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A comparison of three policy approaches for tobacco retailer reduction ☆

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ABSTRACT

Background. The Institute of Medicine recommends that public health agencies restrict the number and regulate the location of tobacco retailers as a means of reducing tobacco use. However, the best policy strategy for tobacco retailer reduction is unknown.

Purpose. The purpose of this study is to test the percent reduction in the number and density of tobacco retailers in North Carolina resulting from three policies: (1) prohibiting sales of tobacco products in pharmacies or stores with a pharmacy counter, (2) restricting sales of tobacco products within 1000 ft of schools, and (3) regulating to 500 ft the minimum allowable distance between tobacco outlets.

Methods. This study uses data from two lists of tobacco retailers gathered in 2012, one at the statewide level, and another "gold standard" three-county list. Retailers near schools were identified using point and parcel boundaries in ArcMap. Python programming language generated a random lottery system to remove retailers within 500 ft of each other. Analyses were conducted in 2014.

Results. A minimum allowable distance policy had the single greatest impact and would reduce density by 22.1% at the state level, or 20.8% at the county level (range 16.6% to 27.9%). Both a pharmacy and near-schools ban together would reduce density by 29.3% at the state level, or 29.7% at the county level (range 26.3 to 35.6%).

Conclusions. The implementation of policies restricting tobacco sales in pharmacies, near schools, and/or in close proximity to another tobacco retailer would substantially reduce the number and density of tobacco retail outlets.

Background

Tobacco remains the leading cause of preventable death and disability in the United States, resulting in the premature loss of over 480,000 lives and $289 billion in economic costs annually (United States Department of Health and Human Services, Office of the Surgeon General, 2014). Tobacco products are sold in approximately 378,000 locations in the US including convenience stores, gas stations, grocery stores, and pharmacies (Center for Public Health Systems Science, 2014a).

The density of tobacco retail outlets in a defined geographic area (e.g. school catchment area or census tract) is associated with the tobacco use behaviors of the people who live or study in that neighborhood (Henriksen et al., 2008; Scully et al., 2013). One potential mechanism to explain this relationship is that residents of high tobacco retailer density areas have greater physical access to tobacco products, and therefore reduced retrieval costs, which can increase consumption (Schneider et al., 2005). In addition, residents in areas with high retailer density are exposed to more branded advertisements for tobacco products at stores, which can stimulate demand and increase tobacco use (Schneider et al., 2005; Loomis et al., 2012; Robertson et al., 2014; Henriksen et al., 2010). US tobacco companies collectively spend over $7 billion each year marketing and promoting tobacco products in retail outlets (Federal Trade Commission, 2013).

Given this compelling evidence, the Institute of Medicine recommends that public health agencies restrict the number and regulate the location of tobacco retailers as a means of reducing tobacco use (Institute of Medicine of the National Academies, 2007). By implementing policy, systems, and environmental interventions to reduce the number and density of tobacco retail outlets, states and

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localities have the potential to mitigate the burden of tobacco and decrease tobacco consumption.

Several policy solutions can reduce the number and density of tobacco retailers (Center for Public Health Systems Science, 2014b). One option is to prohibit the sales of tobacco products in pharmacies or stores with pharmacy counters. The primary function of pharmacies is to dispense medications and provide health care services; however, pharmacies deliver a conflicting message when they also sell tobacco products. The display and availability of tobacco products in what is perceived as a "healthy" store wrongly suggests that tobacco is a safe and acceptable product (Katz, 2008). For these reasons, bans on the sale of tobacco products are supported both by the pharmacy community and the general public (Hudmon et al., 2006; Smith et al., 2012; Kotecki and Hillery, 2002; Farley et al., 2015; Patwardhan et al., 2013; Kroon et al., 2013). In 2014, CVS voluntarily removed tobacco products over 7600 U.S. stores (PR Newswire CVS Caremark, 2014). A second option is to restrict the location of tobacco retail outlets, for example, prohibiting outlets within 1000 ft of schools or other youth serving locations (Center for Public Health Systems Science, 2014b; Luke et al., 2011). The presence of tobacco retailers near schools puts children at particular risk: in school areas with high outlet density, smoking experimentation (McCarthy et al., 2009) and prevalence (Henriksen et al., 2008) are higher, and students are more likely to report buying their own cigarettes rather than getting them from friends or other sources (Leatherdale and Strath, 2007). Finally, a third policy option is to require a minimum distance between outlets, for example, 500 ft. Tobacco outlet density is higher in US communities with lower median household income (Schneider et al., 2005; Hyland et al., 2003; Loomis et al., 2013) or a higher percentage of African American (Schneider et al., 2005; Hyland et al., 2003) or Latino families (Schneider et al., 2005; Hyland et al., 2003). This policy, therefore, may have the potential to reduce tobacco outlet clustering and density in communities where density is already highest, as has been shown from similar policies to restrict the number of alcohol retailers (Livingston et al., 2007; Campbell et al., 2009).

Tobacco control practitioners and policy makers would benefit from an analysis of the potential impact of these three unique policy solutions. Only one study in New Zealand has assessed the relative effectiveness of various policy solutions for reducing the number and density of tobacco retailers (e.g. 95% reduction in the total number of outlets, permitting sales only at 50% of alcohol outlets, eliminating sales within 1 or 2 km of schools) (Pearson et al., 2015). No study has compared multiple retailer reduction policies in the US context. This study aims to quantify and compare the reduction in the number and density of tobacco retailers in North Carolina resulting from three potential policy solutions: (1) prohibiting sales of tobacco products in pharmacies and stores with pharmacy counters, (2) restricting sales of tobacco products within 1000 ft of schools, and (3) regulating to 500 ft the minimum allowable distance between tobacco retail outlets.

Methods

Identification of tobacco retail outlets

North Carolina does not require retail tobacco outlet licensing, therefore no comprehensive list of retailers was available. Two alternate lists were used: (1) a statewide list based on "malt beverage/off-premise" alcohol retailers that is used by law enforcement to conduct youth access compliance checks for tobacco products (North Carolina Alcohol Beverage Control Commission, 2012) because many stores that sell beer and wine (e.g., supermarkets, gas stations, pharmacies) also sell cigarettes and a (2) three-county, field verified gold standard list created for research purposes described elsewhere (Rose et al., 2013; D'Angelo et al., 2014).

The first, statewide list was retrieved on February 6, 2012 from the North Carolina Alcohol Law Enforcement Agency (ALE) and it contained 7950 stores. The list was formatted for geocoding, and cleaned to remove 373 (4.7%) stores with incomplete or non-geographically-referenced P.O. Box addresses, 134 (1.7%) stores known to not sell tobacco at the time of data collection in 2012 (e.g., Target, but not CVS who abandoned sales in 2014), and 29 duplicates (0.4%), leaving 7414 stores for analysis.

The second, three-county list contained tobacco retailers in Buncombe, Durham, and New Hanover counties, and was generated via neighborhood canvassing as part of the Healthy Stores Healthy Communities study (HSHC) (Rose et al., 2013; D'Angelo et al., 2014). The HSHC list represents a gold-standard true census with field validation and the collection of GPS coordinates for each tobacco retail outlet (eliminating error introduced by geocoding of retail outlet addresses). The HSHC list contained 654 tobacco retail outlets: 218, 231, and 205 each in Buncombe, Durham and New Hanover counties, respectively.

Identification of pharmacies and stores with pharmacy counters

Current bans on tobacco sales in pharmacies apply not only to stand-alone pharmacies but also to retail establishments that operate health care institutions within them, such as a grocery store with a pharmacy counter (Tobacco Control Legal Consortium, 2012). In both lists, stores known to be pharmacies (e.g. CVS, Walgreens) and stores known not to be pharmacies (e.g., Exxon) were coded using SAS version 9.3. Next, two methods were used to determine whether the remaining stores were pharmacies or contained a pharmacy counter. In the HSHC list, online store locators were used to verify whether each store had a pharmacy. The ALE list contained over 1000 stores belonging to supermarket chains (e.g., Wal-Mart and Kroger which sometimes, not always, contain a pharmacy counter), so it was not feasible to determine the status of each store. Instead, online store locators were used to determine the proportion of stores in a supermarket chain that had a pharmacy counter in one large North Carolina city, and that chain-specific percentage was applied to the ALE list.

Tobacco retail outlet proximity to schools

North Carolina public and private school point location data (latitude/longitude coordinates) were obtained from the National Center for Education Statistics (NCES) and applied to retailers on both lists (National Center for Education Statistics, 2012). For the HSHC counties only, digital countywide parcel (property) boundary data were obtained from county governments. School point locations were overlaid on the parcel data to identify school parcel boundaries, then Google Maps and the parcel owner (e.g. county government) were used to verify point locations and parcel shapes. Given that digital parcel boundary files are not available for every county in North Carolina and it is very time consuming to collect them, only the schools located in HSHC counties were matched to parcel boundaries. Schools in the other 97 NC counties statewide were mapped as points. The average distance from the parcel centroid to the parcel boundary for the three HSHC counties was 611 ft. Using this information, a 1000-foot buffer was generated around school parcel boundaries for the three HSHC counties, and a 1611-foot buffer was generated around school points statewide to accommodate for the average distance from the point location to the parcel boundaries. ArcMap 10.1 (ESRI, Redlands, California) was used for all geospatial analyses.

Tobacco retail outlet proximity to another tobacco retail outlet

ArcMap was used to identify all tobacco retailers within 500 ft of another tobacco retailer. A custom script was written in Python to randomly select one tobacco retailer to be deleted from the list. This process continued iteratively until the list contained zero tobacco retail outlets within 500 ft of another retailer. This random -choice analysis yields different results each time the process is run (see Figs. 1 and 2). Thus, the process was run 1000 times and the mean number of retailers was removed from each list. Further description of these methods is available in the Supplementary material.

Outcome measures

Retailer density was calculated as the number of tobacco retailers per 1000 residents at the county and state level. Population measures were taken from the American Community Survey 2012 5-year estimate. For each of the three policy solutions, outcomes of interest were (a) the number of retailers removed, and (b) the percent reduction in retailer density (which is mathematically the same as the percent of retailers removed).