear to be targeting communities of color in terms of lower pricing strategies. A possible explanation for this finding is 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 is consistent with other studies showing that food prices are higher in minority neighborhoods.[17–18] A limitation of our study, however, is that we did not have enough variability across neighborhoods in terms of specific types of minority ethnic groups. It is possible that pricing strategies may be more targeted to certain types of populations of ethnic groups than others (e.g., African Americans vs. Latinos), particularly given some studies finding that certain minority ethnic groups are more price sensitive than others.[19]

Neighborhoods with larger number of youth were more likely to have lower priced cigarettes —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 brands of cigarettes may be priced to make them more appealing to youth. Previous studies have shown that youth are price sensitive, with youth more likely to use cigarettes when they are cheaper.[1, 4–5, 10, 20] Premium cigarettes are a brand that is already used by youth,[16] 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 the Discount brand is being priced to appeal to youth.

Interestingly, the number of convenience stores/gas stations located in a neighborhood was not associated with prices of cigarettes. This suggests that 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.

Discount cigarettes were cheaper in stores that were part of chains compared to those independently operated. It is possible that tobacco companies are more likely to offer price

specials to chain stores than 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.

This study has several limitations. First, the study was conducted only in the Minneapolis-St. Paul metropolitan area and may not be generalizable to other areas. A common criticism of studies conducted in Minnesota is the lack of ethnic diversity of the state; however, we conducted this study within the 29 GPUs located in the seven-county Minneapolis-St. Paul metropolitan area, where the average percentage of non-whites per neighborhood in 2000 was 16.7%, ranging from 1.1% to 79.5% across the 214 neighborhoods (as of the 2000 census, approximately 25% of the U.S. population was non-white). Second, our buyers were instructed to purchase only single packs of cigarettes however prices on multi-packs might produce 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—we focused on the type of businesses where youth are most likely to buy cigarettes (i.e., convenience stores, gas stations).[15] Finally, given previous studies showing specific marketing practices targeting communities of color, we focused our analyses on whether cigarette prices were lower in communities with higher percentages of non-whites; however, we recommend 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.

Despite these limitations, this study contributes substantially to the tobacco prevention field. This is the first published study that we are aware of that has explicitly assessed variability of cigarette prices as determined by actual purchases, and assessed whether variability of cigarette price is associated with tobacco brand, store characteristics, and composition of local areas including youth and race/ethnicity makeup. Our findings show that cigarette price does vary by brand, type of store, and by the youth/ethnic composition in a neighborhood, suggesting that the tobacco industry may vary their marketing strategies based on brand as well as by neighborhood and store characteristics. These findings can be useful for community tobacco prevention advocates as well as tobacco prevention researchers.

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Table 1

Descriptive statistics of variables

VARIABLE	N	Mean	Std Dev	Min	Max
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
Average	214	3.4860	0.3692	2.7433	4.6000
Percent non-white	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	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			

Table 2

Coefficients of variables for four multivariate models: Discount, Menthol, Premium, Average

	Model			
Variables	**Discount**	**Menthol**	**Premium**	**Average**
Percent non-white	**0.0030**	−0.0008	**0.0040**	**0.0021**
	(0.0185)	(0.4740)	(0.0005)	(0.0464)
Percent youth	−0.0087	−0.0074	**−0.0168**	**−0.0148**
	(0.3905)	(0.1850)	(0.0256)	(0.0224)
Number of schools	**−0.0544**	0.0215	−0.0214	−0.0142
	(0.0312)	(0.3021)	(0.4384)	(0.5575)
Number of stores	−0.0098	−0.0263	−0.0221	−0.0169
	(0.6884)	(0.0976)	(0.2037)	(0.3723)
Store type[1]	**(0.0181)**	**(0.0113)**	**(0.0004)**	**(0.0011)**
Chain A	−0.0143	**0.1939**	**0.2853**	**0.2774**
	(0.9084)	(0.0010)	(<.0001)	(<.0001)
Chain B	**−0.3895**	0.0430	**−0.4851**	**−0.2879**
	(<.0001)	(0.3634)	(<.0001)	(<.0001)
Chain C	**−0.4706**	−0.0809	**−0.4726**	**−0.3605**
	(<.0001)	(0.2151)	(<.0001)	(<.0001)
Other Chain	−0.1843	**0.1543**	0.0341	0.0316
	0.0620	(0.0231)	(0.6330)	(0.6227)

Note: Values bolded are significant ($p < .05$); p-values (from Type 3 analysis) are reported n parentheses

[1] Independent is used as the reference