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Inequities in tobacco retailer sales to minors by neighborhood racial/ethnic composition, poverty, and segregation, USA, 2015

Joseph G. L. Lee, PhD, MPH^{1,*}, Hope Landrine, PhD², Essie Torres, PhD, MPH¹, and Kyle R. Gregory, JD, MSHA³

¹Department of Health Education and Promotion, College of Health and Human Performance, East Carolina University, Greenville, North Carolina, USA

²Center for Health Disparities, Brody School of Medicine, East Carolina University, Greenville, North Carolina, USA

³Georgia State University Tobacco Center of Regulatory Science, Atlanta, Georgia, USA

Abstract

Objective—Tobacco retailers are an important source of tobacco products for minors. Previous research shows racial discrimination in sales to minors, but no national study has examined neighborhood correlates of retailer underage sales.

Methods—We accessed publicly available results of 2015 FDA inspections of tobacco retailers (n=108,614). In this cross-sectional study, we used multilevel logistic regression to predict the likelihood of retailer sale to a minor based on tract characteristics. We assessed the proportion of residents identifying as American Indian, Asian, Black, Latino, and White; isolation index scores for each racial/ethnic group; the proportion of people less than age 65 living in poverty; and, the proportion of residents age 10–17 in relation to retailer inspection results.

Results—The proportion of American Indian residents, Black residents, Latino residents, and residents less than age 65 under the poverty line in a neighborhood are independently, positively associated with the likelihood that a retailer in that neighborhood will fail an underage buy inspection. The proportion of White residents and residents age 10–17 are independently, negatively associated with the likelihood of sale of tobacco products to a minor. Isolation index scores show a similar pattern. In multivariable models holding neighborhood characteristics constant, higher proportions of Black (+), Latino (+), and age 10–17 (–) residents remained significant predictors of the likelihood of underage sale.

Discussion—Regulatory agencies should consider oversampling retailers in areas with higher likelihood of sales to minors for inspection. Interventions with tobacco retailers to reduce inequities in youth access should be implemented.

*Corresponding author: Department of Health Education and Promotion, 3104 Carol Belk Building, Mail Stop 529, Greenville, NC 27858; phone: (252) 328-4661; leejose14@ecu.edu.

Competing Interests

JGLL has a royalty interest in a store audit/compliance and mapping system, Counter Tools (<http://countertools.org>), owned by the University of North Carolina at Chapel Hill. The tools and audit mapping system were not used in this study.

Keywords

disparities; neighborhoods; youth access; Food and Drug Administration; compliance

INTRODUCTION

Tobacco retailers remain an important source of tobacco products to minors, especially older minors.[1] Given that addiction to tobacco products remains a leading cause of morbidity and mortality,[2] curtailing access to tobacco products has a long history in public health policy efforts.[3–5] The Family Smoking Prevention and Tobacco Control Act of 2009 (FSPTCA) authorized the U.S. Food and Drug Administration (FDA) to re-start a national tobacco retailer compliance and enforcement program to compliment existing state-level enforcement required by the Synar Amendment. Between 2010 and March 31, 2016, FDA’s state subcontractors had conducted over 365,000 underage buy inspections.[6]

Where these inspections are conducted is decided by state subcontractors.[7] The FDA’s inspection program requires participating states to develop sampling plans for inspections that consider “areas that are considered at higher risk for regulatory violations, such as: ... regions with lower socioeconomic populations (historically associated with market targeting)” (p. 15).[7] The FDA also requires states to ensure coverage in “racial and ethnic minority communities” (p. 15).[7]

A 2016 systematic review of youth access to tobacco documented that the likelihood of a sale to a minor varies by the race, ethnicity, and gender of the minor.[8–10] However, that review also noted limited and conflicting research on the role of community or neighborhood characteristics (e.g., neighborhood deprivation or racial/ethnic composition) in the likelihood of a retailer’s sale to a minor.[8] Thus, to inform our understanding of the etiology of inequities in tobacco use and guide states’ development of future sampling strategies, this paper had three aims: To assess the relationship between (1) neighborhood poverty, (2) neighborhood racial/ethnic composition, and (3) racial/ethnic isolation with retailer non-compliance with youth access regulations.

METHODS

We accessed publicly available inspection results posted by the FDA for the 2015 calendar year on January 22, 2016, for U.S. states, the District of Columbia, and U.S. territories. The FDA provides retailer name, address, participation of minor in the inspection, and if a violation was identified (no violation, warning letter for violation, or civil money penalty for violation). We utilized inspections where a minor was involved and where the date of FDA’s decision about the outcome of the inspection was within the 2015 calendar year. We excluded inspections where the inspection result was listed as “N/A” (n=2). We geocoded the resulting 137,578 inspection results using Texas A&M Geocoding Service based on the address of the retail location.[11] All but 797 (0.6%) were successfully geocoded to latitude and longitude; 82% of geocode failures were located in US territories (e.g., Guam). Because estimates for tract composition can be unstable, we removed 143 inspections in tracts with 100 or fewer residents, leaving 136,638 inspections. There were 28,024 repeat inspections;

we conducted analyses only on the first inspection reported (n=108,614). No poverty data were available for 14 inspections, and we used pairwise deletion for this variable.

We used census tracts to approximate neighborhoods. There were 28,236 unique census tracts across 51 states, territories, and the District of Columbia. The number of inspections in states ranged from 1 (Delaware) to 9,855 (Florida) (Mean=2,129.7, SD=2,036.0) and in census tracts from 1 to 68 (Mean=3.4, SD=3.0). We used ArcGIS 10.2 to spatially join inspection locations to American Community Survey 5-year census tract estimates (2010–2014) obtained from Social Explorer.[12] Tract data included 1) race/ethnicity (the proportion of residents self-identifying as American Indian/Alaska Native, Asian American/Pacific Islander, Black or African-American race, as White race alone, and as Hispanic or Latino of any race.); 2) poverty status (the proportion of residents through age 64 living under the poverty line); and, 3) residential segregation of American Indians, Asians, Blacks, Latinos, and Whites measured by census tract Isolation Index for each group.[13–15] Proportions of residents were multiplied by a constant for model convergence and interpretation (e.g., 12%=1.2). The Isolation Index ranges from 0 to 1, and is the average probability that racial/ethnic minorities will encounter only racially/ethnically similar others (i.e., no one of other races or ethnicities) in their census tract. An Isolation Index 0.60 indicates high residential segregation.[16–18] We rescaled Isolation Index to a range of 0–10 (e.g., a one-unit increase in Isolation Index is coded as the equivalent of going from 0.12 to 0.22).

The FDA contracts with states and private contractors to implement inspections.[7] States are required to propose a sampling strategy;[7] however, sampling strategies are not publicly available. Previous research has found substantial differences in outcomes, likely due to differences in how states implement FDA inspections.[19] We identified similarity in inspection results within states (intra-class correlation = 0.14) and utilized multi-level modeling with a random state intercept to address this violation of the assumption of independence between observations. We first modeled unadjusted relationships. We then report an adjusted model omitting White racial composition, which correlates strongly with Black racial composition ($r_{s(n=28,236)} = -0.82, p < 0.001$), and isolation indices, which correlate strongly with racial/ethnic composition (r_s 's > 0.90, p 's < 0.001). We conducted analyses in SAS 9.4 (Cary, NC, USA) using PROC GLIMMIX. Sensitivity analyses confirmed that the inclusion or exclusion of U.S. territories did not change the pattern of results.

RESULTS

Of the 108,614 inspections utilizing minors under age 18 to assess underage sales of a regulated tobacco product, violations were observed in 16.8% of all inspections. Some neighborhood characteristics were associated with the likelihood of a sale to a minor (Table 1). When adjusting for neighborhood characteristics, both the proportion of residents identifying as Black race and Latino ethnicity remained significant, positive predictors of the likelihood of sales to minors and the proportion of youth age 10–17 remained a significant, negative predictor.

DISCUSSION

Certain racial/ethnic composition and poverty characteristics of census tracts are associated with the likelihood that a retailer in a given tract will fail an underage buy inspection for tobacco products. While the associations identified are not large, (e.g., for every 10-percentage point increase in the proportion of Black residents the odds of a retailer selling to a minor increased by 7%), such effects matter at a population level.[20] A similar pattern exists for segregation as measured by the Isolation Index; however, the isolation index provides a more conceptually meaningful measure (i.e., the average probability of encountering only other residents of the same demographic group) than neighborhood composition. Given a long history of residential racial segregation in the production of health inequities,[21] use of the isolation index to target retailer compliance efforts should be considered.

Our findings are consistent with data on existing health and neighborhood inequities. The mix of retailers and retailers' behaviors in neighborhoods with a greater proportion of Black residents may be different than in neighborhoods with a greater proportion of White residents.[22] Retailers are more likely to sell tobacco products to Black and Latino minors[9,23]; Black and Latino minors are more likely to live in neighborhoods with disproportionately higher levels of tobacco industry marketing[24,25]; and, Black and Latino youth are more likely than White youth to reside in low-income communities.[17] Our findings add to this literature by showing that living in a neighborhood with a greater proportion of American Indian, Black or Latino residents is associated with higher likelihood of tobacco sales to minors.

These inequities are amenable to regulatory and community intervention. Tobacco retailer licensing can help enforce youth access laws,[26] community efforts can reduce the amount of tobacco marketing,[27] and retailer density reduction has potential to work better in more urban, denser areas.[28] FDA's inspections are not designed to be a statistically valid random sample. Instead they are based on a plan developed by the states in conjunction with the FDA, which may consider several factors, including areas that are considered at higher risk for regulatory violations such as minority communities.[7] FDA's Office of Compliance and Enforcement should work to ensure state subcontractors are fully identifying and covering retailers in communities with greater poverty and higher proportions of American Indian, African-American or Hispanic residents.[29] Use of the proportion of youth may not target areas with greater likelihood of violations. FDA's power over approving sampling plans[7] should be leveraged in ways that reduce neighborhood inequities.

Limitations

One source of concern about this study is that the sampling strategies used are unknown. Thus, although we had a large sample obtained from a government data source, the data are not generalizable outside of FDA inspections, and we cannot assess the prevalence of violations. Likewise, we cannot assess the race/ethnicity, age, and gender of the minors involved, all of which play an important roll in the identification of a violation.[8–10,23] In addition, we did not have access to store type or chain vs. non-chain status, and these are likely to be important covariates of non-compliance.

Conclusion

The availability of tobacco products to minors from tobacco retailers varies by neighborhood characteristics including racial/ethnic composition, poverty, and segregation. The relationships identified here are consistent with well-documented inequities in tobacco retailer marketing.[23] State FDA subcontractors should design sampling strategies that ensure resources are directed at maximizing retailer compliance. The FDA should adapt retailer education programs to based on these findings and leverage its power over state sampling strategies to reduce these inequities.

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What this paper adds

- Community characteristics including poverty, racial/ethnic composition, and segregation are associated with the likelihood of a retailer violation of youth access provisions in FDA inspections.
- States should consider these inequities in designing sampling plans for FDA-funded retailer inspection programs.

Table 1

Odds ratios of retailer illegal sales to minors predicted by neighborhood characteristics, USA, 2015

Neighborhood characteristic	Models 1–12		Model 13	
	Intercept, Unadjusted OR	95% CI	Adjusted OR	95% CI
Percent Under Poverty Line	0.12, 1.09	1.07–1.10	1.01	1.00–1.03
Percent American Indian	0.14, 1.07	1.01–1.13	1.05	0.99–1.12
American Indian Isolation Index	0.14, 1.04	1.00–1.08	–	
Percent Asian	0.15, 0.98	0.95–1.00	0.99	0.96–1.02
Asian Isolation Index	0.15, 0.98	0.96–1.01	–	
Percent Black	0.13, 1.07	1.06–1.08	1.07	1.06–1.08
Black Isolation Index	0.13, 1.07	1.06–1.07	–	
Percent Hispanic	0.14, 1.05	1.04–1.06	1.05	1.04–1.06
Hispanic Isolation Index	0.14, 1.04	1.03–1.05	–	
Percent White	0.21, 0.94	0.94–0.95	–	
White Isolation Index	0.19, 0.94	0.93–0.95	–	
Percent Age 10–17	0.15, 0.95	0.91–1.00	0.87	0.83–0.92

Note: Demographic characteristics and isolation indices are scaled to 10-point increments. For example, 12% of a census tract's residents reporting White race alone is coded as 1.2, and a one-unit increase represents a 10-percentage point increase. An isolation index of 0.12 is coded as 1.2 to convert the range of scores from 0 to 1 to 0 to 10; a one-unit change represents a 10-point increase in probability of encountering only people of the same identity (e.g., from 0.12 to 0.22). N's are as follows due to missing census tract poverty data (pairwise deletion): Models 1,13: 108,600; Models 2–12, 108,614. Bold signifies significant at $p < 0.05$. Intercepts are exponentiated to show the odds of a violation at the mean of the predictor variable(s). The intercept of model 13 is 0.14.