Sociodemographic Disparities in Tobacco Retailer Density in the United States, 2000–2017

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Abstract

Introduction: Studies find differences in tobacco retailer density according to neighborhood sociodemographic characteristics, raising issues of social justice, but not all research is consistent.

Aims and Methods: This study examined associations between tobacco retailer density and neighborhood sociodemographic characteristics in the United States at four timepoints (2000, 2007, 2012, and 2017) and investigated if associations remained stable over time. Data on tobacco retailers came from the National Establishment Time-Series Database. Adjusted log-linear models examined the relationship between retailer density and census tract sociodemographic characteristics (% non-Hispanic Black [Black], % Hispanic, % vacant housing units, median household income), controlling for percentage of youth, urbanicity, and US region. To examine whether the relationship between density and sociodemographic characteristics changed over time, additional models were estimated with interaction terms between each sociodemographic characteristic and year.

Results: Tobacco retailer density ranged from 1.22 to 1.44 retailers/1000 persons from 2000 to 2017. There were significant, positive relationships between tobacco retailer density and the percentage of Black (standardized exp(b) = 1.05 [95% CI: 1.04% to 1.07%]) and Hispanic (standardized exp(b) = 1.06 [95% CI: 1.05% to 1.08%]) residents and the percentage of vacant housing units (standardized exp(b) =1.08 [95% CI: 1.07% to 1.10%]) in a census tract. Retailer density was negatively associated with income (standardized exp(b) = 0.84 [95% CI: 0.82% to 0.86%]). From 2000 to 2017, the relationship between retailer density and income and vacant housing units became weaker.

Conclusions: Despite the weakening of some associations, there are sociodemographic disparities in tobacco retailer density from 2000 to 2017, which research has shown may contribute to inequities in smoking.

Implications: This study examines associations between tobacco retailer density and neighborhood sociodemographic characteristics in the United States at four timepoints from 2000 to 2017. Although some associations weakened, there are sociodemographic disparities in tobacco retailer density over the study period. Research suggests that sociodemographic disparities in retailer density may contribute to inequities in smoking. Findings from this study may help identify which communities should be prioritized for policy intervention and regulation.

Introduction

There has been significant progress in reducing overall smoking rates in the United States.[1] However, inequities in smoking and related disease have persisted or worsened according to race, ethnicity, and socioeconomic position.[1,2] Tobacco use is higher among individuals with lower income and education as compared to those with higher income and education.[3] In addition, African American and Hispanic/Latino smokers are less likely to quit smoking as compared to non-Hispanic White smokers.[4] Although there are evidence-based interventions to reduce smoking rates in the total population, it is less clear how to reduce sociodemographic inequities in smoking.[5]

Place-based health interventions are a promising lever for reducing health inequities.[6,7] In a widely cited paper, Diez Roux and Mair[8] conceptualize neighborhoods as places that concentrate exposure to physical and social risk and protective factors for behaviors that are associated with health outcomes. One facet of neighborhoods critical to tobacco use is the retail environment.[9] Retailers that sell tobacco provide consumers access to the product; more retailers in a given neighborhood can enhance access by reducing the amount of time it takes to get to the retailer or increasing the likelihood that a consumer passes a tobacco retailer as part of their regular travel. In 2018, more than 85% of tobacco companies' marketing budget was spent at the point of sale,[10] and both marketing and product availability may also influence the social environment by countering or reinforcing tobacco use norms.[11] Several reviews have summarized research finding significant associations between the concentration of tobacco retailers and smoking among youth and adults.[12–16] Exposure to tobacco retailers, and tobacco retail marketing at tobacco retailers, has been associated with smoking initiation,[17,18] cigarette

purchases,[19] higher smoking prevalence,[20,21] and reduced cessation.[22] Tobacco retailer density, which captures the number of tobacco retailers within a certain geographically-defined space, has been associated with health outcomes such as chronic obstructive pulmonary disease and heart disease.[23,24]

Diez Roux and Mair[8] further argue that processes such as segregation by race, ethnicity, and socioeconomic position produce inequities in resource distribution and the risks and protections to health that different neighborhoods pose. Policies, such as those focused on housing and zoning, may dictate where people live and where businesses can operate, potentially resulting in different retail environments in neighborhoods with different demographic compositions. Indeed, studies typically find greater tobacco retailer density in neighborhoods with a higher percentage of Black and Hispanic residents, lower household incomes, more families living in poverty, a greater percentage of residents with lower educational attainment, and a greater percentage of vacant housing rental units.[25–32] Vacant housing units not only act as a proxy for neighborhood economic disadvantage but may also be an indicator of areas that are experiencing a decline in social desirability.[33]

Studies of neighborhood demographics and tobacco retailer density typically examine associations at single points in time. As a result, they do not track changes in these relationships. Neighborhoods are not static; their populations shift with demographic changes in births, deaths, and population movement, while their retailer markets may change with new policies or business trends. Each could strengthen or weaken demographic disparities in tobacco retailer exposure. No prior research, however, has examined trends in the relationship between tobacco retailer density and neighborhood demographic characteristics at the national level.

The objective of this study is to examine the relationship between tobacco retailer density and neighborhood sociodemographic characteristics in the United States at four timepoints (2000, 2007, 2012, and 2017). Although the present study is US-focused, places outside the United States such as Australia and Scotland have also documented disparities in retailer density by socioeconomic status and may find this assessment over time useful for comparison.[34–36] In addition, assessing inequities in tobacco retailer density at multiple time points can help researchers identify political and market shifts that could enhance or alleviate place-based tobacco-related risks. Findings from this study may help identify which communities should be prioritized for policy intervention and regulation.

Methods

This study was conducted by the Advancing Science and Practice in the Retail Environment Center, a consortium of researchers funded by the National Cancer Institute from the University of North Carolina, Chapel Hill, Stanford University, and Washington University in St. Louis. Data on tobacco retailers for this study came from the National Establishment Time-Series (NETS) Database. The NETS Database is a longitudinal data source that is derived from Dun & Bradstreet's annual business register to characterize the commercial business environment in the United States.[37] For the present study, NETS data were used to assess tobacco retailer density at the census tract level in 2000, 2007, 2012, and 2017. The University of North Carolina Office of Human Research determined that this study was not human subjects research.

Measures

Neighborhood Sociodemographic Characteristics

We obtained census tract-level sociodemographic estimates from the 2000 US Decennial Census and the 2005–2009, 2010–2014, and 2015–2019 American Community Surveys to reflect neighborhood sociodemographic characteristics in 2000, 2007, 2012, and 2017, respectively. Census tracts are subdivisions of counties that typically have a population size between 1200 and 8000 people, and are used as proxies for neighborhoods.[38] Sociodemographic variables included the percent of the tract-level population that is non-Hispanic Black or African American (Black); percent of the population that is Hispanic or Latino ethnicity (Hispanic); median household income (adjusted for inflation); percent of housing rental units that are vacant; and percent of the population that are youth (aged 5 to 17).

Urbanicity

US Department of Agriculture Rural-Urban Commuting Area (RUCA) Codes were used to classify census tracts as urban or one of two types of rural geographies (small and isolated rural town, large town).[39,40] RUCA codes classify census tracts based on US Census measures of urbanization, population density, and daily commuting. RUCA codes from 2000 were used to classify census tracts in 2000 and 2007. RUCA codes from 2010 were used to classify census tracts in 2012 and 2017.

US Region

Retailers were categorized by region (West, Midwest, South, Northeast) according to US Census definitions.

Tobacco Retailer List

The NETS Database was used to identify all likely tobacco retailers in the United States from 2000 to 2017 following the methods used by Golden et al.[41] Briefly, North American Industry Classification System (NAICS) codes were used to identify the store type (eg, convenience store, supermarket) of each retailer in the NETS Database. Using data from 2007, 2012, and 2017 Economic Censuses, we considered all retailers within NAICS store type codes for which the majority (≥50%) were tobacco retailers and whose sales accounted for at least 2% of all retail tobacco sales as tobacco retailers (NAICS 447110, 445120, 453991, 445110, 452311, 446110, 445310, and 452319) along with stores whose name included the words "tobacco," "cigarette" or "vape"/"vapor"/"vaping." Stores were removed from the list of tobacco retailers if they were known to not sell tobacco (eg, Whole Foods).

Tobacco Retailer Density.

We calculated tobacco retailer density as the number of tobacco retailers per 1000 people in a census tract. Data on the US population came from the US Census Bureau.

Data Analysis

The analytic sample consisted of nearly all census tracts in the United States. However, because retailer density is sensitive to very small or large population sizes, census tracts that

contained much smaller (<500 persons) or larger (>20 000 persons) populations were removed. The dataset was also restricted to census tracts with complete information on neighborhood sociodemographic characteristics. This resulted in removing 1048 (1.6%), 1459 (2.2%), 1226 (1.7%), and 1082 (1.5%) census tracts in 2000, 2007, 2012, and 2017, respectively. Mean tobacco retailer density was calculated at the census-tract level in 2000, 2007, 2012, and 2017 for the entire United States, for different US regions, and by urbanicity. Descriptive statistics were also assessed for each neighborhood sociodemographic characteristic examined.

Next, in each year (2000, 2007, 2012, and 2017), adjusted log-linear models were estimated to examine the relationship between tobacco retailer density and census tract sociodemographic characteristics (% non-Hispanic Black, % Hispanic, % vacant housing units, median household income), accounting for nesting of tracts within counties (intraclass correlation coefficient [ICC]: 2000 = 0 .07, 2007 = 0 .04, 2012 = 0.04, 2017 = 0.04). A log-linear model was used because the tobacco retailer density variable was skewed (skewness: 5.12). Beta estimates were exponentiated to facilitate interpretation. All models controlled for the percentage of youth in a tract, urbanicity, and US region. To facilitate the comparison of associations of different sociodemographic characteristics, census tract characteristics in the models were standardized. For the percentage of non-Hispanic Black, Hispanic, vacant housing units, youth, and median household income variables, a one-unit change in the model reflects one standard deviation increase in the variable. To examine the relationship between census tract sociodemographic characteristics and retailer density across all years, one adjusted log-linear model was estimated that included data from 2000, 2007, 2012, and 2017.

To examine whether the relationship between tobacco retailer density and demographic characteristics changed over time, four additional models were estimated with interaction terms between each demographic characteristic and year. For all models with significant interaction terms, beta estimates for each demographic characteristic (ie, percentage of Black residents, percentage of Hispanic residents, percentage of vacant housing units, median household income) were obtained in 2000, 2007, 2012, and 2017 from the adjusted log-linear models. Subsequent pairwise comparisons were conducted to examine whether the beta estimate for a demographic characteristic in the subsequent year (ie, 2000 vs. 2007; 2007 vs. 2012; 2012 vs. 2017) was significantly different and whether there were significant differences in beta estimates obtained in 2000 and 2017. Due to the exploratory nature of this study, there was greater concern for type II error as opposed to type I error, so no adjustment for multiple comparisons was made.[42]

Results

Descriptive Statistics

Tobacco retailer density was 1.2 (*SD* = 1.2), 1.4 (*SD* = 1.4), 1.4 (*SD* = 1.3), and 1.2 (*SD* = 1.1) in 2000, 2007, 2012, and 2017, respectively. In each year, retailer density was highest in the South and lowest in the West. See Table 1 for additional descriptive statistics.

Retailer Density and Demographic Characteristics

Adjusted log-linear regression models were estimated to examine relationships between tobacco retailer density and census tract demographic characteristics (Table 2). In each year (2000, 2007, 2012, 2017), there were significant, positive relationships between retailer density and the percentage of Black (exp(*b*) = 1.03 [1.01, 1.05] to 1.06 [1.04, 1.08]) and Hispanic (exp(*b*) = 1.03 [1.01, 1.06] to 1.07 [1.05, 1.08]) residents and the percentage of vacant housing units (exp(*b*) = 1.07 [1.05, 1.09] to 1.10 [1.08, 1.12]). Retailer density was significantly, negatively associated with income (exp(*b*) = 0.74 [0.71, 0.76] to 0.86 [0.84, 0.88]).

In addition, in each year, compared to urban tracts, retailer density was significantly higher in small town/isolated rural areas (exp(*b*) = 1.12 [1.09, 1.16] to 1.34 [1.30, 1.39]). Also, compared to urban tracts, retailer density was significantly higher in large rural towns in every year (exp(*b*) = 1.04 [1.01, 1.07] to 1.16 [1.13, 1.20]), except for in 2012 when there was no ($p > .05$) significant difference in retailer density. Compared to the South, retailer density was lower in the West (exp(*b*) = 0.81 [0.77, 0.85] to 0.86 [0.81, 0.90]) and Midwest (exp(*b*) = 0.87 [0.84, 0.90] to 0.89 [0.86, 0.92]) in each year. In 2012 and 2017, retailer density was higher in the Northeast (exp(*b*) = 1.07 [1.03, 1.11] to 1.08 [1.04, 1.12]). However, in 2000 and 2007, there were no significant ($p > .05$) differences in retailer density in the Northeast as compared to the South.

Compared to the models conducted in each year, relationships were similar for all tract demographic characteristics in the summary model combining all years.

Relationships Over Time

To examine whether relationships between retailer density and demographic characteristics remained stable over time, four additional adjusted log-linear regression models were estimated that each also included an interaction between year and a single demographic characteristic. The interaction term was significant ($p < .05$) for all demographic characteristics, except for the percentage of a tract that is Hispanic (results not shown). This suggests that there was no change in the relationship between retailer density and the percentage of a tract that is Hispanic over the study period. For the three neighborhood demographic characteristics with significant interaction terms, subsequent pairwise comparisons were examined to assess whether the beta estimates in two adjacent years (eg, 2000 vs. 2007) for a census tract characteristic were significantly different and whether the estimates in 2000 and 2017 were significantly different.

For the percentage of the tract that is Black, there was a significant ($p = .01$) difference in beta estimates (exp(*b*) estimates: 2000: 1.05, $p < .01$; 2007: 1.06, $p < .01$; 2012: 1.05, $p < .01$; 2017: 1.05, $p < .01$) when comparing 2000 to 2007, but all other pairwise comparisons in adjacent years, as well as comparisons of beta estimates in 2000 and 2017, were not significant. The relationship between retailer density and the percentage of the population that is Black remained fairly stable over time. For the percentage of housing units that are vacant, there was no significant ($p = .67$) difference in beta estimates (2000: 1.11, $p < .01$; 2007: 1.10, $p < .01$; 2012: 1.07, $p < .01$; 2017: 1.07, $p < .01$) when comparing 2012 to 2017, but all other pairwise comparisons in adjacent years were significant ($p < .05$), as well as comparisons of beta estimates in 2000 and 2017 ($p < .01$). The relationship between retailer density and the percentage of vacant housing units in a census tract became weaker, albeit the change over time was small (Figure 1).

Table 1. Descriptive Statistics, Census Tracts in the United States (2000–2017)

Characteristics	2000 (*N* = 64 395)	2007 (*N* = 64 002)	2012 (*N* = 71 830)	2017 (*N* = 71 181)
	Mean (*SD*) Median; IQR	Mean (*SD*) Median; IQR	Mean (*SD*) Median; IQR	Mean (*SD*) Median; IQR
Tobacco retailer density (per 1000 population)				
Overall				
	1.23 (1.18) 0.97; 1.16 Range: 0.00–49.14	1.44 (1.41) 1.15; 1.28 Range: 0.00–75.27	1.39 (1.27) 1.11; 1.26 Range: 0.00–33.93	1.22 (1.13) 0.96; 1.16 Range: 0.00–23.63
By region				
South	1.43 (1.29)	1.66 (1.51)	1.55 (1.36)	1.35 (1.22)
Northeast	1.21 (1.10)	1.49 (1.34)	1.52 (1.30)	1.30 (1.13)
Midwest	1.15 (1.04)	1.32 (1.15)	1.26 (1.06)	1.14 (0.98)
West	1.00 (1.17)	1.23 (1.51)	1.14 (1.23)	1.01 (1.09)
By urbanicity				
Small town/Isolated rural	1.77 (1.11)	1.83 (1.19)	1.68 (1.14)	1.52 (1.12)
Large town	1.45 (1.15)	1.53 (1.22)	1.45 (1.21)	1.35 (1.19)
Urban	1.11 (1.17)	1.38 (1.45)	1.34 (1.28)	1.17 (1.12)
Census tract characteristics				
% Non-Hispanic Black	13.42 (23.40) 2.78; 12.19	13.78 (23.21) 3.33; 13.87	13.39 (21.93) 3.75; 13.72	13.51 (21.52) 4.07; 14.15
% Hispanic or Latino	11.51 (18.87) 3.38; 10.41	13.73 (20.42) 4.86; 14.41	15.64 (21.17) 6.60; 16.94	16.71 (21.51) 7.65; 18.15
% Vacant housing	8.54 (8.65) 5.98; 6.88	11.46 (9.90) 8.91; 9.87	12.01 (10.43) 9.30; 10.03	11.84 (10.65) 8.92; 10.23
Median household income	$45 758 (21 324)	$51 955 (25 473)	$55 462 ($27 573)	$62 7034 (33 493)

IQR = interquartile range; SD = standard deviation..

Table 2. Model-Adjusted Correlates of Census Tract Tobacco Retailer Density in the United States, 2000–2017

	2000 (N = 64 395)	2007 (N = 64 002)	2012 (N = 71 830)	2017 (N = 71 181)	Combined (2000–2017) (N = 271 408)
	Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)
Sociodemographic characteristics					
Non-Hispanic Black, %	1.03 (1.01 to 1.05)[b]	1.06 (1.04 to 1.08)	1.06 (1.04 to 1.07)	1.05 (1.03 to 1.07)	1.05 (1.04 to 1.07)
Hispanic or Latino, %	1.03 (1.01 to 1.06)[a]	1.06 (1.04 to 1.08)	1.07 (1.05 to 1.08)	1.05 (1.03 to 1.07)	1.06 (1.05 to 1.08)
Vacant housing, %	1.07 (1.05 to 1.09)	1.10 (1.08 to 1.12)	1.08 (1.07 to 1.10)	1.08 (1.07 to 1.10)	1.08 (1.07 to 1.10)
Income (per $10 000)	0.74 (0.71 to 0.76)	0.82 (0.80 to 0.85)	0.86 (0.84 to 0.88)	0.86 (0.84 to 0.88)	0.84 (0.82 to 0.86)
Youth, %	0.89 (0.87 to 0.90)	0.89 (0.87 to 0.90)	0.88 (0.87 to 0.90)	0.90 (0.89 to 0.91)	0.89 (0.88 to 0.90)
Urbanicity					
Urban	Ref	Ref	Ref	Ref	Ref
Large town	1.16 (1.13 to 1.20)	1.04 (1.01 to 1.07)[a]	1.01 (0.99 to 1.04)[NS]	1.05 (1.02 to 1.08)[b]	1.07 (1.05 to 1.10)
Small town/Isolated rural	1.34 (1.30 to 1.39)	1.17 (1.12 to 1.21)	1.13 (1.10 to 1.17)	1.12 (1.09 to 1.16)	1.21 (1.18 to 1.24)
Region					
South	Ref	Ref	Ref	Ref	Ref
Northeast	0.97 (0.92 to 1.02)[NS]	1.04 (1.00 to 1.10)[NS]	1.08 (1.04 to 1.12)[b]	1.07 (1.03 to 1.11)[b]	1.04 (1.00 to 1.07)[a]
Midwest	0.87 (0.84 to 0.91)	0.87 (0.84 to 0.90)	0.87 (0.85 to 0.90)	0.89 (0.86 to 0.92)	0.87 (0.85 to 0.90)
West	0.82 (0.77 to 0.86)	0.86 (0.81 to 0.90)	0.81 (0.77 to 0.85)	0.84 (0.80 to 0.88)	0.83 (0.79 to 0.86)
Year					
2000	—	—	—	—	Ref
2007	—	—	—	—	1.14 (1.12 to 1.16)
2012	—	—	—	—	1.10 (1.07 to 1.13)
2017	—	—	—	—	1.01 (0.99 to 1.03)[NS]

All relationships are statistically significant at $p < 0.0001$ unless otherwise noted.
CI = confidence interval; Ref = reference.
[a]Indicates significance at $p < .05$ level.
[b]Indicates significance at $p < .001$. NS = Not significant at the $p < .05$ level. Tobacco retailer density is measured as the count of tobacco retailers per 1000 people in a census tract. The estimates presented are exponentiated beta estimates. Example interpretation: In 2017, a one standard deviation increase in the percentage of non-Hispanic Black residents in a census tract was associated with a 5% increase in tobacco retailer density.

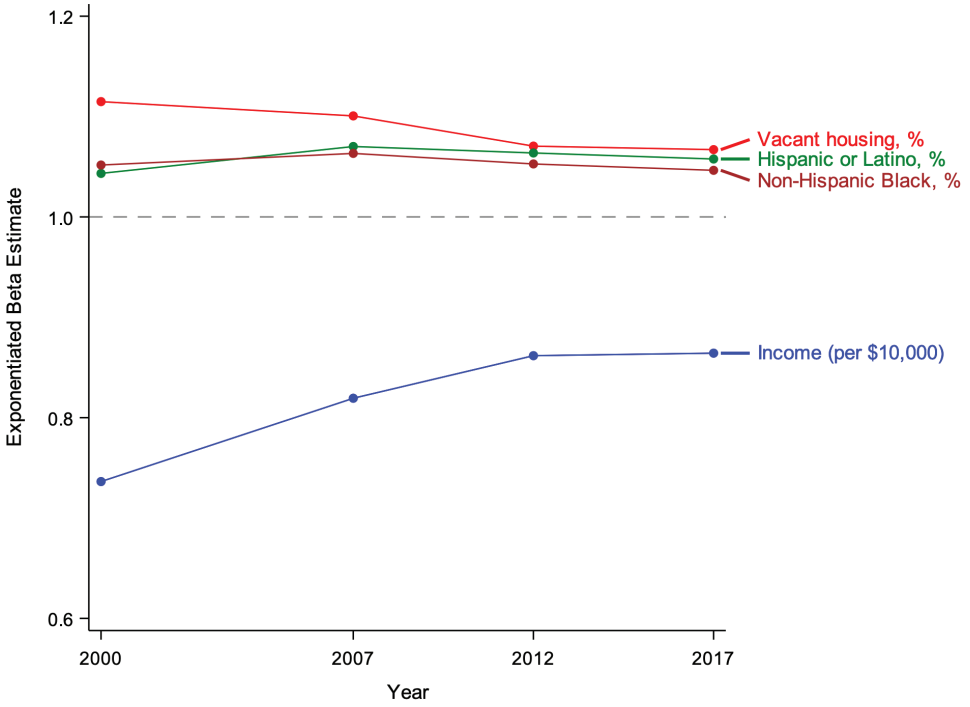

Figure 1. Relationship between tobacco retailer density and census tract demographic characteristics (2000, 2007, 2012, and 2017). Estimates of the adjusted relationships between tobacco retailer density (count of tobacco retailers per 1000 people) and demographic characteristics are presented in each year. The beta estimates are exponentiated to facilitate interpretation. All models adjusted for the percentage of youth in a tract, urbanicity and region.

The relationship between retailer density and the median household income of a census tract became less strong from 2000 to 2017. For income, there was no significant difference ($p = .84$) in beta estimates (2000: 0.74, $p < .01$; 2007: 0.82, $p < .01$; 2012: 0.86, $p < .01$; 2017: 0.86, $p < .01$) when comparing 2012 to 2017, but all other pairwise comparisons in adjacent years were significant ($p < .01$), as well as comparisons of beta estimates in 2000 and 2017 ($p < .0001$).

Discussion

Our study results confirm prior research finding sociodemographic disparities in tobacco retailer density in the United States. Similar to previous work at single time points in local areas[25,28,30–32] and in national studies,[26,27,29,43] we found greater tobacco retailer density in neighborhoods with a higher percentage of non-Hispanic Black and Hispanic residents at four periods within two decades. Higher median household income was associated with lower tobacco retailer density. In addition, consistent with prior work,[26,27,29] a higher percentage of vacant housing units in a neighborhood was associated with greater tobacco retailer density.

Disparities in tobacco retailer density according to racial, ethnic, or socioeconomic neighborhood composition has social justice implications. Studies find that higher tobacco retailer density in neighborhoods is associated with higher rates of smoking in these areas.[12–15] Therefore, disproportionate tobacco retailer density in racial/ethnic minority and lower socioeconomic neighborhoods may contribute to racial/ethnic and socioeconomic inequities in smoking, although longitudinal research is needed to establish casual relationships. Greater demand for tobacco products in these neighborhoods may also be in part responsible for the higher density of tobacco retailers in these areas. Greater demand can be caused by many factors, such as more experiences of stress among racial/ethnic minority and lower-income people in the United States.[44] Regardless of the cause of these inequities, however, higher density of tobacco retailers in neighborhoods with a greater percentage of racial/ethnic minority and lower-income residents is of public health concern.

Within our data, the mean percentage of residents who are Hispanic and the mean percentage of housing units that are vacant increased over the study period. Both demographic characteristics are positively associated with retailer density, indicating that the number of neighborhoods associated with disproportionately high tobacco retailer density in the US grew. Current demographic trends suggest more neighborhoods could face these risks in the future. According to the Pew Research Center, between 2000 and 2015 the percent of the population that was non-Hispanic White fell from 74% to 62%, while the percent of the population that was Hispanic increased from 10% to 18% and the percent of the population that was Black remained constant around 12%; these trends are expected to continue in the future.[45] Although median household income has increased in recent decades, this growth was slow between 2000 and 2018, and incomes have grown more for higher-income households.[46] Furthermore, the percentage of low-income people living in areas with high levels of poverty has increased, creating areas of more concentrated poverty.[47] Given that numerous studies document demographic disparities in tobacco product marketing in the retail environment,[48] an increasing number of communities may be facing a risk of both more tobacco retailers as well as more cues for tobacco use.

When comparing the strength of associations across neighborhood sociodemographic characteristics, relationships

between tobacco retailer density and median household income were consistently stronger than relationships between tobacco retailer density and the percentage of non-Hispanic Black or Hispanic/Latino residents and the percentage of vacant housing units in a census tract. Many neighborhoods with the highest median household incomes had no tobacco retailers. Disparities in tobacco retailer density for each of the neighborhood sociodemographic characteristics assessed, however, were significant and are of public health concern.

We did observe changes in the strength of associations between some neighborhood demographics and tobacco retailer density over time. Specifically, relationships between tobacco retailer density and median household income and the percentage of vacant housing units in a census tract weakened from 2000 to 2017, suggesting that tobacco retailer density has become less strongly associated with socioeconomic indicators of disadvantage, possibly reflecting s ome p rogress toward equity. Future analysis specifically tracking store openings and closings in different neighborhoods, as well as changes to corporate policies and decisions that might disproportionately impact some places, might shed light on whether these changes are likely to continue in the future. For example, following substantial profits in 2020, Dollar General reported plans to open more than 1000 new stores in 2021.[49] Research suggests that dollar stores are more likely to locate in racial/ethnic minority and lower-income neighborhoods.[50] Such growth could result in a disproportionate increase in tobacco retailer density in these neighborhoods.

Potential policy options to reduce tobacco retailer density, which may also reduce its associated marketing, include capping the number of tobacco retailers in an area, requiring tobacco retailers to be a specified minimum distance from one another, and prohibiting tobacco retailers near schools.[51,52] Some of these policies might also reduce tobacco retailer density disparities.[9,53] Lawman et al.[54] found a greater tobacco retailer density reduction in low-income as compared to higher-income districts after the implementation of four retailer regulation policies (retail license density caps, tobacco-free school zones, increased tobacco permit fees, strict permit penalties) in Philadelphia, Pennsylvania. Some communities are using equity as a lens for prioritizing retailer-related policies. For example, in 2014 the San Francisco Board of Supervisors passed a policy that caps the number of tobacco retailers that can sell tobacco in San Francisco, California.[55] The Youth Leadership Institute led the advocacy effort for this policy to reduce the disproportionate concentration of tobacco retailers in lower-income and racial/ethnic minority communities.[55] Data describing variation in the number of tobacco retailers by neighborhood income were used to advocate for change and for assessing the impact of the policy over time.[55] To date, such policies have only been implemented in limited jurisdictions, so they are unlikely to contribute to the national patterns we observe in this study, but could be important to consider as they become more widespread or are considered at state and national levels.

There are limitations to the present study. As our study is national in scope and spans almost two decades, we were not able to verify the sales of tobacco products. It is possible that we included retailers that do not sell tobacco products as well as excluded those that do. However, we used an extensive protocol that considered local and corporate policies, and we do not believe this potential error to be systematically biased. Second, although this study investigated associations between tobacco retailer density and several neighborhood sociodemographic characteristics over time, the study design employs repeated cross-sections, and we, therefore, cannot infer causality. Third, we investigated associations between retailer density and sociodemographic characteristics at the census tract level, but there may also be other local geographic areas or scales of importance, such as districts or community-defined areas. In addition, relationships between retailer density and neighborhood sociodemographic characteristics may differ dependent on how retailer density is defined.[29] Future studies should examine relationships between retailer density and neighborhood sociodemographic characteristics over time using other measures of retailer density (eg, retailers per square mile, total count of retailers) that may reflect different types of access to tobacco retailers.

This study examined disparities in tobacco retailer density at the national level over time. We found that racial, ethnic, and socioeconomic disparities have been consistently present, despite the weakening of associations with socioeconomic indicators over the study period. Policies that both reduce tobacco retailer density and have a pro-equity impact are needed.

Supplementary Material

A Contributorship Form detailing each author's specific involvement with this content, as well as any supplementary data, are available online at https://academic.oup.com/ntr.

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Declaration of Interests

AYK serves as a paid expert consultant in litigation against tobacco companies. All other authors report no conflicts of interest.

Data Availability

Tobacco retailer data used in the present study is not publicly available. Data on neighborhood sociodemographic characteristics can be obtained from the US Census Bureau.

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