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Predicting Tobacco Sales in Community Pharmacies Using Population Demographics and Pharmacy Type

Lisa M. Hickey, Karen B. Farris, N. Andrew Peterson, and Mary L. Aquillino

ABSTRACT

Objective: To determine whether the population demographics of the location of pharmacies were associated with tobacco sales in pharmacies, when controlling for pharmacy type.

Design: Retrospective analysis.

Setting: Iowa.

Participants: All retailers in Iowa that obtained tobacco licenses and all pharmacies registered with the Iowa Board of Pharmacy in 2003.

Main Outcome Measure and Interventions: Percentage of pharmacies selling tobacco (examined by pharmacy type using chi-square analysis); median income and distribution of race/ethnicity in the county for pharmacies that did or did not sell tobacco (t tests); predictors of whether a pharmacy sold tobacco (logistic regression using the independent variables county-level demographic variables and pharmacy characteristics).

Results: County gender composition, race/ethnicity make-up, and income levels were different for tobacco-selling and -nonselling pharmacies. Logistic regression showed that whether a pharmacy sold tobacco was strongly dependent on the type of pharmacy; compared with independent pharmacies (of which only 5% sold tobacco products), chain pharmacies were 34 times more likely to sell tobacco products, mass merchandiser outlets were 47 times more likely to stock these goods, and grocery stores were 378 times more likely to do so. Pharmacies selling tobacco were more likely to be located in counties with significantly higher numbers of multiracial groups.

Conclusion: The best predictor of whether an Iowa pharmacy sells tobacco products is type of pharmacy. In multivariable analyses, population demographics of the county in which pharmacies were located were generally not predictive of whether a pharmacy sold tobacco.

Keywords: Community and ambulatory pharmacy, tobacco, smoking, race, ethnicity.

USE of tobacco products is a leading cause of death in the United States, second in fact only to heart disease.\textsuperscript{1} As providers of health care, one important public health contribution of pharmacists is to promote healthy lifestyles. The sale of tobacco products in pharmacies sends contradictory messages to patients regarding pharmacists' promotion of healthy lifestyles. Pharmacists can resolve the conflict between tobacco sales and healthy lifestyles by removing tobacco products from the pharmacy.

Whether pharmacies sell tobacco is the decision of the pharmacy owner and not necessarily the pharmacists working in the pharmacy. Pharmacies are increasingly owned by corporations.\textsuperscript{2} Thus, removal of tobacco products might depend on pharmacists encouraging their employers to discontinue tobacco sales. Our previous research showed that 42% of pharmacists in independent or apothecary pharmacy settings, as compared with 88% of pharmacists in chain, grocery, and mass merchandise outlets, had no input on whether tobacco products were sold in the pharmacy.\textsuperscript{3}

Pharmacists are currently seen by patients as valuable sources of information regarding adverse effects of nicotine replacement therapy but not widely as a resource for the process of smoking cessation, particularly if it involves nondrug strategies.\textsuperscript{4} Pharmacists can increase their role in the smoking cessation processes of their patients by offering information about the hazards of smoking, providing assistance throughout the cessation process, and by following up with patients as to the success of their quit attempts. A survey of Iowa pharmacists conducted in 2002 showed that 99% of pharmacists believed provision of smoking cessation counseling was important, but only 57% were doing so.\textsuperscript{5} Pharmacists' counseling has been shown to improve quit rates.\textsuperscript{6,7,8} However, we have little information on pharmacists' role in controlling tobacco sales.

We had previously surveyed 33 pharmacies in Cedar, Iowa, Johnson, and Washington counties in the state of Iowa to determine whether they sold tobacco products. Of the 18 pharmacies that did not sell tobacco products, the majority were smaller, independent operations. A recent study in Iowa also showed that counties with a higher density of tobacco outlets and cigarette smoking prevalence tended to have higher percentages of residents who were African American than did counties with lower outlet density and smoking prevalence.\textsuperscript{9} Contrary to previous studies, the data also indicated that counties with higher tobacco outlet density and smoking prevalence also tended to have higher median household incomes.

In general, smokers tend to be young men, comprising 28.4% of those between the ages of 18 and 34 and 26.5% of people between the ages of 36 and 49.\textsuperscript{10} In 2002, 25% of men and 20% of women were smokers.\textsuperscript{11} The proportions of smokers were highest for Native Americans and Alaska Natives among both men (29.6%) and women (33.8%), followed by African American men (26.6%) and white men (25.1%).\textsuperscript{11} A majority of smokers have no high school diploma or general equivalency diploma (GED) (30.9%) or have graduated from high school or obtained their GED (28.1%).\textsuperscript{11} Some smokers have attended college (21.6%), with only a few obtaining a bachelor's degree (10%).\textsuperscript{11} According to the 2000 National Health Interview Survey,\textsuperscript{12} 34.7% of smokers were considered poor (income below the poverty threshold), 34.2% were considered near poor (100%–199% of poverty threshold), 31.4% were considered middle income (200%–299% of poverty threshold), and 20.7% were considered higher income (>300% of poverty threshold). Based on these studies, we became interested in whether tobacco sales in pharmacies varied by population demographics.

**Objective**

The purpose of this study was to determine whether an association exists between the population demographic characteristics of a pharmacy's location and tobacco sales in that pharmacy when controlling for pharmacy type. We expected the sale of tobacco to be higher in mass merchandiser, grocery, and chain pharmacies.

**Methods**

Two different data sets were used in this study. The first contained information on all retailers in Iowa that obtained tobacco licenses in 2003. The retailers were organized by the type of retail store (e.g., department store, gas station, pharmacy). The data set also contained the addresses with ZIP codes and county of loca-
The second data set, from the Iowa Pharmacy Association, contained a list of all pharmacies registered with the Iowa Board of Pharmacy in 2003. It also contained pharmacy addresses with ZIP codes and type of pharmacy (e.g., chain, franchise [typically apothecary shops], independent, or hospital). Among chain pharmacies, we determined through inspection of pharmacy names whether units were located in grocery stores, mass merchandiser outlets, or traditional chain pharmacies. Hospital pharmacies \((n = 148)\) were excluded from the analysis.

The data set ultimately used for analysis was created by adding tobacco license and compliance status to the data set that contained all Iowa community pharmacies. Demographic data such as race/ethnicity and income were added to each pharmacy using 2000 U.S. census data for the county in which the pharmacy was located.

For purposes of this study, if the retail outlet—such as grocery store or mass merchandiser—had a pharmacy located in it and also sold tobacco (even if those sales occurred elsewhere in the store) then the pharmacy was defined as selling tobacco. The percentage of pharmacies selling tobacco was calculated and examined by pharmacy type using chi-square analysis. We also compared the median income and distribution of race/ethnicity of the customers in the county to examine variation among the pharmacies that did or did not sell tobacco using \(t\) tests. Logistic regression was used to predict whether a pharmacy sold tobacco, using the independent variables of county-level demographic variables (median household income, mean age, percentage of men, and percentages of African Americans, Alaska Natives, Asians, Hawaiian Pacific Islanders, other race, multiracial, and Hispanics) and pharmacy characteristics (pharmacy type and the number of pharmacies per person in the county). Pharmacy type was included in the model as three dummy variables, which designated chain, mass merchandiser, and grocery pharmacies, compared with independent pharmacies. All pharmacy types were mutually exclusive.

We also generated an Iowa map showing the percentage of pharmacies selling tobacco in each county and the distribution of pharmacy type in each county.

Results

In all, 778 nonhospital pharmacies were located in Iowa in 2003, including 169 (22%) chain pharmacies, 88 (11%) pharmacies located in grocery stores, 109 (14%) pharmacies located in mass merchandiser settings, 342 (44%) independent pharmacies, and 70 (9%) franchise pharmacies. None of the franchise pharmacies sold tobacco, and they were therefore excluded from logistic regression analyses.

Pharmacies located in grocery stores and mass merchandisers were most likely to sell tobacco (Figure 1). The frequency of pharmacy type and percentage of pharmacies that sold tobacco varied by county (Figure 2). In urban counties (defined as county population greater than 51,000), 57.2% of pharmacies sold tobacco. In rural counties (county population 51,000 or less), 30% of pharmacies sold tobacco, not a significant difference from more urban counties. For all demographic variables except Alaska Native ethnicity, the pharmacies that sold tobacco were statistically significantly different from pharmacies that did not sell tobacco (Table 1).

Logistic regression showed that population demographics had almost no effect on whether a pharmacy sold tobacco. Pharmacies selling tobacco were more likely to be located in counties with significantly higher numbers of residents of multiracial origin, but no other demographic characteristics were statistically significant in the multivariable analysis. The decision to sell tobacco was almost exclusively dependent on the type of pharmacy, with odds ratios ranging from 34 to 378 (Table 2).

![Figure 1. Proportions of Iowa Pharmacies Selling Tobacco Products in 2003, by Pharmacy Type](image-url)
Discussion

Our results show that the decision to sell tobacco in pharmacies is based on the type of pharmacy and not the demographics of the patients or consumers that the pharmacy serves. This finding is somewhat surprising because when all retail outlets in Iowa were examined in Peterson et al., population characteristics, particularly race/ethnicity and income, did affect whether outlets sold tobacco.9 Our finding may be explained by possibly greater corporate ownership among pharmacies than among other types of retail outlets that sell tobacco.

About 60%–65% of community pharmacies in the United States are chain pharmacies, and pharmacists in corporately owned settings typically have little or no effect on the decision to sell tobacco.13,14 In our study, only 5% of independently owned pharmacies and no franchise pharmacies sold tobacco. Combined, 76% of all corporately owned pharmacies (chain, grocery, mass merchandiser) sold tobacco. Almost all pharmacies located in grocery stores sold tobacco.

Many independent pharmacies are owned by pharmacists. Compared with corporate owners, pharmacist owners may be more committed to the pharmacists' role in promotion of public health through programs such as smoking cessation. Thus, independent pharmacies may be less likely to sell tobacco products. Managers of corporately owned pharmacies that sell tobacco may be more concerned with other issues that contribute to customer satisfaction, such as convenience and one-stop shopping.

We included in our study any outlet that sold tobacco and had a
Table 1. County Population Characteristics Comparing Pharmacies Selling and Not Selling Tobacco in 2003 (n = 708)*

<table>
<thead>
<tr>
<th>County Population Characteristics</th>
<th>Selling Tobacco (n = 297) Mean ± SD</th>
<th>Not Selling Tobacco (n = 411) Mean ± SD</th>
<th>T test</th>
<th>P value, 706 df</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Men</td>
<td>48.8 ± 0.7</td>
<td>49.1 ± 0.7</td>
<td>2.239</td>
<td>.025</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% African American</td>
<td>2.72 ± 2.3</td>
<td>1.58 ± 2.0</td>
<td>-7.001</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>% Alaska Native</td>
<td>0.30 ± 0.3</td>
<td>0.03 ± 0.7</td>
<td>0.404</td>
<td>.666</td>
</tr>
<tr>
<td>% Asian</td>
<td>1.53 ± 1.2</td>
<td>0.99 ± 1.1</td>
<td>-6.075</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>% Hawaiian Pacific Islander</td>
<td>0.04 ± 0.02</td>
<td>0.03 ± 0.02</td>
<td>-5.626</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>% Other</td>
<td>1.48 ± 1.4</td>
<td>1.06 ± 1.2</td>
<td>-4.188</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>% Multiracial</td>
<td>1.25 ± 0.5</td>
<td>0.93 ± 0.5</td>
<td>-8.925</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>% Hispanic</td>
<td>3.19 ± 2.6</td>
<td>2.39 ± 2.2</td>
<td>-4.320</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>Median household income, $</td>
<td>40,726.8 ± 4926</td>
<td>38,913.7 ± 4,588.6</td>
<td>-5.234</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>Median age, years</td>
<td>36.0 ± 3.1</td>
<td>37.6 ± 3.3</td>
<td>6.704</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>No. pharmacies per 10,000 county population</td>
<td>2.85 ± 0.7</td>
<td>3.25 ± 1.0</td>
<td>6.324</td>
<td>&lt; .01</td>
</tr>
</tbody>
</table>

*Franchise (apothecary) pharmacies were excluded since none sold tobacco products.

pharmacy that dispensed prescription medications, which implies that the pharmacy sold tobacco. We recognize that pharmacists themselves may not be required to actually sell tobacco in grocery or mass-merchandise stores because the pharmacy is one specific department. Even in chain pharmacies, pharmacists may not have to sell tobacco directly to patients, as tobacco is often located in the front of the store, whereas pharmacies are located in the back. However, given the level of evidence about tobacco’s effect on health, we believe that the sale of tobacco products in any pharmacy sends contradictory messages to patients regarding pharmacists’ promotion of healthy lifestyles.

Pharmacies that were located in counties with more multiracial residents were more likely to sell tobacco. Previous studies showed that smokers are more likely to be Native American/Alaska Native and African American versus white. Unclear from our data set is who is included in this multiracial category of the U.S. census; it could be any of several minority groups.

Limitations

These results are only generalizable to states where similar population characteristics are evident, but our approach provides a model for other researchers. Given the strong findings related to type of pharmacy, these results are likely generalizable, although the magnitude of the effect may vary with different population characteristics. We used county-level demographic data in which the pharmacy was located to predict whether the pharmacy sold

Table 2. Logistic Regression Predicting Tobacco Sales in Pharmacies (n = 708)*

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>P Value</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men, %</td>
<td>-0.133</td>
<td>.538</td>
<td>0.876 (0.575-1.335)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American, %</td>
<td>-0.151</td>
<td>.196</td>
<td>0.860 (0.863-1.081)</td>
</tr>
<tr>
<td>Alaska Native, %</td>
<td>-0.543</td>
<td>.082</td>
<td>0.581 (0.315-1.072)</td>
</tr>
<tr>
<td>Asian, %</td>
<td>-0.296</td>
<td>.166</td>
<td>0.744 (0.499-1.131)</td>
</tr>
<tr>
<td>Hawaiian Pacific Islander, %</td>
<td>3.868</td>
<td>.181</td>
<td>4,386.36 (0.020-9.47E+08)</td>
</tr>
<tr>
<td>Other, %</td>
<td>0.144</td>
<td>.755</td>
<td>1.154 (0.469-2.844)</td>
</tr>
<tr>
<td>Multiracial, %</td>
<td>1.643</td>
<td>.039</td>
<td>5.172 (1.089-24.565)</td>
</tr>
<tr>
<td>Hispanic, %</td>
<td>-0.071</td>
<td>.777</td>
<td>0.931 (0.0570-1.522)</td>
</tr>
<tr>
<td>Median household income, $</td>
<td>0</td>
<td>.098</td>
<td>1.00 (1.00-1.00)</td>
</tr>
<tr>
<td>Median age, years</td>
<td>-0.036</td>
<td>.676</td>
<td>0.964 (0.813-1.144)</td>
</tr>
<tr>
<td>Urban (&gt; 51,000 population; versus ≤ 51,000 population)</td>
<td>0.365</td>
<td>.487</td>
<td>1.440 (0.515-4.026)</td>
</tr>
<tr>
<td>Chain (versus independent)</td>
<td>3.516</td>
<td>&lt; .01</td>
<td>33.657 (18.226-62.156)</td>
</tr>
<tr>
<td>Mass merchandiser (versus independent)</td>
<td>3.862</td>
<td>&lt; .01</td>
<td>47.064 (24.182-91.597)</td>
</tr>
<tr>
<td>Grocery (versus independent)</td>
<td>5.934</td>
<td>&lt; .01</td>
<td>377.632 (121.028-1,178.289)</td>
</tr>
<tr>
<td>Pharmacies per 10,000 population</td>
<td>-0.241</td>
<td>0.177</td>
<td>0.786 (0.564-1.116)</td>
</tr>
</tbody>
</table>

*Franchise (apothecary) pharmacies were excluded since none sold tobacco products.
tobacco. This approach assumes that individuals within a county are homogenous. This assumption may not be true, particularly in urban areas. An analysis based on ZIP codes would provide more insight into possible differences that may be seen within metropolitan counties.

Conclusion

On the basis of previous studies, we hypothesized that the demographic characteristics of populations of the areas where pharmacies were located would predict whether the pharmacy sold tobacco. In our multivariate analyses, percentage of county residents of multiracial origins and pharmacy type predicted whether the pharmacy sold tobacco. Pharmacy type was a much stronger predictor than any of the demographic variables we tested, with nearly all grocery stores, most mass merchandiser outlets, and many traditional chain pharmacies selling tobacco products, compared with relatively few independent pharmacies and no franchise pharmacies.

References