Prices for Tobacco and Nontobacco Products in Pharmacies Versus Other Stores: Results From Retail Marketing Surveillance in California and in the United States

Lisa Henriksen, PhD, Nina C. Schleicher, PhD, Dianne C. Barker, MHS, Yawen Liu, PhD, and Frank J. Chaloupka, PhD

Objectives. To examine disparities in the price of tobacco and nontobacco products in pharmacies compared with other types of stores.

Methods. We recorded the prices of Marlboro, Newport, the cheapest cigarettes, and bottled water in a random sample of licensed tobacco retailers (n = 579) in California in 2014. We collected comparable data from retailers (n = 2603) in school enrollment zones for representative samples of US 8th, 10th, and 12th graders in 2012. Ordinary least squares regressions modeled pretax prices as a function of store type and neighborhood demographics.

Results. In both studies, the cheapest cigarettes cost significantly less in pharmacies than other stores; the average estimated difference was $0.47 to $1.19 less in California. We observed similar patterns for premium-brand cigarettes. Conversely, bottled water cost significantly more in pharmacies than elsewhere. Newport cost less in areas with higher proportions of African Americans; other cigarette prices were related to neighborhood income and age. Neighborhood demographics were not related to water prices.

Conclusions. Compared with other stores, pharmacies charged customers less for cigarettes and more for bottled water. State and local policies to promote tobacco-free pharmacies would eliminate an important source of discounted cigarettes. (*Am J Public Health.* 2016;106:1858–1864. doi:10.2105/AJPH.2016.303306)

Tobacco-free pharmacies are recommended by more than 2 dozen state attorneys general, many state pharmacy boards, and tobacco control advocacy organizations.[1,2] In spite of this, public opinion polls do not reveal uniformly strong public support for this policy. For example, the percentage of respondents who somewhat or strongly favor a ban on the sale of all tobacco products in pharmacies was 31% among US adults[3] and 49% among adults in New York.[4] Although public support for tobacco-free pharmacies increases after policy implementation,[5] only 3 states (California, Massachusetts, and Minnesota) have such local ordinances, and efforts at the state level (e.g., Illinois, Massachusetts, New Hampshire, New York, Rhode Island,

Tennessee, West Virginia) have not yet succeeded. Pharmacies still constitute approximately 7% of the 380 000 tobacco retailers in the United States.[6] Thus, new evidence about the paradox of promoting health care and tobacco products in the same retail space is needed to inform policy change.

This study focuses on the price of cigarettes in pharmacies relative to other store types because price is such an important determinant of tobacco use.[7,8] Higher prices reduce the number of youths who start smoking as well as the prevalence and intensity of smoking among youths and adults.[9,10] In addition, higher prices lead more smokers to make quit attempts and to remain abstinent.[9]

In pharmacies that choose to sell tobacco, higher prices for cigarettes would be more consistent with a goal of promoting public health. However, some data suggest that prices might be lower in pharmacies. For example, whereas overall sales of cigarettes declined from 2005 to 2009, sales in pharmacies increased over the same time period.[11] A plausible explanation for increasing sales during this period is that pharmacies sold cigarettes at lower prices and offered more promotional discounts. Lower prices may also explain why sales data from a national chain pharmacy found that 1 in 20 customers with chronic illnesses that are exacerbated by smoking also purchased cigarettes when they filled prescriptions.[12]

Previous studies documented lower cigarette prices in pharmacies, but only compared with 1 reference category of stores. For example, in 50 midsize California cities, premium-brand cigarettes cost less in pharmacies than in small markets.[13] In Washington, DC, the advertised price for Newport (menthol) and the cheapest cigarettes was less in

pharmacies than in convenience stores.[14] In St. Louis, Missouri, the cheapest pack of cigarettes cost less in pharmacies than in supermarkets.[15] No previous study has examined how prices in pharmacies compare with prices in all other types of stores that sell cigarettes, or has reported such comparisons from samples representing a geographic area larger than cities. We addressed important gaps in the literature by (1) comparing cigarette prices in pharmacies with those in all other types of tobacco retailers, (2) including data for premium brands and the cheapest pack, (3) featuring the price of a nontobacco product for comparison, and (4) reporting data from 2 representative samples of tobacco retailers, 1 in California and 1 selected from school enrollment zones across the United States.

In addition, the current research is among the first to examine variation in cigarette prices as a function of neighborhood demography in a representative sample of US tobacco retailers. One previous study examined the price of Marlboro (nonmenthol) and Newport (menthol) in a representative sample of US tobacco retailers from 97 counties in 40 states.[16] Newport cost less at stores in neighborhoods (i.e., census tracts) with a higher proportion of African Americans, a pattern that has been reported in other studies.[14,17] However, no other differences in cigarette prices by race/ethnicity or income were significant. Building on a growing literature about neighborhood disparities in retail tobacco marketing,[18] the current research is the first to compare neighborhood correlates of cigarette prices with a nontobacco product. It also examines whether cigarette prices are lower in neighborhoods with a higher proportion of youths because this population is so price sensitive.[10]

METHODS

We report data from 2 studies in which trained auditors used different instruments to collect comparable data about the price and promotion of tobacco and nontobacco products.

Study Samples

We obtained data from California (Study 1) from the routine retail marketing surveillance conducted in licensed tobacco retailers for the state's tobacco control program every 3 years.[19] In 2014, the sample (n = 579) included 454 stores that were visited in 2011 and replacement stores that were randomly selected from the state's most recent tobacco retailer licensing list. Telephone verification confirmed that eligible stores sold cigarettes.

Data from the Bridging the Gap–Community Obesity Measures study (Study 2) provided a national sample of tobacco retailers located in 160 US communities representing school enrollment zones for nationally representative samples of 8th-, 10th-, and 12th-grade public school students in the continental United States in 2012.[20,21] The selection of tobacco retailers in Study 2 is described in detail elsewhere.[22] In brief, likely tobacco retailers were identified from address lists purchased from InfoUSA and Dun & Bradstreet, telephone verified, randomly selected from these business lists, and then supplemented with retailers identified in the field.

Data Collection Procedures

In Study 1, trained auditors used iPads to record observations about retail marketing in a random sample of licensed tobacco retailers in the state (n = 579; completion rate = 94.9%) between August and September 2014. Reasons for incomplete audits (n = 33) were refusals, closures, and other. Repeat visits by different auditors were conducted in a random subset of 44 stores within 12 days after the initial visit to assess interrater reliability.

In Study 2, trained auditors worked in pairs to attempt audits in 2492 food stores that sold tobacco and also in 196 tobacco stores between May and July 2012. Auditors used a paper-and-pencil instrument to obtain tobacco data in 2603 stores in 160 communities located across 38 states (completion rate = 96.8%). The average number of stores per state was 68.5. Of the 85 incomplete audits, 63 were due to ineligible businesses (permanently closed, did not exist, outside community boundaries, misclassified as an eligible store type). The remaining incomplete audits resulted from businesses being temporarily inaccessible or located in unsafe areas and from refusals.

Measures

Price of cigarettes. Following a protocol developed in previous studies,[17,19,23] auditors in both studies recorded the single-pack price for the most popular premium nonmenthol brand (Marlboro Red) and menthol brand (Newport) as well as the cheapest pack of cigarettes regardless of brand. Study 1 also collected price data for a value brand (Pall Mall Red), whereas Study 2 collected price data for Camel (data not shown). Auditors indicated whether the sales tax was included. If price was not advertised, auditors were instructed to ask a sales clerk.

Price of nontobacco products. Auditors collected prices for bottled water to make comparisons between cigarettes and a healthy product that is widely available in many different types of stores. In both studies, auditors recorded the price of a 20-ounce bottle of Aquafina and indicated whether sales tax was included. In Study 2, auditors also recorded the price of a second brand, Dasani, as well as the price and size of larger or smaller containers if 20-ounce bottles were not available. We selected the 2 brands by examining the market leaders from Nielsen Homescan data, which were assumed to be the most widely available in stores.

Store type. In both studies, auditors selected from among multiple categories that were defined similarly: convenience stores with and without gasoline, gas only (kiosks), liquor stores, pharmacies, supermarkets, smaller grocery stores, tobacco shops, and other stores selling tobacco. The pharmacy category did not include supermarkets or big-box stores with a pharmacy counter. In Study 1, we combined gas only (n = 7) and tobacco stores (n = 8) with other establishments (n = 11) because of small sample sizes. In Study 2, the primary focus was on food retailers; therefore, we excluded from the study gas stations that did not sell foods. The category of "other" stores (n = 74) included discount department stores, newsstands, and general merchandise stores.

Neighborhood demographics. Both studies assessed the same set of covariates but used different definitions of store neighborhoods. In Study 1, neighborhoods were defined by a ½-mile roadway network service area around each store.[24] We obtained census tract data on race (% African American, % Asian/Pacific

Islander, % other), ethnicity (% Hispanic), age (% school-aged youths aged 5–17 years and % young adults aged 18–24 years), median household income, and population density from intercensal estimates (GeoLytics Inc, East Brunswick, NJ) and weighted them in proportion to tract area. In Study 2, we defined store neighborhoods by aggregated census block groups, and we derived the same covariates from the American Community Survey 5-year estimates for 2007 through 2011. In Study 2, the variables for age were percentage of youths (younger than 18 years) and young adults (aged 18–24 years).

Analyses

We computed intraclass correlation coefficients (ICCs) to assess concordance between measures of the same prices by different data collectors in the same stores. In Study 1, ICCs for cigarette prices were 0.49 for Newport, 0.88 for Marlboro, and 0.94 for the cheapest pack; the ICC for bottled water price was 0.82. In Study 2, ICCs ranged from 0.97 to 1.0 for cigarettes, and the ICC for bottled water was 0.75.

For all analyses, we converted prices for cigarettes and bottled water to the price before sales tax. In Study 2, we subtracted the state excise tax on cigarettes from cigarette prices to eliminate state tax variability as an explanation for neighborhood variation in advertised prices. In both studies, ordinary least squares regression models examined price as a function of store type, treating pharmacies as the reference category. Because of the complex sampling design and the need to account for the probability of selection of the school enrollment zone and the store, Study 2 applied appropriate cluster, stratum, and weight variables. All models adjusted for neighborhood demographics, defined in Study 1 as a store-centered buffer (½-mile roadway service area around each store) and defined in Study 2 by aggregated census block groups. We standardized all census-derived demographic variables across the entire sample for each study. We performed all analyses with IBM SPSS Statistics version 22 (IBM Corporation, Armonk, NY) in Study 1 and with Stata/SE version 13.3 (StataCorp LP, College Station, TX) in Study 2.

RESULTS

Table 1 summarizes descriptive statistics for store type and neighborhood covariates as well as average prices for California (Study 1) and for the United States (Study 2). Pharmacies constituted 7.3% of tobacco retailers in Study 1 and 8.5% in Study 2. Newport was the more expensive of the cigarette brands in both the California and US sample (Table 1).

Price Differences by Store Type

Table 2 summarizes multivariate models for each price as a function of store type and adjusted for neighborhood demography in California. Compared with the price of Marlboro in pharmacies, the price in convenience stores, liquor stores, small grocery stores, and supermarkets was significantly higher, with average estimated differences ranging from $0.32 in convenience stores to $1.12 in supermarkets. Compared with the price in pharmacies, the price for Newport was significantly higher in liquor stores and supermarkets, but prices in small grocery stores and convenience stores did not differ from those in pharmacies for this brand. The cheapest pack of cigarettes cost significantly more in all store types compared with pharmacies, with average estimated differences ranging from $0.47 in liquor stores to $1.19 in supermarkets.

We observed the opposite pattern for bottled water: Aquafina cost significantly less in all other store types than in pharmacies, with average estimated differences ranging from $0.13 less in supermarkets to $0.39 less in small grocery stores.

TABLE 1—Descriptive Statistics for Store Type Composition, Neighborhood Demographics, and Price From Tobacco Retailers in California (2014) and the United States (2012)

Variable	Study 1: California, 2014 (n = 579)	Study 2: United States, 2012 (n = 2 603)
Store type composition, %		
Pharmacy	7.3	8.5
Convenience store	51.1	57.8
Liquor store	14.9	10.1
Small grocery store	10.4	5.1
Supermarket	11.9	10.7
Tobacco store	NA	4.9
Other	4.5	2.8
Neighborhood demographics		
African American, mean % (SD)	5.7 (8.9)	11.8 (17.6)
Asian/Pacific Islander, mean % (SD)	11.4 (13.3)	6.0 (8.0)
Multiple or other race(s), mean % (SD)	18.6 (12.0)	8.5 (10.8)
Hispanic, mean % (SD)	38.3 (25.2)	15.5 (18.9)
Young adults (aged 18–24 y), mean % (SD)	10.4 (4.7)	9.9 (5.0)
Youths (aged 5–17 y for Study 1, birth–17 for Study 2), mean % (SD)	17.5 (5.3)	23.6 (4.8)
Household income, Median $ (SD)	60 545 (23 469)	58 985 (21 901)
Population/sq mi, mean % (SD)	7 592 (8 562)	3 332 (5 412)
Cigarette prices, mean $ (SD)		
Marlboro Red (nonmenthol)	5.82 (0.75)	4.59 (0.73)
Newport (menthol)	6.22 (0.88)	4.89 (0.79)
Cheapest pack regardless of brand	4.27 (0.96)	3.18 (0.85)
Nontobacco prices, mean $ (SD)		
Aquafina water (20 oz)	1.42 (0.27)	1.38 (0.28)
Dasani water (20 oz)	NA	1.35 (0.28)

Note. NA = not available. Neighborhood demographics are an attribute of store-centered buffers in Study 1 and aggregated census block groups in Study 2.

TABLE 2—Difference in Pretax Price (in US Dollars) for Tobacco and Nontobacco Products, by Store Type and Neighborhood Demographics: Licensed Tobacco Retailers in California, 2014

	Cigarettes			Water: Aquafina (n = 256), Coef[a] (95% CI)
Variable	Marlboro (n = 511), Coef[a] (95% CI)	Newport (n = 420), Coef[a] (95% CI)	Cheapest Pack (n = 464), Coef[a] (95% CI)	
Intercept	5.39 (5.18, 5.61)	5.80 (5.52, 6.07)	3.61 (3.32, 3.89)	1.67 (1.58, 1.76)
Store type				
Pharmacy (Ref)	1	1	1	1
Convenience store	0.32 (0.09, 0.54)	0.26 (−0.04, 0.55)	0.67 (0.36, 0.98)	−0.31 (−0.41, −0.21)
Liquor store	0.37 (0.11, 0.64)	0.47 (0.14, 0.80)	0.47 (0.11, 0.83)	−0.35 (−0.49, −0.22)
Small grocery store	0.48 (0.20, 0.77)	0.31 (−0.05, 0.67)	0.70 (0.31, 1.08)	−0.39 (−0.53, −0.24)
Supermarket	1.12 (0.86, 1.39)	1.44 (1.10, 1.77)	1.19 (0.83, 1.56)	−0.13 (−0.26, −0.01)
Tobacco store	NA	NA	NA	NA
Other	0.27 (−0.10, 0.64)	−0.03 (−0.50, 0.45)	0.77 (0.28, 1.25)	−0.32 (−0.62, -0.02)
Neighborhood demographics				
Race, %				
African American	−0.05 (−0.12, 0.02)	−0.08 (−0.15, −0.01)	−0.05 (−0.14, 0.04)	0.01 (−0.04, 0.05)
Asian/Pacific Islander	−0.05 (−0.12, 0.02)	−0.13 (−0.22, −0.05)	−0.07 (−0.16, 0.02)	0.02 (−0.02, 0.06)
Multiple or other race(s)	−0.05 (−0.15, 0.05)	0.02 (−0.10, 0.15)	−0.01 (−0.15, 0.14)	−0.01 (−0.06, 0.05)
Hispanic, %	0.01 (−0.11, 0.13)	−0.06 (−0.21, 0.09)	0.11 (−0.05, 0.28)	0.00 (−0.07, 0.06)
Age, y, %				
5–17	−0.13 (−0.22, −0.04)	−0.08 (−0.19, 0.02)	−0.24 (−0.36, −0.12)	−0.02 (−0.07, 0.03)
18–24	−0.08 (−0.14, −0.02)	−0.05 (−0.13, 0.02)	−0.07 (−0.15, 0.02)	−0.01 (−0.05, 0.03)
Median household income	0.02 (−0.05, 0.09)	0.06 (−0.03, 0.15)	0.11 (0.01, 0.21)	−0.03 (−0.07, 0.01)
Population density	0.05 (−0.02, 0.13)	0.06 (−0.03, 0.14)	0.12 (0.02, 0.22)	−0.03 (−0.09, 0.02)
R^2	0.217	0.291	0.1642	0.193

Note. Coef = coefficient; CI = confidence interval; NA = not available.
[a]Coefficients from ordinary least squares regression with a CI that includes 0.00 are not statistically significant ($P < .05$). Neighborhood demographics are standardized; for example, Newport menthol pack cost $0.08 less with each standard deviation (8.9-percentage-point) increase in the percentage of African Americans. Pretax prices exclude sales tax.

Results from the US sample revealed similar discrepancies in the relative prices of cigarettes and bottled water in pharmacies compared with other stores (Table 3). Pharmacies charged less for Marlboro than convenience stores, liquor stores, small grocery stores, supermarkets, and other stores, with the average estimated differences ranging from $0.36 for convenience stores to $0.63 for grocery stores. The price of Newport averaged $0.65 higher in supermarkets and $0.40 higher in small grocery stores than in pharmacies, but it did not differ significantly for convenience stores, liquor stores, tobacco shops, or other stores. The cheapest pack of cigarettes cost significantly more in convenience stores, liquor stores, small grocery stores, and supermarkets than in pharmacies, with the average price difference

ranging from $0.18 in convenience stores to $0.57 in grocery stores. Cigarette prices in pharmacies did not differ significantly from prices in tobacco shops, suggesting that pharmacies sold Marlboro, Newport, and the cheapest pack at the same low prices as tobacco shops. As in Study 1, US pharmacies charged significantly more than all other store types for both brands of bottled water (Table 3).

Neighborhood Correlates of Price

Results from multivariate models that adjusted for store type illustrate how prices varied as a function of race/ethnicity, age, median household income, and population density in California (Table 2) and the United States (Table 3). In both studies, Newport menthol cost less in neighborhoods with a higher

proportion of African American residents ($0.08 less with each 8.9-percentage-point increase in the proportion of African Americans in California neighborhoods) and in Study 2 ($0.09 less with each 17.6-percentage-point increase in the proportion of African Americans in the census tract). In California, Newport menthol also cost less in store neighborhoods with a higher proportion of Asians/Pacific Islanders ($0.13 per pack with each 13.3-percentage-point increase in the proportion of Asian/Pacific Islander residents).

The proportion of Hispanic residents in the store neighborhood was not related to cigarette prices in California. In the US sample, only the cheapest pack cost less in areas with a higher proportion of Hispanic residents ($P = .052$).

In California, for each 5.3-percentage-point increase in the percentage of youths (aged 5–17

TABLE 3—Difference in Pretax Price (in US Dollars) for Tobacco and Nontobacco Products, by Store Type and Neighborhood Demographics: Tobacco Retailers in the United States, 2012

Variable	Cigarettes			Water	
	Marlboro (n = 2290), Coef[a] (95% CI)	Newport (n = 2069), Coef[a] (95% CI)	Cheapest Pack (n = 2310), Coef[a] (95% CI)	Dasani (n = 1376), Coef[a] (95% CI)	Aquafina (n = 395), Coef[a] (95% CI)
Intercept	4.23 (4.12, 4.35)	4.74 (4.57, 4.90)	2.98 (2.86, 3.11)	1.64 (1.58, 1.70)	1.65 (1.63, 1.68)
Store type					
Pharmacy (Ref)	1	1	1	1	1
Convenience store	0.36 (0.23, 0.49)	0.11 (−0.05, 0.28)	0.18 (0.05, 0.31)	−0.36 (−0.43, −0.29)	−0.35 (−0.40, −0.31)
Liquor store	0.53 (0.31, 0.75)	0.27 (−0.03, 0.57)	0.28 (0.06, 0.50)	−0.38 (−0.48, −0.29)	−0.43 (−0.61, −0.26)
Small grocery store	0.63 (0.41, 0.85)	0.40 (0.14, 0.65)	0.57 (0.30, 0.84)	−0.26 (−0.36, −0.16)	−0.47 (−0.62, −0.31)
Supermarket	0.52 (0.40, 0.64)	0.65 (0.46, 0.83)	0.36 (0.23, 0.48)	−0.08 (−0.14, −0.02)	−0.13 (−0.20, −0.05)
Tobacco store	−0.01 (−0.21, 0.20)	−0.14 (−0.38, 0.11)	0.09 (−0.27, 0.45)	−0.19 (−0.35, −0.03)	−0.67 (−0.72, −0.63)
Other	0.41 (0.22, 0.60)	0.14 (−0.08, 0.36)	0.26 (0.00, 0.52)	−0.41 (−0.52, −0.31)	−0.39 (−0.61, −0.17)
Neighborhood demographics					
Race, %					
African American	−0.03 (−0.08, 0.02)	−0.09 (−0.15, −0.04)	−0.05 (−0.11, 0.01)	0.02 (−0.01, 0.05)	−0.01 (−0.03, 0.01)
Asian/Pacific Islander	0.07 (−0.09, 0.24)	0.10 (−0.08, 0.27)	0.09 (−0.07, 0.25)	0.01 (−0.01, 0.03)	0.00 (−0.02, 0.02)
Multiple or other race(s)	−0.15 (−0.32, 0.02)	−0.08 (−0.24, 0.09)	0.09 (−0.11, 0.29)	−0.03 (−0.08, 0.02)	0.01 (−0.04, 0.06)
Hispanic, %	0.02 (−0.13, 0.16)	0.01 (−0.14, 0.17)	−0.18 (−0.35, 0.00)	0.04 (−0.02, 0.09)	0.04 (0.00, 0.09)
Age, y, %					
Birth–17	0.02 (−0.03, 0.08)	0.02 (−0.04, 0.09)	0.03 (−0.04, 0.10)	−0.01 (−0.03, 0.01)	−0.01 (−0.04, 0.02)
18–24	0.03 (−0.06, 0.11)	0.02 (−0.04, 0.08)	0.03 (−0.04, 0.10)	−0.01 (−0.03, 0.01)	−0.02 (−0.05, 0.00)
Median household income	0.12 (−0.00, 0.24)	0.09 (−0.03, 0.20)	0.19 (0.04, 0.34)	0.01 (−0.01, 0.03)	0.01 (−0.01, 0.04)
Population density	0.43 (0.33, 0.54)	0.37 (0.23, 0.50)	0.42 (0.31, 0.53)	0.01 (−0.02, 0.03)	−0.02 (−0.03, −0.01)
R^2	0.315	0.271	0.285	0.241	0.407

Note. Coef = coefficient; CI = confidence interval.

[a]Coefficients from ordinary least squares regression with a CI that includes 0.00 are not statistically significant ($P < .05$). Neighborhood demographics are standardized across the entire sample; for example, Newport menthol cost $0.09 less with each standard deviation (18-percentage-point) increase in the percentage of African Americans. Pretax price excludes sales tax and state excise tax (cigarettes only).

years) living in the store neighborhood, Marlboro cost 13 cents less and the cheapest pack cost 24 cents less (Table 2). However, variables related to the composition of youths or young adults in the neighborhood did not predict variation in cigarette prices in the US sample (Table 3).

As shown in Tables 2 and 3, the cheapest cigarette pack cost less in neighborhoods with lower median household income, both in California and in the US sample. None of the variables related to race/ethnicity, age, and income predicted variation in the price of bottled water in either study.

DISCUSSION

This study is the first that we are aware of to compare prices for tobacco and nontobacco

products as a function of store type and neighborhood demography. The inclusion of a nontobacco product addresses the question of whether lower prices in pharmacies are unique to cigarettes. In 2 representative samples of tobacco retailers, a consistent pattern emerged: compared with other types of stores, pharmacies charged customers less for cigarettes and more for bottled water. In the California and US samples, Marlboro and the cheapest pack of cigarettes cost less in pharmacies than in nearly all other types of tobacco retailers. Conversely, bottled water, an indisputably healthy product, cost more in pharmacies than in all other types of tobacco retailers.

One potential explanation for cheaper cigarettes in pharmacies is that this category of store is composed almost entirely of large

corporate chains and very few small, independent stores. To the extent that the tobacco industry rewards volume sales with discounted prices, this may explain some of the relatively lower cigarette prices in pharmacies than in other types of stores.

In 2 representative samples of tobacco retailers in California and the United States, 1 consistent pattern emerged about the relationship between neighborhood demographics and cigarette price. The most popular brand of menthol was significantly cheaper in neighborhoods with a higher proportion of African American residents. This pattern is consistent with several previous studies[16,17] and emblematic of a pattern of racial disparities in retail tobacco marketing that were documented in a systematic review.[16] In fact, differences in the relative price

of Newport across store types were not as consistent as for other cigarettes, possibly because neighborhood demographics explained as much or more variation in the price of Newport than store type did. There was lower reliability for the price of Newport in the California sample. However, this concern is mitigated by consistent results (e.g., it was cheaper in neighborhoods with a higher proportion of African Americans) in both studies reported here and in other studies.[16,17]

In California, Marlboro and the cheapest cigarette pack cost significantly less in neighborhoods with a higher proportion of school-age youths, but no such pattern was observed in the US study. The 2 studies had different operational definitions of youths and store neighborhoods, used different sampling strategies for tobacco retailers, and collected data in different years, all of which could contribute to the discrepant findings. Future research about cigarette price and neighborhood demography should consider whether price varies with the percentage of school-age youths in other settings, whether this association varies across geographies, or whether this neighborhood characteristic is a proxy for some other variable that correlates with cigarette price.

Results from this research are consistent with other studies indicating that corporate practices for some pharmacies are antithetical to protecting public health. For example, in a North Carolina study, pharmacies were more than 3 times more likely than grocery stores to violate marketing provisions of the US Family Smoking Prevention and Tobacco Control Act, such as self-service displays of smokeless tobacco or advertising for low, light, or mild cigarettes.[25] In California and other states, the high rates of sales-to-minor violations observed in pharmacies and other retail chains prompted many state attorneys general to negotiate agreements with these retailers to enhance compliance with employee training programs and to reduce youths' access to tobacco.[26,27]

Strengths and Limitations

Strengths of this research are the 2 independent studies with large representative samples of tobacco retailers, and different data collection periods (i.e., before and after CVS Caremark abandoned tobacco sales in 2014). The inclusion of multiple cigarette brands and the price of a nontobacco product for comparison with cigarettes are additional strengths.

Limitations of this research are the relatively small samples of pharmacies and a narrow definition of this store type. Future studies should consider oversampling pharmacies to better detect differences between stores types. In addition, future research should consider including supermarkets and big-box stores with a pharmacy counter in the definition of pharmacies because policies that pertain to tobacco-free pharmacies include these store types as well.

Public Health Implications

Evidence about disparities in cigarette price is important to state and local tobacco control policy because price is among the most important determinants of tobacco use, and limiting the availability of low-cost tobacco products is recommended to improve health equity.[7,8] As an alternative to tax increases, policy interventions that may have differential effects in pharmacies are to restrict price promotions and coupons and to establish or strengthen minimum price laws for tobacco products.[28]

Results from the current study may also be useful to state and local programs to bolster and reframe messages about policy interventions to promote tobacco-free pharmacies. Arguments for tobacco-free pharmacies typically emphasize product availability: why do pharmacies sell cigarettes at all? The findings from this research raise concerns about product price: why do pharmacies sell cigarettes at the cheapest prices?

A popular counterargument to tobacco-free pharmacies is that the policy matters little because pharmacies represent a small proportion of tobacco retailers.[29] However, eliminating the cheapest source of cigarettes first is a logical recommendation for state and local jurisdictions that aim to reduce tobacco retailer density and promote health equity. Previous research has estimated that tobacco-free pharmacies would result in a 10% reduction in the number of tobacco retailers in Massachusetts[30] and a 14% reduction in North Carolina.[31] In addition, evidence from California and Massachusetts suggests a possible spillover effect of local ordinances for tobacco-free pharmacies on other tobacco retailers.[32] Results from this study suggest that in addition to reducing the retail availability of tobacco products, banning their sale in pharmacies would eliminate an important source of cheap cigarettes. Thus, tobacco-free pharmacies may better promote public health by eliminating the paradox of cheap prices and promotions for cigarettes in a retail environment where consumers seek smoking cessation aids and other health remedies. AJPH

REFERENCES
1. A. G. Schneiderman spearheads national effort calling on major pharmacies to stop selling tobacco products [press release]. Albany: New York State Office of the Attorney General; March 17, 2014.

2. California State Board of Pharmacy board meeting minutes. October 2014. Available at: http://www.pharmacy.ca.gov/meetings/minutes/2014/14_oct_bd.pdf. Accessed February 1, 2016.

3. Patwardhan P, McMillen R, Winickoff JP. Consumer perceptions of the sale of tobacco products in pharmacies and grocery stores among US adults. *BMC Res Notes*. 2013;6:261.

4. Schmitt CL, Juster HR, Dench D, Willett J, Curry LE. Public and policy maker support for point-of-sale tobacco policies in New York. *Am J Health Promot*. 2014;28(3): 175–180.

5. Kroon LA, Corelli RL, Roth AP, Hudmon KS. Public perceptions of the ban on tobacco sales in San Francisco pharmacies. *Tob Control*. 2013;22(6):369–371.

6. Center for Public Health Systems Science. Point-of-sale report to the nation: the tobacco retail and policy landscape. Center for Public Health Systems Science at the Brown School at Washington University in St. Louis and the National Cancer Institute, State and Community Tobacco Control Research Initiative. Updated 2014. Available at: http://cphss.wustl.edu/Products/Documents/ASPiRE_2014_ReportToTheNation.pdf. Accessed February 1, 2016.

7. Brown T, Platt S, Amos A. Equity impact of interventions and policies to reduce smoking in youth: systematic review. *Tob Control*. 2014;23(e2):e98–e105.

8. Contreary K, Chattopadhyay S, Hopkins D, et al. Economic impact of tobacco price increases through taxation—a community guide systematic review. *Am J Prev Med*. 2015;49(5):800–808.

9. IARC Handbooks of Cancer Prevention: Tobacco Control, Vol 14: Effectiveness of Tax and Price Policies for Tobacco Control. Lyon, France, 2011. Available at: https://www.iarc.fr/en/publications/pdfs-online/prev/handbook14/handbook14.pdf. Accessed February 1, 2016.

10. US Dept of Health and Human Services. Preventing tobacco use among youth and young adults: a report of the surgeon general. 2012. Available at: http://www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/full-report.pdf. Accessed February 1, 2016.

11. Seidenberg AB, Behm I, Rees VW, Connolly GN. Cigarette sales in pharmacies in the USA (2005–2009). *Tob Control*. 2012;21(5):509–510.

12. Krumme AA, Choudhry NK, Shrank WH, et al. Cigarette purchases at pharmacies by patients at high risk of smoking-related illness. *JAMA Intern Med*. 2014; 174(12):2031–2032.

13. Lipperman-Kreda S, Grube JW, Friend KB. Contextual and community factors associated with youth access to cigarettes through commercial sources. *Tob Control*. 2014;23(1):39–44.

14. Cantrell J, Ganz O, Anesetti-Rothermel A, et al. Cigarette price variation around high schools: evidence from Washington DC. *Health Place*. 2015;31:193–198.

15. Barnoya J, Jin L, Hudmon KS, Schootman M. Nicotine replacement therapy, tobacco products, and electronic cigarettes in pharmacies in St. Louis, Missouri. *J Am Pharm Assoc (2003)*. 2015;55(4):405–412.

16. Lee JG, Goldstein AO, Pan WK, Ribisl KM. Relationship between tobacco retailers' point-of-sale marketing and the density of same-sex couples, 97 US counties, 2012. *Int J Environ Res Public Health*. 2015;12(8):8790–8810.

17. Henriksen L, Schleicher NC, Dauphinee AL, Fortmann SP. Targeted advertising, promotion, and price for menthol cigarettes in California high school neighborhoods. *Nicotine Tob Res*. 2012;14(1):116–121.

18. Lee JG, Henriksen L, Rose SW, Moreland-Russell S, Ribisl KM. A systematic review of neighborhood disparities in point-of-sale tobacco marketing. *Am J Public Health*. 2015;105(9):e8–e18.

19. Schleicher N, Johnson T, Ahmad I. Tobacco marketing in California's retail environment (2011–2014). Final report for the California Tobacco Advertising Survey (2014). Stanford Prevention Research Center, 2015. Available at: http://www.cdph.ca.gov/programs/tobacco/Documents/Resources/Publications/Tobacco%20Marketing%20in%20Californias%20Retail%20Environment_Notations_Final%202.9.16.pdf. Accessed February 1, 2016.

20. Bachman J, Johnston L, O'Malley P, Schulenberg J. *The Monitoring the Future Project After Thirty-Seven Years: Design and Procedures. Monitoring the Future Occasional Paper Series*. Ann Arbor, MI: Institute for Social Research, University of Michigan; 2011.

21. Barker DC, Chaloupka FJ, Chriqui J, et al. *Bridging the Gap Community Obesity Project: Methodology. Bridging the Gap Research Paper Series, Paper#1*. Chicago, IL: Bridging the Gap; 2015.

22. Rose SW, Barker DC, D'Angelo H, et al. The availability of electronic cigarettes in US retail outlets, 2012: results of two national studies. *Tob Control*. 2014;23 (suppl 3):iii10–iii16.

23. Wakefield MA, Terry YM, Chaloupka FJ, et al. Tobacco industry marketing at point of purchase after the 1998 Master Settlement Agreement billboard advertising ban. *Am J Public Health*. 2002;92(6):937–940.

24. Duncan DT, Kawachi I, Subramanian SV, Aldstadt J, Melly SJ, Williams DR. Examination of how neighborhood definition influences measurements of youths' access to tobacco retailers: a methodological note on spatial misclassification. *Am J Epidemiol*. 2014;179(3):373–381.

25. Rose SW, Myers AE, D'Angelo H, Ribisl KM. Retailer adherence to Family Smoking Prevention and Tobacco Control Act, North Carolina, 2011. *Prev Chronic Dis*. 2013;10:E47.

26. Krevor BS, Poniki WR, Grube JW, DeJong W. The effect of mystery shopper reports on age verification for tobacco purchases. *J Health Commun*. 2011;16(8):820–830.

27. Krevor BS, Lieberman A, Gerlach K. Application of consumer protection authority in preventing tobacco sales to minors. *Tob Control*. 2002;11(2):109–111.

28. Golden SD, Smith MH, Feighery EC, Roeseler A, Rogers T, Ribisl KM. Beyond excise taxes: a systematic review of literature on non-tax policy approaches to raising tobacco product prices. *Tob Control*. 2015;25(4):377–385.

29. Maxfield J. Why it doesn't matter if Wal-Mart and Walgreen stop selling cigarettes. Updated March 18, 2014. Available at: http://www.fool.com/investing/general/2014/03/18/why-it-doesnt-matter-if-wal-mart-and-walgreen-stop.aspx. Accessed February 1, 2016.

30. Seidenberg AB, Hong W, Liu J, Noel JK, Rees VW. Availability and range of tobacco products for sale in Massachusetts pharmacies. *Tob Control*. 2013;22(6):372–375.

31. Myers AE, Hall MG, Isgett LF, Ribisl KM. A comparison of three policy approaches for tobacco retailer reduction. *Prev Med*. 2015;74:67–73.

32. Jin Y, Lu B, Klein EG, Berman M, Foraker RE, Ferketich AK. Tobacco-free pharmacy laws and trends in tobacco retailer density in California and Massachusetts. *Am J Public Health*. 2016;106(4):679–685.