



Linking Historical Discriminatory Housing Patterns to the Contemporary Alcohol Environment

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Received: 9 December 2021 / Accepted: 16 November 2022 / Published online: 6 December 2022
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Abstract

Research on alcohol outlet density consistently shows greater disparities in exposure in disinvested communities. Likewise, structural racism via discriminatory housing practices has created many of the issues that beset contemporary disinvested neighborhoods. Little work, however, has examined the relationship between housing practices and alcohol outlet disparities. The central premise of our work is that these discriminatory and inequitable practices create distinctions in the alcohol environment, and that such disparities have implications for work on alcohol policy. Here we link alcohol outlet density with a spatial database examining redlining, blockbusting, and gentrification in Baltimore, Maryland, and Flint, Michigan (two cities with common experiences of urban disinvestment over the last 50 years). Standard measures are used to account for the impacts of neighborhood racial, socioeconomic, and housing composition in a multilevel model. Our findings highlight that gentrification and redlining are strongly associated with alcohol outlet density, while blockbusting is not. Gentrification and redlining also frequently co-occur in inner-urban areas, while the more suburban phenomenon of blockbusting rarely overlaps with either. These findings further contextualize nascent work on structural racism in housing that illustrates important disparities along the lines of these distinct practices. Future work should consider how legacy impacts of discriminatory housing patterns impact our communities today.

Keywords Alcohol · Food environments · GIS · Gentrification · Blockbusting · Redlining

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Background

Alcohol outlet density (AOD) and the quality of the housing environment are correlated, especially insofar as alcohol retailers often target denser and poorer neighborhoods. This inequality—and the undue harms associated with higher AOD—represents a health equity issue (Marmot et al., 2008; Roche et al., 2015; Northridge & Freeman, 2011). Zoning is a tool to address health equity (Furr-Holden et al., 2020; Ransom et al., 2011; Hartnett, 1993), but historically has been used for the opposite purpose of perpetuating inequality (Manville et al., 2020; Massey & Rugh, 2017). Places that have experienced deliberate disinvestment in housing also frequently have higher AOD as a function of loosely enforced zoning codes and lack of political power to oppose such stores (Trangenstein et al., 2020a; Raleigh & Galster, 2015). Abandonment of homes and lower property values can drive many kinds of businesses out of neighborhoods, leaving small stores that make most of their sales from alcohol as the only remaining retailers (Singleton et al., 2017). This can be problematic for such neighborhoods, as higher AOD is also correlated to higher rates of addiction (Corburn, 2015), child abuse (Morton et al., 2014), robberies (Snowden & Freiburger, 2015), and, of course, alcohol consumption (Slutske et al., 2019; Schonlau et al., 2008) and alcohol-related harms (Connor et al., 2011).

Despite community-level disinvestment being closely linked to AOD, to date no one has explored the connections between *historical* forms of structural racism via housing discrimination and AOD. In this paper, we link measures of the historical and contemporary housing environment to the contemporary alcohol environment. While redlining has become of increased interest to urban scholars (including in one study by Trangenstein et al., 2020b), ours is the first study to explicitly link *multiple* forms of housing discrimination to AOD. Below we outline several types of structural racism in housing that may influence AOD, building on our earlier work showing connections to food access (Sadler et al., 2021a). We then introduce our study communities of Baltimore, Maryland, and Flint, Michigan, and the measures we use here to indicate AOD.

Housing Discrimination

Impoverished, immigrant, and minoritized groups have been systematically isolated in under-resourced neighborhoods with environmental justice issues since long before formal techniques such as redlining existed (Cohn, 2009; Zunz, 1977; Deskins, 1972). As housing and the urban development process became more formalized and mass-produced in the early 20th century, discriminatory practices too became more formal.

Redlining was one of the first explicit legal tools used by lenders to separate housing based on race and other characteristics. In particular, lenders used it to exclude racial minorities and other groups from obtaining loans in their neighborhoods and prevent them from living elsewhere (i.e. in predominately White neighborhoods) (Sugrue, 2014). Redlining exacerbated segregation and generated artificial

neighborhood decline long before American cities were affected by deindustrialization (Aaronson et al., 2021; Swope & Hernandez, 2019; Hoalst-Pullen et al., 2011; Squires & Kubrin, 2005); indeed, it likely helped support the self-fulfilling prophecy of the neighborhood life cycle (Lang, 2000; Metzger, 2000)—the idea that neighborhoods have a predictable and inevitable tendency to decline over time, as new housing becomes available and older housing ‘filters’ to less and less in-demand land uses. Even today, areas that were previously redlined have lower property values and more problems with abandonment when compared to similar (but not redlined) neighborhoods (Appel & Nickerson, 2016), hence why scholars have studied its association to contemporary outcomes.

A national Fair Housing Act was passed in 1968 that outlawed formal housing discrimination (Callies & Simon, 2017). But in its wake, other practices—such as blockbusting, racial steering, and exclusionary zoning—emerged to continue to uphold racial segregation in housing (Highsmith, 2009; Liebmann, 1990; Kmiec, 1986). Although it was illegal to directly discriminate against people based on their race, many remained effectively immobile, as these practices sought to reestablish racial dividing lines (Braveman et al., 2018).

Blockbusting and White flight characterized the abandonment of previously all-White neighborhoods, but the movement of people back to earlier disinvested neighborhoods occurred simultaneously. This process—known as gentrification—contrasts with standard redevelopment because it displaces populations and alters a neighborhood’s social fabric (Zuk et al., 2015; Smith, 1982; Pattison, 1977). Gentrification in the US dovetails neatly with the progression of housing discrimination into new forms, whereas in other countries the effects of White flight, urban renewal, and other policies have been less pronounced (Ley, 1986).

As noted above, practices such as redlining, blockbusting, and gentrification have been described as reflecting real consumer demands and used to justify the neighborhood life cycle theory (Metzger, 2000). And yet these deliberate practices undertaken by real estate agents, banks, and the government bely the idea that these processes of decline were inevitable (Aalbers, 2014; Lang, 2000). As we relate in our earlier work (Sadler et al., 2021a, b, quoting Aalbers, 2014, p. 527): “public and private actors...actively and passively structure the process of neighborhood decline, e.g. by producing maps that not only *describe* but also *prescribe* neighborhood decline”. That neighborhood decline has been intentionally provoked nationwide is as important as the recognition that AOD has likewise been shaped by deliberate actors seeking to maximize profits and prey on low-income and minority consumers.

Alcohol Outlet Density

Structural racism has had a long and enduring impact on neighborhoods via the housing market, but the inequality resulting from such practices as redlining, blockbusting, and gentrification also has interconnected impacts on the alcohol environment. In particular, there is good reason to believe that links exist between high concentrations of alcohol outlets and areas that had been redlined. Even so, research has not yet interrogated links between historical patterns of structural racism and AOD.

Peripherally, much work has been done on the types of environments where AOD is highest. For example, lottery outlets are more common in poorer neighborhoods, with the authors noting commercial disinvestment may have been responsible for the shift in retailer type (Wiggins et al., 2010). In another paper, the authors explored how AOD moderated the relationship between crime and blight—two features well-known to exist in disinvested neighborhoods (Kajeepata et al., 2020). It's also been made clear that patterns of disinvestment driving inequalities in AOD are the result of structural racism (Bieretz & Schilling, 2019). This disinvestment drives down economic opportunity for residents (Pietila, 2012), and the inverse of moving to neighborhoods with better conditions has been shown to improve similar outcomes (Linton et al., 2016). High AOD, therefore, is an added burden residents must face in their efforts to build healthy communities.

Study Context and Rationale

Our study communities are Baltimore, Maryland, and Flint, Michigan, two cities that have experienced considerable disinvestment and depopulation, and which therefore make for interesting case studies in studying links between patterns of housing discrimination and contemporary AOD. Baltimore was the first American city to enact a 'segregation law' over 100 years ago (Power, 1983), while Flint was long the nation's most segregated city (Highsmith, 2009). Their shared experiences with blockbusting point to the potential existence of a pattern in that phenomenon in many cities; namely, that areas proximate to redlined neighborhoods were blockbusted first and worst, and that the impacts spread into suburban locales over time (Orser, 2015; Sadler et al., 2021a, b; Sadler & Lafreniere, 2017). And while Baltimore saw considerable gentrification starting in the 1990s (Wyly & Hammel, 2004), redevelopment in Flint has lagged more, leaving most neighborhoods still in a state of stagnation or decline. In Baltimore, attempts to address inequalities via an inclusionary housing ordinance have not yet yielded positive results (Brown, 2016). Meanwhile, Flint's recently adopted master plan aims to redevelop Flint in an equitable manner, but may not be able to do enough to overcome years of White flight to surrounding suburban municipalities (Sadler et al., 2021). Both cities remain two of America's most segregated (Massey & Tannen, 2015; Sadler & Highsmith, 2016).

Inequalities in AOD has been of increasing interest in Flint, but has been studied extensively in Baltimore. Earlier work established inequalities in areas with high AOD, including higher rates of pedestrian injury (Nesoff et al., 2018, 2019), higher propensity for violent crime (Trangenstein et al., 2018; 2020c) and strong association with historical redlining (Trangenstein et al., 2020b). Policy-oriented work has shown that changes to the zoning code will potentially reduce AOD in the poorest neighborhoods (Hippensteel et al., 2019; Furr-Holden et al., 2020).

The body of work in Flint, meanwhile, is older and less well developed, but still offers important insights into the environment there. In Goldstick et al. (2015), the authors found greater harms associated with both (a) off-premise alcohol outlets when compared to on-premise outlets and (b) greater density of

any type of alcohol outlet. Earlier work by Resko et al. (2010), meanwhile, found that greater AOD was associated with higher odds of violent behavior among Flint youth.

Our paper builds on work from multiple directions, including Sadler et al.'s (2021a, b) examination of food access and discriminatory housing practices, Furr-Holden et al.'s (2020, 2019) work on AOD in Baltimore, and the broader body of work on the effect of the built environment on contemporary health and economic outcomes. We also build on Trangenstein et al.'s (2020a) recommendation to use spatial access measures when defining AOD.

As with our paper examining food access and discriminatory housing practices, this work presents new opportunities for those studying AOD. Researchers are well aware of the ways that the contemporary environment influences AOD. But here we elaborate on how these 'legacy' or long-term effects of structural racism may influence contemporary built environments.

Our core pursuit here is to investigate how historical and contemporary aspects of structural racism can influence differential rates of AOD. Some new work has explored the association between structural racism and AOD (Scott et al., 2020; Trangenstein et al., 2020b), but more work is necessary to demonstrate specific links between different types of discriminatory practices and AOD. Our hypothesis is that AOD will be highest in blockbusted neighborhoods owing to patterns of disinvestment, while associations in gentrifying and redlined neighborhoods will be weaker but potentially still significant.

Data

Our data includes three measures of structural racism and/or inequitable housing practices—redlining, blockbusting, gentrification—as well as AOD. Redlining is from the University of Richmond's Mapping Inequality Project (Nelson et al., 2020). The creators of this project digitized every 1930s era redlining map, including Baltimore and Flint. Although we acknowledge potential gaps between Home Owners' Loan Corporation (HOLC) maps and the Federal Housing Administration's (FHA's) actual implementation of them, we still believe these maps should be interrogated for potential associations in the built environment (Fishback et al., 2020). Our blockbusting variable is measured by calculating the change in racial composition at the census tract level from one decade to another. We created this method in Flint and adapted more recently for Baltimore (Sadler & Lafreniere, 2017; Sadler et al., 2021a, b). Gentrification was defined by the National Community Reinvestment Coalition (NCRC) (Richardson et al., 2019), which is also based on changes in population from US census data.

The data for the AOD measure comes from the state licensing databases for Michigan and Maryland. All outlets that prospectively sold alcohol were geocoded and categorized by type. Final geocoded shapefiles of all layers were then combined for further spatial analysis, to enable exploration of the alcohol landscapes in Flint and Baltimore.

Methods

Our central motivation was to use geographic information systems to connect spatial measures of AOD and housing discrimination. We used parcel centroids as our geographic and statistical unit of analysis, with the intention of determining the association between AOD and housing discrimination, controlling for age of housing, neighborhood socioeconomic distress, and neighborhood racial composition. We ran a series of diagnostic tests to ensure that our variables signified unique constructs and were acceptable for our multivariate model. Our multicollinearity check yielded acceptable VIFs (all < 2.5). Residuals were normally distributed, with a reasonable amount of homoscedasticity.

We then used multilevel mixed effects modeling to assess the relevance of redlining, gentrification, and blockbusting for predicting AOD net of relevant sociodemographic controls. This method was chosen because of the nested nature of parcels within census tracts and the measurement of key characteristics at the census tract level of aggregation (blockbusting, gentrification, percent White, socioeconomic distress). Census tract intercepts were modeled as random effects to account for this nesting, whereas all other characteristics were modeled at the fixed effects level. The 'identity' option was chosen for modeling random effects, as this applied a shared variance parameter for random effects and no covariance parameter given that only intercepts were modeled for census tracts as random effects. Poisson regression was utilized because of the right-skewed nature of the AOD dependent variable. Coefficients were then interpreted as the expected effect that a one-unit change in a given independent variable has on the log of the expected count value on the AOD scale. Two models were estimated: one for Baltimore city and one for Genesee County. This was done because none of the parcels in the Genesee County data met the study definition for gentrification. As such, the models were estimated separately. We used Stata MP 16.1 to conduct these analyses.

Alcohol Outlet Density

After geocoding the location of all alcohol outlets, we ran the kernel density analysis tool in ArcGIS; each alcohol outlet serving as an unweighted point. Kernel density analysis creates a raster whose values are based on the density of features (in this case, alcohol outlets) around each cell. Given its continuous surface, it is also useful for visualizing areas that have relatively lower or higher AOD. We linked this raster surface to our unit of analysis using the Extract Values to Points tool, which performs a similar function to what a spatial join would do with vector data.

Housing

As noted, our housing variable (residential parcels) doubles as our unit of analysis. Our parcel datasets from the Baltimore City Open GIS (2020) and City of Flint

(2016) included land use type and year of construction. For this paper, we isolated only the residential parcels, and appended AOD scores from above and the housing variables introduced below to their records.

Redlining

Redlining is based on the HOLC's designation of neighborhoods in one of 4 classes (green = best, blue = still desirable, yellow = declining, red = hazardous). Since mortgages were restricted in redlined 'hazardous' neighborhoods, we focus especially on these areas. This resulted in a binary variable which delineated redlined and non-redlined neighborhoods (0 = not redlined; 1 = redlined). The model coefficients pertaining to this variable would then be indicative of whether or not individual housing parcels in redlined vs. non-redlined neighborhoods report greater average AOD scores. By using parcels as our unit of analysis and delineating the exact boundary of redlined neighborhoods, we avoid some of the methodological issues found in other papers; namely, the spatial mismatch and data quality reduction seen when joining redlining data to census tracts, ZIP codes, or other polygonal features (Li & Yuan, 2022; Li et al., 2021; Lynch et al., 2021; Nardone et al., 2020a, b; Rutan & Glass, 2018).

Blockbusting

We adapt the framework created by Sadler et al. (2021a, b) to define neighborhoods where blockbusting likely occurred. This entails calculating the percent change in the White population between census periods for the 3 decades from 1950 to 1980. Census tracts experiencing declines in the White population of more than 75% were deemed 'extreme blockbusting' and given a score of 3. Tracts with White population decline of between 50% and 74% were deemed 'high blockbusting' and given a score of 2. Neighborhoods where White flight was between 25% and 49% were deemed 'moderate blockbusting'. These scores were summed across the three time periods, though no neighborhood saw such an extreme in more than two. The maximum sum blockbusting score was 3; neighborhoods were designated as having very high, high, or some blockbusting (scores of 3, 2, or 1).

Gentrification

Gentrification was derived using a method developed by the National Community Reinvestment Coalition (NCRC) (Richardson et al., 2019) measuring economic gentrification and population displacement. Eligible tracts fall below the 40th percentile in median home value for the region. Gentrified tracts have a median home value and percent of college-educated residents at or above the 60th percentile regionally, and an increase in median household income. Tracts are said to have experienced displacement if they lose 5% or more of any non-White racial or ethnic group.

Sociodemographic Characteristics

We are focused here on identifying the ongoing effects of historical structural racism, but we are also controlling for contemporary socioeconomic and racial composition. To simplify the influence of material and social deprivation, we have included a census block group-level socioeconomic distress index (originated by Pampalon et al., 2009) used in Flint and Baltimore (Sadler & Lafreniere, 2017; Sadler et al., 2021a, b). This index is calculated from the unweighted sum of the z-scores of 4 census variables: low educational attainment, low income (i.e. living below the poverty line), unemployment, and lone parent families. We also computed the percent of White population for each CBG in 2010 (since racial disparities in both housing and AOD persist), and control for the era of construction by using the age of the residence measured in the year the building was constructed (from the parcel dataset).

Results

In our results when speaking about Baltimore, we will refer to Baltimore Community Statistical Area names as contained in Baltimore's Neighborhood Health Profile Reports (Baltimore City Health Department, 2017) (Fig. 1). Flint does not have formal neighborhood names, but we have appended a map highlighting neighborhood groups and colloquial names (Fig. 2).

AOD

Figures 1 and 2 highlight the results of the AOD kernel density analysis in Baltimore and Flint (Figs. 1 and 2). In Baltimore, the highest scores strongly follow the 'White L' of gentrifying and predominately White neighborhoods (e.g. Canton, Fells Point, Downtown, Federal Hill, Midtown, Greater Charles Village, Hampden), with some dense areas in more suburban areas (e.g. Southwest Baltimore, Sandtown-Winchester, Highlandtown, Pilimco/Arlington/Hilltop). Lower scores are generally found in outlying suburban neighborhoods, but also in the highly distressed neighborhoods of Jonestown/Oldtown and Perkins/Middle East.

In Flint, the highest scores are downtown and in inner-urban neighborhoods on the northeast (Kearsley Park, Columbia Heights), south (Lincoln Park, Southside), and southwest (Westside) sides of town. Lower scores are generally found on the edge of the city limits and into the suburbs.

Housing

Given our central interest in the relationship of AOD and housing discrimination to other built environment characteristics, we also include variables for age of housing, socioeconomic distress, and racial composition. For both cities, we found an expected pattern of newer housing on the cities' fringes. Distinct patterns of

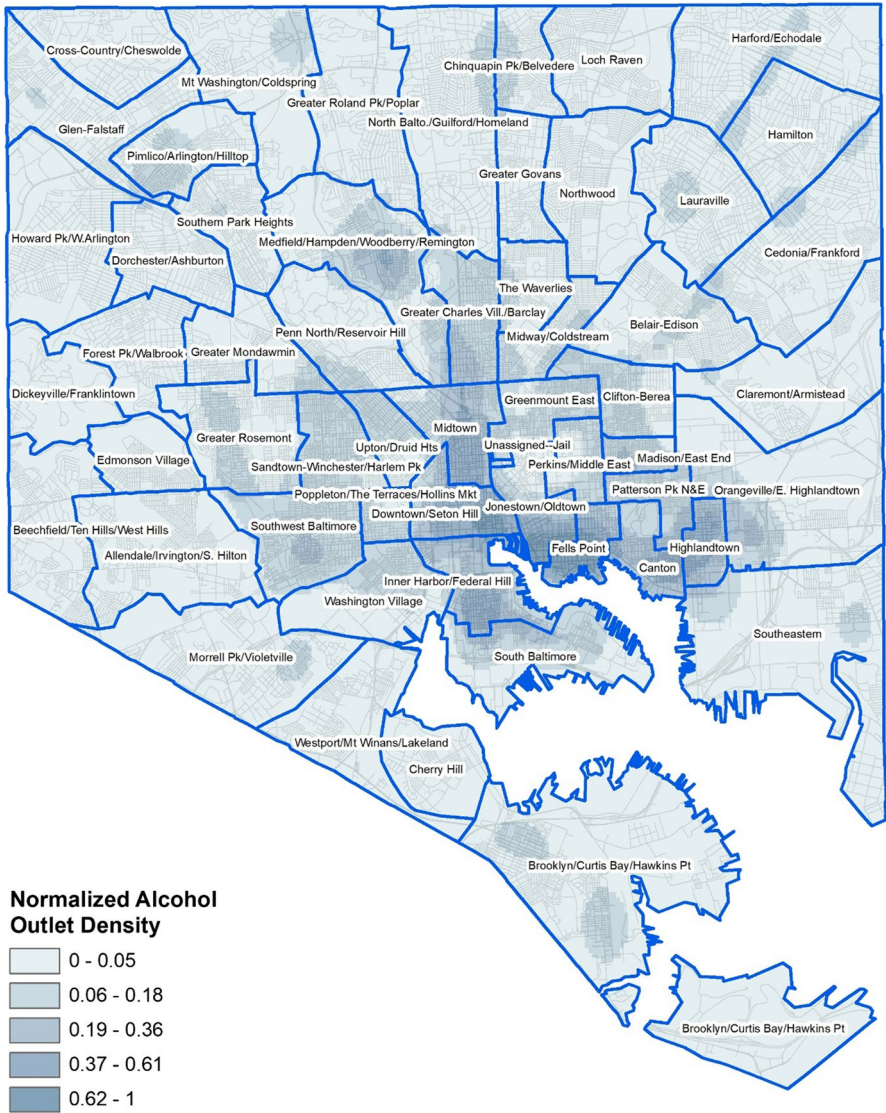


Fig. 1 Alcohol Outlet Density, Baltimore, Maryland

socioeconomic distress are also visible: in Flint, higher distress spreads through the middle and northern sections of the city. In Baltimore, meanwhile, two swaths are visible: one throughout most of west Baltimore, the other in a more concentrated area in east-central Baltimore. Racial composition follows a somewhat similar pattern to distress in both cities, and de facto ‘color lines’ exist separating African American from White populations in many places. To illustrate locations of the discriminatory housing variables, redlining, blockbusting, and gentrification are shown

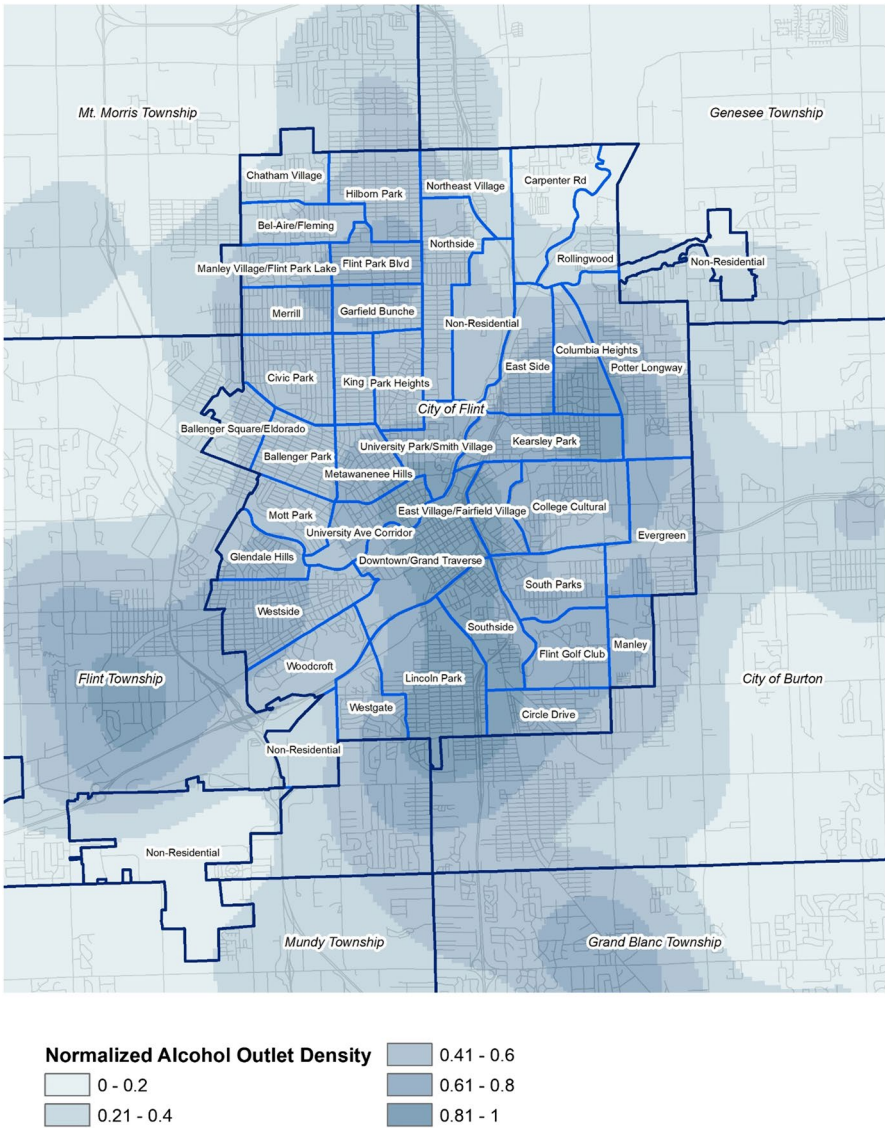


Fig. 2 Alcohol Outlet Density, Flint & Genesee County, Michigan

in Figs. 3 and 4. And to visually link these processes to AOD, we have also overlaid alcohol outlets by their primary serving method (on- or off-premise).

Redlining

In Baltimore and Flint alike, the oldest inner-most parts of the cities were red-lined. Only the wealthiest, most well-established arewas areas received green or

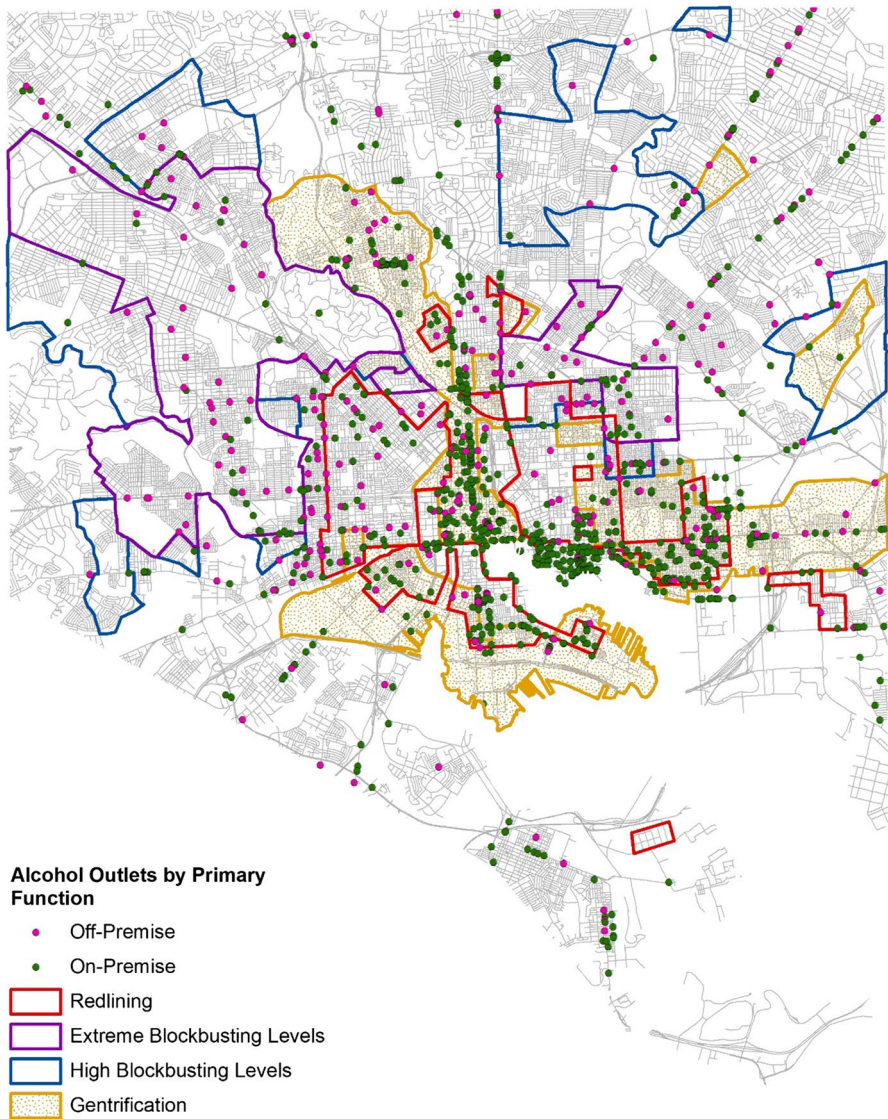


Fig. 3 Discriminatory housing practices and alcohol outlets, Baltimore, Maryland

blue ratings. In Figs. 3 and 4, redlined areas can be found near industrial uses, railroads, rivers, and other less desirable areas (where investment was restricted until redlining’s abolition via the Fair Housing Act).

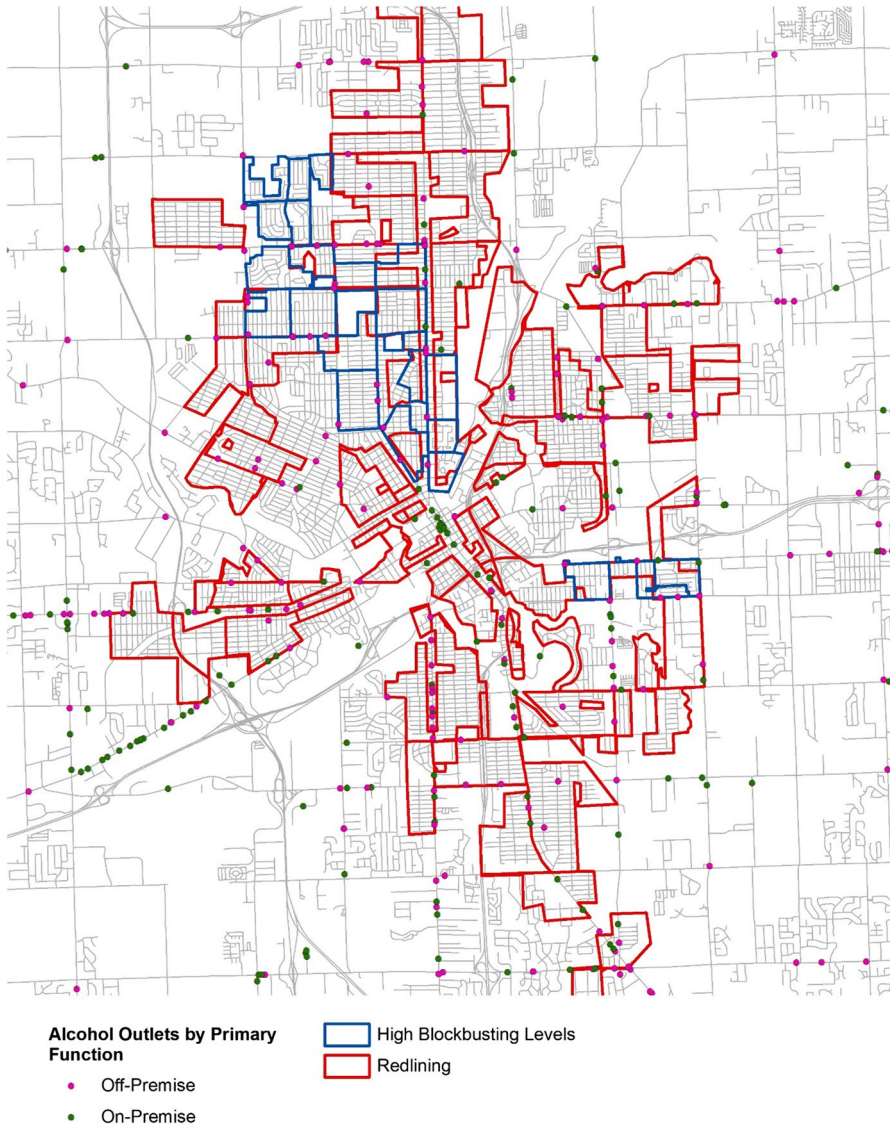


Fig. 4 Discriminatory housing practices and alcohol outlets, Flint & Genesee County, Michigan

Blockbusting

Blockbusting was run for the time period 1950 to 1980 (Figs. 3 and 4). In Baltimore, blockbusting began in inner-suburban areas closer to the core, and followed toward the northwest and eventually to outer-suburban areas. In Flint, blockbusting followed a northwesterly direction, likewise starting closer to redlined neighborhoods and heading toward the northwest city limits (passing through Park Heights, King,

Garfield Bunche, Flint Park Blvd, Merrill, and Manley Village/Flint Park Lake). In Baltimore, blockbusted neighborhoods make up most of west Baltimore (including Dorchester/Ashburton, Southern Park Heights, Greater Rosemont, and Edmonson Village), as well as parts of east and northeast Baltimore (including Clifton-Berea, Midway/Coldstream, Northwood, and Claremont/Armistead). Our general hypothesis is that AOD could be higher in these areas because of the recency and severity of disinvestment characterized by blockbusting and White flight. This delineation is important for understanding the impacts of White flight, as not every predominately African American neighborhood was blockbusted (nor did every neighborhood see White flight), thus the ongoing experience of structural racism could be felt differently depending on the neighborhood.

Gentrification

Our final housing related variable was gentrification (in yellow on Fig. 3, only for Baltimore). To accord with the NCRC definition, we computed areas where displacement occurred and median income increased. Gentrified areas nearly perfectly mirror the 'White L', from Hampden in the north, into downtown, and east toward Canton. We also expect gentrified areas to have higher AOD scores.

Housing Dynamics

Figures 3 and 4 reveal some key patterns about housing dynamics. Notably, few neighborhoods in either city have experienced two or more of these phenomena. Blockbusted neighborhoods are almost never already gentrified, and redlined areas were almost never blockbusted (owing to the long time horizon involved in disinvestment and reinvestment). Redlined areas in Baltimore, by contrast, have seen gentrification in recent years. A critical point to consider, therefore, is that disparities may exist between (a) neighborhoods that were redlined but are now gentrifying and (b) neighborhoods that were blockbusted and still experience disinvestment.

Linking the Alcohol Environment

Results from the Baltimore city data (Table 1) indicated that parcels located within redlined areas had significantly greater AOD compared to parcels not located within redlined areas (Coefficient=0.224). Parcels in gentrified areas also had significantly greater AOD (Coefficient=0.872). Blockbusting scores at the census tract level did not significantly predict AOD. Census tracts with greater socioeconomic distress scores and greater proportions of White residents also had significantly greater AOD in the Baltimore city data. Age of housing was not a significant predictor of AOD in this model.

Results from the Genesee County data (Table 2) indicated that parcels within redlined areas had significantly greater AOD (Coefficient=0.214). Blockbusted neighborhoods were not significant predictors of AOD. Census tracts with greater socioeconomic distress and lower proportions of White residents also had significantly

Table 1 Mixed effects poisson regression modeling of covariate effects on Alcohol Outlet Density (AOD) nested within census tracts: Baltimore City (N = 193,147)

	Coefficient	95% Confidence interval		<i>p</i> -Value
Fixed effects model				
Redlined (0 = No; 1 = Yes)	0.224	0.157	0.291	<i>p</i> < .001
Blockbusting	0.023	-0.163	0.208	0.811
Gentrification	0.872	0.528	1.215	<i>p</i> < .001
Parcel year of construction	>-0.001	>-0.001	<0.001	0.568
Socioeconomic distress	0.191	0.117	0.265	<i>p</i> < .001
Percentage of white residents	2.546	1.618	3.473	<i>p</i> < .001
Constant	-4.126	-4.540	-3.713	<i>p</i> < .001
Random effects model				
Constant variance	1.418			

Table 2 Mixed effects poisson regression modeling of covariate effects on Alcohol Outlet Density (AOD) nested within census tracts: Genesee County (N = 149,196)

	Coefficient	95% Confidence Interval		<i>p</i> -Value
Fixed effects model				
Redlined (0 = No; 1 = Yes)	0.214	0.184	<i>p</i> < .001	0.244
Blockbusting	-0.165	-0.608	0.465	0.278
Parcel year of construction	>-0.001	>-0.001	0.270	<0.001
Socioeconomic distress	0.122	0.035	0.006	0.208
Percentage of white residents	-1.260	-2.433	0.035	-0.087
Constant	-0.218	-1.151	0.647	0.716
Random effects model				
Constant variance	1.133			

greater AOD in the Genesee County data. Age of housing was not a significant predictor of AOD score in this model either.

Sensitivity analyses omitted the gentrification variable from the Baltimore City model to see if findings were robust. This was done because gentrification data was unavailable for Genesee County, so this additional model estimation would provide indication of how omission of these data may have influenced findings. These results were robust, essentially indicating analogous findings from the main analyses for Baltimore City even when the gentrification variable was omitted.

Discussion

While Trangenstein et al. (2020b) offered the first glimpse into the association between redlining and AOD, the need to examine further spatial patterns of historical and contemporary housing discrimination in relation to AOD remains. Our study

is the first to use multiple established designations to investigate the association to AOD, and builds on the growing body of work linking historical structural racism to contemporary health determinants and outcomes. Literature from the urban development and health equity nexus has recently worked more in the realm of redlining or environmental racism more broadly (Beyer et al., 2016; Krieger et al., 2020; Nardone et al., 2020a, b). One recent review highlighted 12 studies examining redlining and health, and conveyed a number of important findings, including an increased risk of pre-term birth across 3 studies alongside health disparities in domains of asthma, cancer, COVID-19, gun-related injuries, chronic diseases, and heat-related diseases (Lee et al., 2021). Yet even that study oversimplified the complex and ongoing process of historical and contemporary structural racism in housing, jumping from the passage of the Fair Housing Act to contemporary health studies.

The continued use of Sadler and Lafreniere's (2017) blockbusting measure is therefore an important continued contribution, as it has only been used in the context of food environments (Sadler et al., 2021a, b). We discovered no such association between blockbusting and AOD, suggesting a potential unintended positive of living in disinvested communities: that overexposure to AOD may be less pronounced in these generally suburban locales. While blockbusting measures the impact of more recent disinvestment patterns, it may also signify places that were never as dense as redlined communities, meaning exposure to deleterious business uses may well be lower.

More importantly, this is the first study to explicitly link these patterns with AOD. By linking these important housing measures to a tangible health determinant (e.g. alcohol outlet exposure), we bring to bear the potential negative health outcomes of structural racism in housing. Repeating such work in other cities and with additional forms of historical structural racism are important future directions for research.

Our key major findings include: (1) redlining and gentrification are key examples of housing discrimination that shapes higher AOD; (2) as with our previous work, blockbusting and gentrification are often mutually exclusive, and gentrifying neighborhoods therefore often have higher AOD; (3) blockbusting was not a major predictor of high AOD, possibly owing to the recency of business disinvestment, including alcohol outlets. The overall pattern of higher AOD in redlined neighborhoods is noteworthy, and may reflect coincidence with gentrification (i.e. recent reinvestment in these places and the proliferation of bars and nightclubs).

Conversely, the historical injustices perpetrated on redlined neighborhoods that are not gentrifying may yet be negatively impacting low-income and minoritized populations (i.e. in the form of higher rates of liquor stores). Continued advocacy to address predatory lending and other insidious forms of housing discrimination and structural racism remain important given these new findings (Mock, 2015).

Policy Implications

Our findings should influence advocacy around alcohol outlet exposure and health equity. The processes that have made obtaining adequate and fair housing difficult or impossible for minoritized populations are a key determinant of contemporary

health disparities (Bailey et al., 2017; Ramaswamy & Kelly, 2015; Osypuk & Acevedo-Garcia, 2010). Redlining has been hugely important in shaping African American health disparities over the last hundred years, and our study suggests that such neighborhoods may still be most disadvantaged when it comes to AOD. By not giving enough consideration to how neighborhoods were tragically harmed by way of disinvestment, the modern process of gentrification may wind up repeating the disinvestment patterns seen elsewhere in our cities, thereby making equitable redevelopment even more difficult.

We continue to advocate that these structural racism-related variables be used in future research. Doing so would enable decision-makers and advocates to make more well-informed decisions based on how disinvestment patterns might negatively impact the proliferation of the alcohol environment. Coordination of efforts around limiting alcohol outlet exposure and providing new evidence such as that presented here is essential to effectively translating research findings into more equitable urban development patterns.

Limitations

We acknowledge a few limitations. First, we highlighted just two cities, so it is not clear whether these patterns would exist or persist elsewhere. We continue to recommend further inquiry into these patterns across the US by replicating these methods, including with larger datasets for which health determinants or outcomes are available (i.e. the CDC's PLACES Project) (CDC, 2021).

Second, we acknowledge the limitations with using only a kernel-density weighted measure of AOD, as we cannot infer the price or availability of alcohol types within the stores. Future work should seek to link objective, in-store assessments of the alcohol environment to our housing measures.

Third, we acknowledge that age of residents could be a relevant sociodemographic characteristic to consider as a confound. Prior research has indicated that young adults are at elevated risk for alcohol use (Grucza et al., 2018; White, 2020). As such, communities with larger proportions of individuals in this age range may have greater AOD density to satiate increased demand for alcohol. That said, data pertaining to this characteristic was unavailable, thus, these analyses were beyond the scope of this study. This indicates the need for future research to investigate the potential that average resident age within neighborhoods may act as a confounder and determine the robustness of these results.

Conclusion

With this and ongoing work, we are identifying, measuring, and raising up the influence of a variety of forms of structural racism in the built environment (i.e. beyond redlining). We hope this work will be valuable for a range of researchers and policy advocates, including those working toward eliminating disparities in housing and alcohol environments. As each of these are closely linked to issues of health equity, we likewise hope that future attention is given to additional aspects of the built

environment that could be linked to these practices; that is, how multiple forms of housing discrimination can continue to have deleterious effects on communities. We believe that blockbusting, as well as other measurable forms of discrimination that are heretofore not commonly measured, form important next steps for researchers to consider. As with our earlier work on food access, we continue to advocate for the consideration of this and other variables in the study of contemporary alcohol environments as well as other topics. We hope this propels health equity research meaningfully forward into studying more underlying determinants beyond the standard measures.

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