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Using Zoning as a Public Health Tool to Reduce Oversaturation of Alcohol Outlets: An Examination of the Effects of the New '300 Foot Rule' on Packaged Goods Stores in a Mid-Atlantic City

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Abstract

The oversaturation of alcohol outlets can have disastrous public health consequences. The goal of this study was to evaluate the potential impact of new zoning legislation, *TransForm* Baltimore on locations of alcohol outlets. More specifically, the study sought to determine the effect of the new zoning code on the potential re-distribution of alcohol outlets and also provide empirical support for the need to actively monitor redistribution of outlets to avoid further inequitable oversaturation in disadvantaged neighborhoods.

Methods—Data on off-premise alcohol outlets (e.g. packaged goods stores) were obtained from the Board of Liquor License Commissioners for Baltimore City. The alcohol outlets were geocoded and assigned to zoning parcels. Churches and schools were also geocoded. The alcohol outlets were also assigned to Census tracts to calculate socioeconomic statuses.

Results—172 of the 263 off-premise packaged goods stores (PGS) were in violation of the new zoning law. *TransForm* will reduce the land parcels available to alcohol outlets by 27.2%. Areas containing non-conforming PGS were more likely to have a higher percentage of Black residents,

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Not applicable.

single parent families, unemployment, household poverty, and vacancy compared to Baltimore City averages and areas without non-conforming PGS.

Conclusions—Planning enforcement efforts need to accompany related laws to prevent/reduce overconcentration of PGS in disadvantaged neighborhoods.

Keywords

zoning; alcohol outlets; alcohol outlet policy

Introduction

Alcohol outlet oversaturation can have disastrous public health consequences (Campbell *et al.*, 2009). Density and proximity of alcohol outlets are associated with excessive drinking (Ahern *et al.*, 2013; Kypri *et al.*, 2008; Schonlau *et al.*, 2008), drug markets (Jennings *et al.*, 2013), violent crime (Campbell *et al.*, 2009, Franklin *et al.* 2010; Furr-Holden *et al.*, 2017; Jennings *et al.*, 2014), and fear among children (Milam *et al.*, 2014). Even though communities with higher levels of education and income (Kanny *et al.*, 2013) and higher white populations are more strongly associated with alcohol consumption (Chartier & Caetano, 2010), alcohol outlet oversaturation is more common in poor, minority-majority communities (LaVeist & Wallace, 2000; Pollack *et al.*, 2015; Truong & Sturm, 2009). This suggests alcohol outlets are displaced from neighborhoods with more wealthy and white residents into disadvantaged communities and communities of color. Such disadvantaged communities are the least equipped to handle the negative public health consequences of alcohol availability and oversaturation (GyimahBrempong, 2006; Mair *et al.*, 2013). This raises serious concerns of class and racial equity in the distribution of alcohol outlets and their associated public harms (LaVeist & Wallace, 2000).

Studies have found positive effects from decreasing alcohol outlet density (Zhang *et al.,* 2011; Yu *et al.*, 2008), and other researchers have asserted that the regulation of alcohol density and clustering may help decrease associated public health harms (Livingston *et al.*, 2007; Popova *et al.*, 2009; Campbell *et al.*, 2009). Relatedly, the World Health Organization, the Substance Abuse and Mental Health Services Administration Center for Substance Abuse Prevention, and the Task Force on Community Preventative Services agree that policies regulating alcohol outlet density may help increase community safety and health (Babor, Caegano, Casswell *et al.*, 2003; Grover & Bozzo, 1999; Campbell *et al.*, 2009). Finally, the European Union (WHO, 1999) and the WHO Western Pacific Region (WHO, 2007) have both included alcohol outlet density regulation in their Alcohol Action Plans. To reduce the density of alcohol outlets with the goal of reducing or preventing harmful effects, communities have relied on licensing, enforcing existing regulations, and zoning regulations (Gruenewald *et al.*, 1992; Mosher & Treffers, 2013). Zoning in particular has long been used as a public health tool to “further public good” (Ashe *et al.*, 2003). Because zoning occurs at the and state- and municipal-level, it can be a powerful tool for local communities to take control of land use decisions (Mosher & Treffers, 2013). As early as the 19th century, municipalities used zoning to stop the spread of tuberculosis and cholera (Ashe *et al.* 2003), and by 1926, the U.S. Supreme Court affirmed the State’s police power to promote safety and public health (Ransom *et al.*, 2011). By the 1980s, states were attempting to use zoning

as a tool to regulate businesses selling alcohol (Ashe *et al.*, 2003). To date, there is little research on the effect of using zoning law to reduce alcohol outlet density/clustering.

In an effort to decrease alcohol outlet density (AOD), in 1968 the Baltimore City Liquor Board adopted legislation which banned the issuance of new Class A liquor licenses (liquor, wine, and beer packaged goods stores) within the city until AOD decreased from 2.65 per 1,000 residents to 1 per 1,000 residents (Thornton *et al.*, 2013). In 1971, the Baltimore City zoning rewrite also restricted alcohol outlets in residential zones. All existing alcohol outlets in residential zones were labeled "non-conforming," but were allowed to continue operating; city officials assumed these non-conforming outlets would naturally decrease over time (Thornton *et al.*, 2013). Although alcohol outlets decreased from 2,318 in 1968 (Thornton *et al.*, 2013) to 1,249 in 2016 (Comptroller of Maryland, 2016), Baltimore's population simultaneously decreased from 905,759 in 1970 (U.S. Census Bureau, 1995) to 621,849 in 2016 (U.S. Census Bureau, 2016). Nearly 50 years after the passage of the zoning legislation, AOD remains at 2.01 per 1,000 residents, still well above the 1968 goal of 1 per 1,000 residents.

Research shows that as AOD increases, crime (Franklin *et al.*, 2010; Gruenewald & Remer, 2006; Jennings *et al.*, 2013; Livingston, 2008), alcohol consumption, (Scribner *et al.*, 2000; Theall *et al.*, 2011) and injuries all increase (Morrison *et al.*, 2015). Further, high AOD concentrates in disadvantaged, minority areas (Bluthenthal *et al.*, 2008; LaVeist & Wallace, 2000; Pollack *et al.*, 2005; Romley *et al.*, 2007). In Baltimore, researchers have extensively examined the relationship between alcohol outlets and public health harms; this research was used to help support policies and legislation such as *TransFrom*. The studies found that each additional alcohol outlet in a census tract was associated with a violent crime increase of 2.2% (Jennings *et al.*, 2013). Second, violent crime was higher around alcohol outlets and decreased by 5.6% for every 100-foot increase in distance from the alcohol outlet (Furr-Holden *et al.*, 2016). Relatedly, marijuana use decreased as distance to off-premise outlets increased (Milam *et al.*, 2014). Lastly, children who passed alcohol outlets on their way to school were more likely to be offered alcohol, tobacco, or other drugs (Milam *et al.*, 2014). To mitigate the public health consequences of alcohol outlet oversaturation, the Baltimore City Council passed the first major zoning rewrite in more than 40 years, *TransForm Baltimore* (hereafter referred to as *TransForm*). *TransForm* went into effect in June 2017 with new restrictions to strategically reduce AOD (TransForm Baltimore Zoning, 2016). *TransForm* provides a unique opportunity to examine the effects of new policy intervention on AOD by specific neighborhood type.

Study Context

TransForm has the potential to dramatically alter Baltimore's alcohol outlet landscape, and specific policy changes offer opportunity for tracking of this change. First, historically nonconforming alcohol outlets were given 2 years to either convert to a residential-conforming business or move into appropriate non-residential zones. Next, retail goods establishments selling alcoholic beverages cannot reside within 300 feet of each other with the exception of five districts. State commercial laws will also continue to impact alcohol outlet location and density. According to Maryland code §9–204.3, non-conforming licensed

premises cannot be transferred within 300 or 500 feet of a school or church, depending on legislative district (Maryland Code). Licenses of outlets that do not become conforming will expire, requiring owners to cease operation and further reducing AOD. Spatial clustering of sites will decline due to *TransForm* zoning even if every license holder moves instead of allowing their license to expire.

Because this zoning code re-write is unprecedented, many questions remain about its effects on alcohol outlet density. The objectives of this study are threefold: (1) determine how *TransForm* changes the number of non-conforming *off-premise* alcohol outlets, including historically non-conforming/grandfathered outlets; (2) determine where off-premise nonconforming outlets can move based on a GIS analysis of available parcels; and (3) analyze the community demographics of the census tracts where off-premise outlets currently exist. This study will only look at off-premise alcohol outlets, otherwise known as packaged goods stores (PGS) or liquor stores (where customers purchase alcohol for consumption at another location), in comparison to on-premise alcohol outlets (where customers purchase and consume alcoholic beverages on site). Our hypothesis is that non-conforming PGS will currently cluster in census tracts with lower socioeconomic status and higher populations of minorities; further, we hypothesize that non-conforming PGS will have greater opportunity to move to areas with similar socioeconomic characteristics. As such, *TransForm* may disperse the social and health inequity inherent in the clustering of PGS, but not necessarily ameliorate it. We therefore examine the effects of the new zoning code on the potential re-distribution of PGS and provide empirical support for the need to actively monitor redistribution of outlets to avoid further inequitable oversaturation in disadvantaged neighborhoods.

Methods

To determine the potential re-distribution of PGS in Baltimore City we identify which are non-conforming by addressing 3 restrictions: (1) zoning; (2) local laws; and (3) state laws. A geospatial approach highlighting PGS locations and potential future sites is required for this analysis. Data on all 263 PGS were obtained from the Board of Liquor License Commissioners for Baltimore City and geocoded using ArcGIS (ESRI, 2016). Since automated geocoding uses a line-based streets file to place points within a designated offset street distance, automatically placed points occasionally end up on the edge of a road or between parcels. Thirty PGS that fell outside the land parcel layer provided by the Baltimore City Department of Planning were moved to the location of existing PGS within their respective parcels. We repeated this process with public schools and religious building data obtained from the Mayor's Office of Information Technology (2017) via OpenBaltimore (Mayor's Office of Information Technology, 2017).

Zoning/Residential Non-conformity

Non-conforming liquor stores included both historically (pre-*TransForm*) and newly created (post-*TransForm)* non-conforming PGS. Two new shapefiles of pre- and post-*TransForm* zoning were obtained from the Mayor's Office of Information Technology (2017) via OpenBaltimore (Mayor's Office of Information Technology, 2017). To identify PGS in

residential areas, we created subsets of PGS that geographically overlapped residential areas, both when considering pre- and post-*TransForm* zoning. This is an essential step, given that we cannot identify a change in nonconforming PGS without knowing how many violated this policy before and after the implementation of *TransForm.*

300 Foot Rule

To determine the number of PGS within 300 feet of other PGS, churches, and/or schools (and therefore, out of compliance), we used straight-line buffers on parcels (rather than points) in ArcGIS (ESRI, 2016) to account for the potential spatial error of geocoded points and better represent the PGS landscape (Healy & Gililand, 2012). The resulting buffers roughly resemble bagels or doughnuts; the center (which is the existing PGS parcel) is missing so that a PGS does not count itself during analysis. We performed three intersect operations in ArcGIS on PGS parcels and each of the following buffers: PGS, church, and school. Intersect operations identify areas that overlap, so that we can count the number of overlaps which corresponds to the number of violations. All license types were used in this analysis whether they were currently open or not, because the 300 foot rule still applies to the active license.

Where Could/Can PGS Establish

Any parcels designated as parks were immediately discarded. Residential land parcels were removed by overlaying the pre- and post-*TransForm* zoning layers, resulting in two new parcel layers. The next step accounted for the 300 foot rule, and only applied to the post *TransForm* parcel layer. Any PGS that must transfer their license to a new address must not be within 300 feet of another PGS, except in PC, C-5, and C-1-E districts, where no spacing requirement exists. Any parcels created in the previous section that overlapped the PGS parcel buffers were removed. Next, any parcel within 300 feet of a school or a church parcel was removed from both the pre and post layers. An additional law requires a 500 foot spacing requirement from churches and schools in the 45th legislative district of Baltimore city. To account for this, a legislative district file was obtained from the Mayor's Office of Information Technology (2017) via OpenBaltimore. Buffers of 500 feet were created around both school and church parcels and clipped to the 45th legislative district. Parcels intersecting the 500 foot buffers were removed. Finally, under the new zoning code, a PGS can only move into districts that allow retail goods establishments with alcohol sales as permitted or conditional uses (those include 16 districts: all 4 Port Covington districts, Transit-Oriented Development districts 2 and 4, BioScience Campus district, Industrial Mixed-Use district, Light Industrial district, and all 7 commercial districts). Any other land parcels were removed from the post-*TransForm* layer. Under the old zoning code, the city only classified PGS as permitted or conditional uses in four districts: B2, B3, B4, and B5. Any land parcels outside of these districts were removed from the pre-*TransForm* layer. Liquor licenses for PGS can/could move to any remaining land parcels.

Community Demographics

Decennial demographic census information from 2010 and the corresponding census tract shapefile were downloaded from the National Historical Geographic Information System (Minnesota Population Center, 2016). Demographic information of interest included: total

population, population by race, total families, education, household income, poverty, total housing units, vacancy, number of people per room in owner and renter occupied units, house value, single parent families, and unemployment. We used census tracts for analysis because they represented the finest spatial resolution that included the desired data. Since census tracts are inexact representations of neighborhoods (Tienda, 1991), we split data and re-aggregated to the community level using the 55 community statistical areas (CSAs) from the Mayor's Office of Information Technology (2017) via OpenBaltimore (Mayor's Office of Information Technology, 2017). Each CSA is comprised of 2 or more neighborhoods, and many census tracts fit within the boundaries of a neighborhood, albeit imprecisely—meaning they represent sub-neighborhood level areas. Tabular demographic data was joined in ArcGIS (ESRI, 2016) to its corresponding census tract geography by using tract Federal Information Processing Standard (FIPS) codes. Census tract data were reallocated to CSA boundaries to assign proportional values from each tract to their corresponding CSA. This method was recently used to address the need for neighborhood-level statistics and account for changes in census units from one census to the next (Sadler & Lafreniere, 2017).

To examine the relationship between various demographics and the locations of current PGS, we weighted CSAs according to population, and then appended the population-weighted demographic characteristics to PGS. The sums of these values were then divided by the total number of PGS in Baltimore City to obtain weighted CSA averages (effectively, the concentration of PGS per CSA). This process was repeated using only non-conforming PGS (those that must move) and compared to the unweighted city averages to determine the relative impact of the policy by CSA.

We then calculated socioeconomic distress (SES) for each CSA (Larsen & Gilliland, 2008; Sadler, Gililand, & Arku, 2011) using four indicators: low educational attainment (proportion of people >=25 years old that have not graduated from high school), unemployment rate (proportion of unemployed adults >=16 who are eligible to work), single -parent families (proportion of sole parent families), and poverty (proportion of households with income below the federal poverty level). Distress index scores were calculated for each CSA by summing the zscores from each indicator. Composite scores referring to SES range from −7.03 (least distressed) to 7.20 (most distressed).

Results

Zoning/Residential Non-conformity

Figure 1A shows the zoning districts where PGS are permitted pre- and post-*TransForm.* Overall, *TransForm* increased the number of residential parcels from 200,567 (25,768.2 acres) to 205,997 (26,161.8 acres). Post-*TransForm*, 19 of the 90 historically non-conforming PGS in residential areas will no longer be in residential areas, but they will still be required to terminate alcoholic beverage sales because they were in areas formerly zoned residential (TransForm Baltimore, 2016; Subtitle 7, pg. 415). An additional 9 historically conforming PGS are now nonconforming, as they are located in newly residential areas. A total of 99 (37.6%) existing PGS must terminate alcoholic beverage sales due to at least one policy change in *TransForm* (TransForm Baltimore, 2016; Subtitle 7, pg. 415). All 99 historically non-conforming PGS can a) convert to a different type of business and let their

liquor license expire, b) transfer the license to an acceptable parcel, or c) sell the license to another operator at an eligible parcel.

300 Foot Rule

Of the 263 PGS parcel buffers, 37 intersect at least 1 other PGS parcel and 5 intersect 2 or more. Table 1 lists the number of PGS with multiple violations; 78 are too close to churches and 23 are too close to schools. Eight PGS were within 300 feet of another PGS and a church, 1 was within 300 feet of another PGS and a school, and 8 were within 300 feet of at least 1 church and school. One PGS was within 300 feet of at least 1 other PGS, church, and school. Figure 1C highlights the location of schools, churches, PGS, and parcels where PGS may relocate.

Where PGS Can Establish

While residential zoning became more restrictive toward allowing PGS, the City of Baltimore actually enabled PGS to move into a larger number of commercial-type zoning districts post-*TransForm*. Pre-*TransForm,* PGS were only allowed to move into the 'B' (commercial) districts, covering 6.9% of all parcels citywide (15,379 parcels). Post-*TransForm,* PGS are allowed to move into the 16 districts noted in the Methods section, which cover 7.9% of all parcels (17,720 parcels) and include specialty districts in addition to commercial districts. Policymakers recognized the effect this increase may have, and therefore incorporated additional aspects into *TransForm*.

Restrictions on residential land and proximity to other PGS, schools, and churches helped reduce the number of eligible parcels from 7,903 (3.5%) to 5,753 (2.6%) of the 223,900 parcels citywide. *TransForm* therefore reduced the number of eligible parcels by 2,150 (27.2%) when compared to pre-*TransForm*. Figure 1B displays zoning restrictions for PGS after the implementation of *TransForm*. Figures 2 and 3 show citywide parcel-level visual representations of the processes we used to remove land where PGS are not allowed (e.g. residential areas, near churches, near schools, etc.), both pre and post-*TransForm*, respectively. Many areas were disqualified along multiple criteria, but an area only needed to be disqualified by one criterion to be removed from eligibility. These maps simply show the locations of all of those parcels.

(CSA) Demographics

Since increased PGS density has been found in disadvantaged (Bluthenthal *et al.*, 2008; LaVeist & Wallace, 2000; Pollack *et al.*, 2005; Romley *et al.*, 2007) and minority (LaVeist & Wallace, 2000; Romley *et al.*, 2007) neighborhoods, we examined the relationship between PGS location and each SES variable along with Black population and housing vacancy at the CSA level (Table 2). Consistent with other studies, communities with more PGS and the subset of CSAs with violating PGS had consistently higher values than citywide CSA averages (LaVeist & Wallace, 2000; Pollack *et al.*, 2005; Romley *et al.*, 2007). Two-sample t-tests were conducted on each demographic value using Minitab 17 (Minitab 17 Statistical Software, 2010) to test for CSA-level significant differences between each combination of (1) city average, (2) PGS average, and (3) non-conforming PGS average. The proportion of the population not graduating from high school was not significant for any pairing, while

vacancy was significantly higher than both the city CSA and PGS CSA averages in CSAs with non-conforming PGS. Black population, single parent family, unemployment, and household poverty were significantly higher for CSAs with non-conforming PGS when compared to CSAs with PGS and all CSAs citywide.

Parcel level values derived from CSAs were averaged in Table 3 for the following groups of parcels: (1) parcels with existing PGS; (2) parcels with PGS violating the 300-foot rule; (3) parcels with PGS in historic or contemporary residential zones; (4) parcels PGS could move to; and (5) parcels PGS are predicted to target. Two-sample t-tests revealed that existing PGS parcels have significantly higher surrounding Black population proportions, more nearby vacant housing units, and higher surrounding SES values representing higher distress at a 99% confidence level ($p < 0.001$) when compared with parcels where PGS can relocate post-*TransForm*. Figure 1D highlights the SES in the 6 CSAs with the highest number of PGS. The values in Table 4 were compared to the average of the other 49 CSAs with <0.68 PGS per 1,000 people. In addition to having the 6 highest PGS densities and totals, 5 out of 6 had above average values of violating PGS, PGS violation percentage, number of PGS per 1,000 parcels, Black population percentage, SES, and vacant units. Due to the consistently high values these communities warrant future study, to examine CSA-level PGS density changes and any impacts it may have on SES or other demographic values.

Discussion

Our goals were threefold: (1) determine how the new zoning created by *TransForm Baltimore* rewrite changes the number of non-conforming PGS; (2) determine where PGS can move based on a GIS analysis of available parcels; and (3) analyze community demographics where PGS currently exist. We found that 172 of the 263 PGS (65%) were in a residential zone or within 300 feet of a school, church, or another PGS, either recently or historically. Of these, 99 PGS in residential zones will have 2 years to relocate or convert their PGS into a zoning conforming business. Post-*TransForm*, Baltimore City will have 5,753 land parcels where alcohol outlets may locate, a 27.2% reduction from the Pre-*TransForm* land parcel total of 7,903. We also found that the majority of PGS are currently in communities with higher Black populations, single parent families, household poverty and vacancy, and unemployment when compared to citywide community (CSA) averages which is consistent with prior studies (LaVeist & Wallace, 2000; Furr-Holden *et al.*, 2016; Jennings *et al.*, 2014).

The Sandtown-Winchester/Harlem Park CSA has been predominately Black since 1940, while Southwest Baltimore and Greater Rosemont CSAs have been predominately Black since the 1960s. These 3 residential communities account for the most PGS, containing 11, 18, and 13, respectively. Potentially, they had the most to gain from the Baltimore City zoning rewrite of 1971 because 32 of the 42 PGS within them are non-conforming. Because existing outlets were grandfathered in, however, these three communities ultimately suffered the most from the oversaturation of PGS. Currently, these communities have the greatest proportion of vacant units, and some of the lowest SES in Baltimore. When the 32 PGS in these communities close, change business type, or relocate to other communities, future

research will be needed to assess whether the amelioration of PGS density improves community health.

The downtown communities of Downtown/Seton Hill, Greater Charles Village/Barclay, and Midtown are predominately White and have higher than average SES. These communities are mostly non-residential and account for almost one fifth of parcels remaining eligible to PGS. Empirically, one would expect more PGS to relocate to these communities; however, given their political capital and collective efficacy, this remains to be seen. Specifically, Downtown/Seton Hill is mostly commercial and accounts for 8.8% of the remaining PGS eligible parcels. While *TransForm* will help ameliorate the overconcentration of alcohol outlets in Baltimore City as a whole, one concern is that some communities may experience negative spillover effects. We suspect these spillover effects will be influenced by a variety of complex factors, including active community associations, political capital, and collective efficacy.

Community-specific density policies may help prevent spillover effects. One option would be to set a blanket density goal for every CSA, regardless of their geographies or demographics. A second option would determine how many outlets individual communities can handle by examining their geographies and social characteristics. Both policies would need a way to identify alcohol outlets to close. Using distance parameters, like those in *TransForm*, is ideal for identifying these outlets. Residents may then discuss further options to meet the goal of reducing AOD. Future research focused on assessing the needs of each CSA (i.e. grocery stores, recreation centers, medical clinics, etc.) may aid this process.

This work is of great value to public policymakers—as well as researchers examining the effects of AOD on community health—because it models the effect of a new policy intervention on AOD by community type. By using GIS at both the community and parcel level, we identified and predicted the potential indirect impacts of *TransForm* within municipalities. The changes in PGS density in various communities in Baltimore City could be of particular interest to researchers interested in the relationship between AOD, crime, and community disadvantage.

This zoning change could also play a vital role in reducing food deserts in Baltimore City (defined as “vapid of fresh fruit, vegetables, and other healthful whole foods, usually found in impoverished areas;” American Nutrition Association, 2015). City officials could work with PGS owners to help them re-establish as healthy food stores or other essential services and businesses that are needed. Such work will not only remove pathogenic characteristics associated with PGS and other alcohol outlets, but also build toward creating environments with salutogenic characteristics, such as healthy food stores. Other municipalities outside of Baltimore can likewise explore how zoning rewrites may be able to simultaneously decrease the negative effects of and alcohol availability and food deserts. They can use this work to understand the potential implications of proposing reductions in AOD through zoning tools. As seen here, while density may go down overall, Baltimore may experience a spreading out of alcohol outlets into currently disadvantaged communities, further snowballing public health issues. It is unclear whether such changes might have unintended consequences in other communities, but it merits deliberate consideration.

Future work is needed to examine the intended and unintended effects of *TransForm* at the city and community level. The 99 PGS in direct violation of *TransForm* have 2 years to become compliant. While some may transform into other business types or close, many will likely move. This gives a rare opportunity to predict where PGS may move, based on the information available on the geographies and general demographics. Further, longitudinal analysis will be required to monitor the effects of *TransForm*. Some communities are likely to increase in PGS density, others will likely decrease. These potential shifts in PGS density need to be actively monitored. Relocation may follow patterns that could help predict not only where other PGS are likely to move in Baltimore, but the types of neighborhoods where PGS may gravitate towards in other cities that eventually pass similar zoning rewrites to control AOD. This would be of particular interest to other cities with declining populations such as those in the Rust Belt. According to Hollander and others (2009), urban planning in the U.S. has focused too narrowly on managing or revitalizing urban growth, but little empirical work has been conducted on land use change in shrinking cities. Cities such as St. Louis, Cleveland, Buffalo, Pittsburgh, and Detroit—which have all lost over half their populations—are likely to have an excessive number of alcohol outlets (Sakaguchi *et al.*, 2014). Ultimately, continued research in Baltimore will help unravel the temporal relationship between AOD and community decline and help establish a causal link between the two, work that is of particular interest to other declining cities and may provide an effective policy tool for addressing this concern.

Baltimore City is just one of many U.S. cities experiencing a dramatic decline in population. Without direct intervention, the AOD in these cities will continue to increase, which could have disastrous public health consequences (Campbell *et al*, 2009). The goal of this study was to evaluate the potential impact of new zoning legislation (*TransForm* Baltimore) on locations of alcohol outlets. This was accomplished by geocoding existing PGS and using both pre- and post-*TransForm* zoning files to identify various past and present PGS violations. Socioeconomic variables were obtained and used to explain the PGS landscape in-depth. While 172 of the 263 PGS in Baltimore City violate zoning, the 99 found in residential zones (including 90 historically non-conforming) have 2 years to relocate or become compliant. To date, little research exists on the effect of using zoning law to reduce alcohol outlet density/clustering, thus the outcomes of *TransForm* need to be closely monitored to determine the efficacy of using this approach in other cities, particularly those with declining populations.

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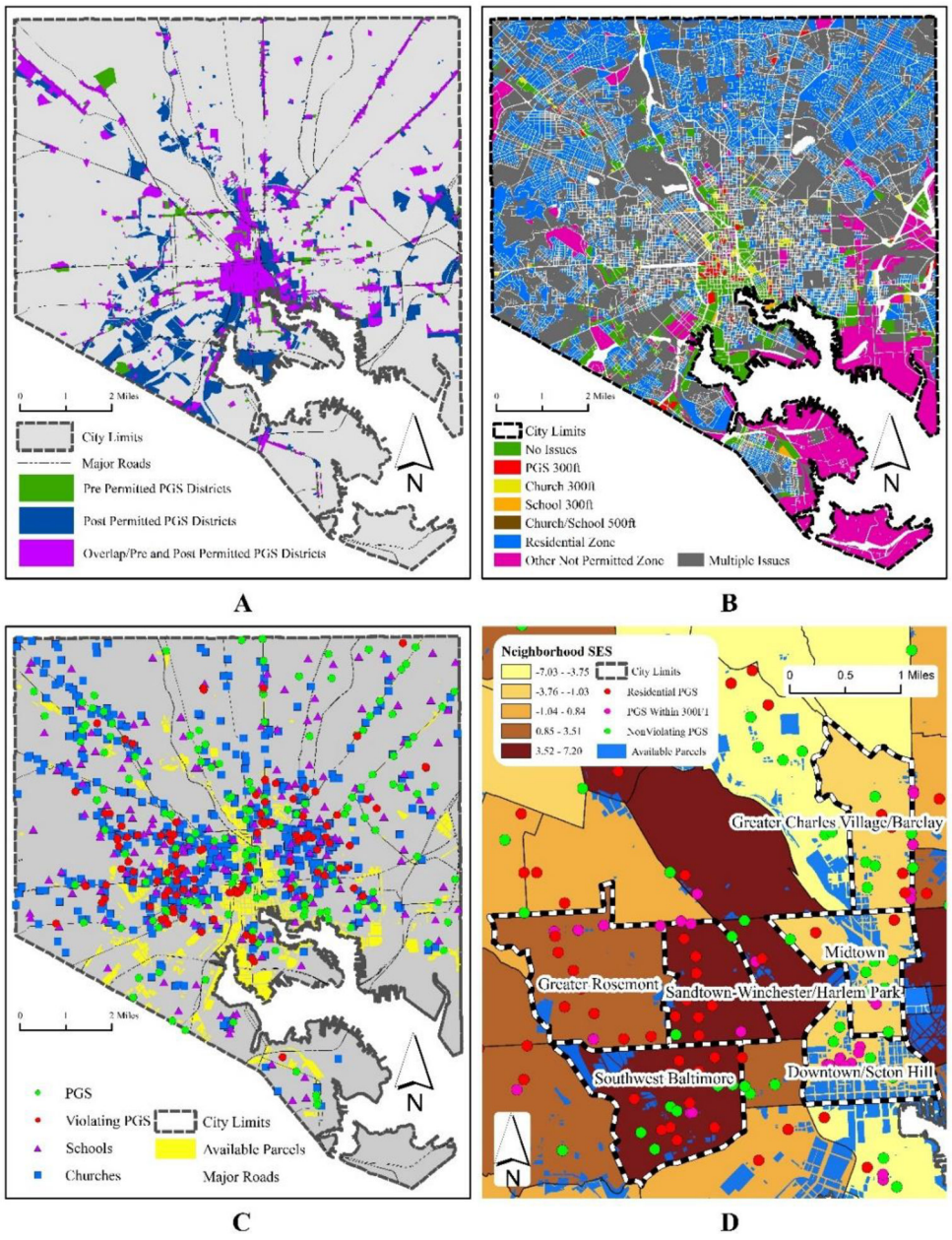

Figure 1.

Maps of Baltimore City showing: (A) districts allowing PGS relocation pre and post *TransForm*, (B) zoning restrictions for alcohol outlets post-*TransForm*, (C) location of schools, churches, PGS, and land parcels where PGS may be able to relocate, (D) featured CSAs of West Baltimore highlighting SES; with violating and non-violating PGS and land parcels where PGS may be able to relocate.

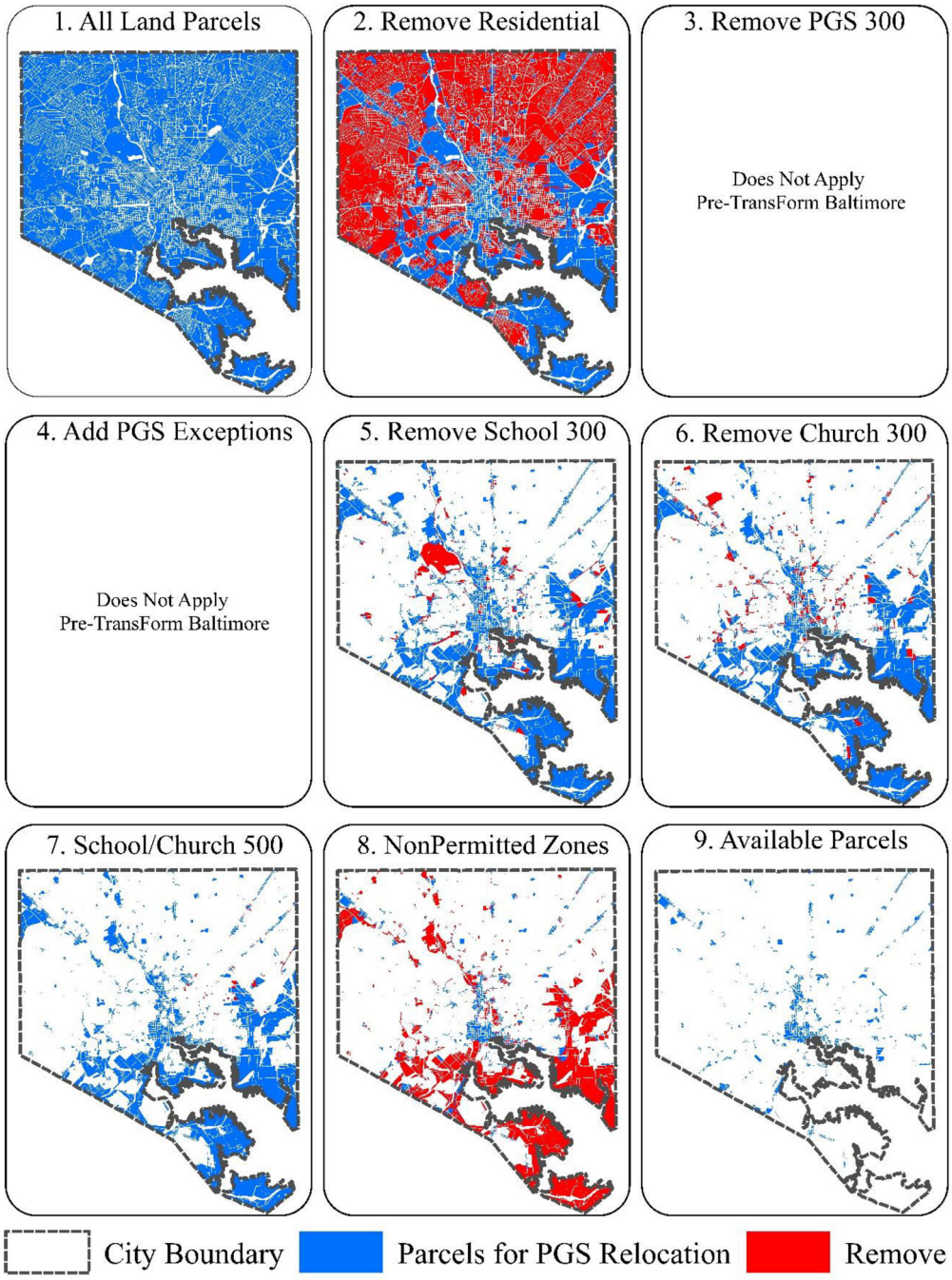

Figure 2.
Highlights the process of finding land parcels where PGS may be able to relocate preTransForm.

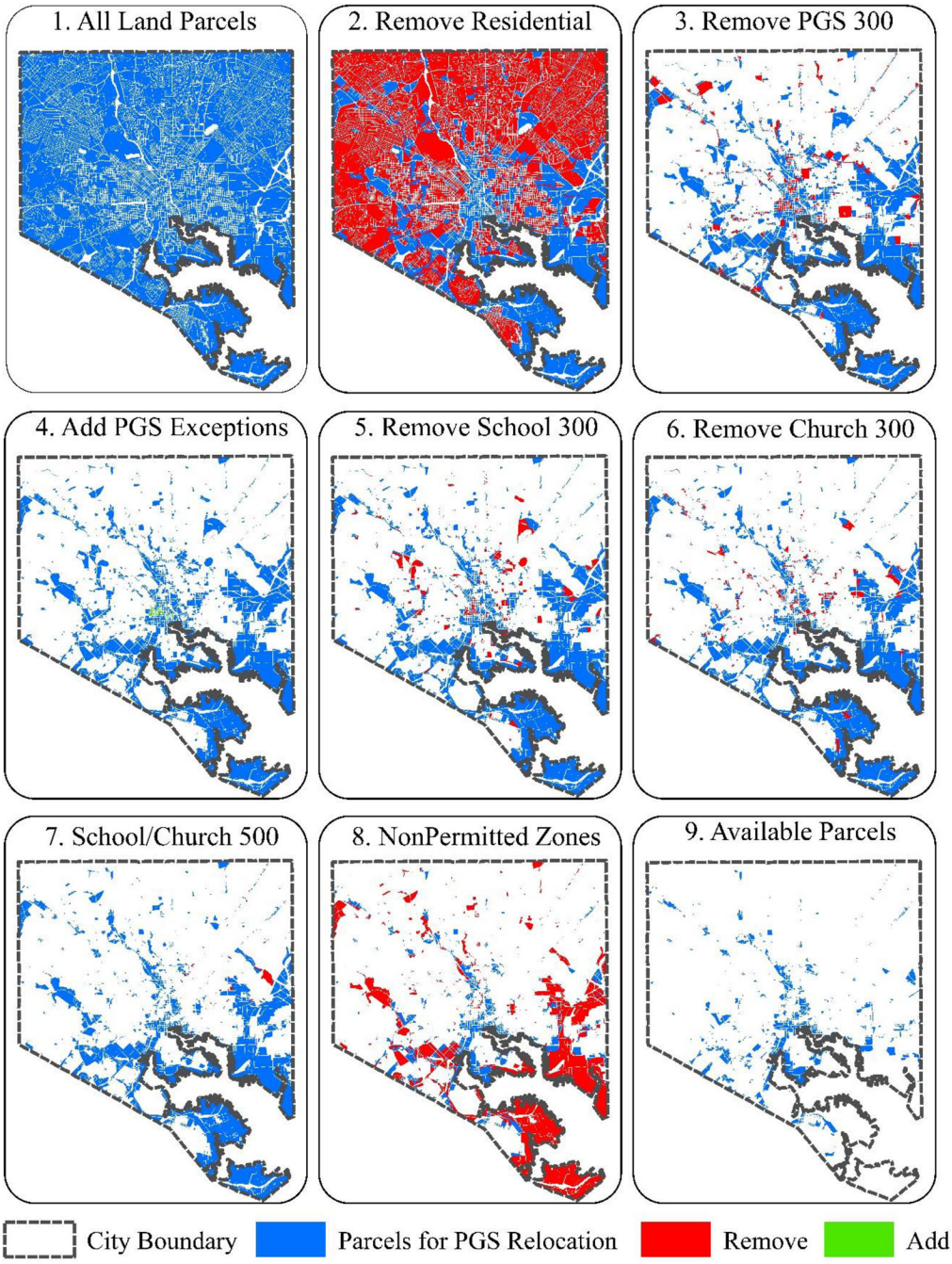

Figure 3.

Highlights the process of finding land parcels where PGS may be able to relocate postTransForm

Table 1.

PGS violating one or more zoning criteria with 300 Foot Buffers Overlapping PGS Parcels / Church Parcels / School Parcels and multiple parcel types.

	Total Number	Number of LA	Number of LA-2	Number of WA
PGS	37	33 (89.2)	1 (2.7%)	3 (8.1)
Churches	78	64 (82.1%)	9 (11.5%)	5 (6.4%)
Schools	23	19 (82.6%)	1 (4.3%)	3 (13.1%)
PGS & Churches	8	7 (87.5%)	1 (12.5%)	0 (0%)
PGS & Schools	1	1 (100%)	0 (0%)	0 (0%)
Churches & Schools	8	7 (87.5%)	1 (12.5%)	0 (0%)

LA License Type: Off-premise sale of beer, wine, and liquor

LA-2 License Type: Off-premise sale of beer, wine, and liquor with more sale hour restrictions

WA License Type: Off-premise sale of beer and wine

Table 2.

Average demographics for only CSAs with PGS, CSAs with only PGS violating the 300 Foot Rule, and the city average which includes all CSAs.

Parcel Averages	Black Population	Not Graduate High School	Lone Parent Family	Unemployment	Household Poverty	Vacancy
PGS (Percent)	64.58	55.10	34.99	12.96	23.07	37.11
Violating PGS (Percent)	73.39	58.29	38.25	15.14	26.02	43.85
Citywide (Percent)	63.74	52.06	33.90	12.01	20.54	30.90

Table 3.

CSA averages for the following groupings of parcels: existing stores, existing stores violating 300 foot rule, existing stores in residential zones, and where PGS could/can establish pre- post-*TransForm*.

Community Averages	Parcel Area (Ac)	Population	Percent Black	SES	Vacant Units	PGS/1,000 Parcels	PGS/1,000 People
Existing Store Parcels N=263	0.68	13091.37	65.82	0.63	2440.93	1.59	0.54
Existing Store Parcels Violating 300 ft Rule N=37	0.37	12570.83	61.33	−0.18	2306.38	2.97	0.71
Existing Store Parcels in Residential Zones N=90	0.04	12982.58	80.1	2.38	3119.12	1.37	0.59
Available Parcels Pre-*TransForm* N=7929	1.26	11374.99	47.45	−0.21	1742.05	1.26	0.52
Available Parcels Post-*TransForm* N=5779	0.48	10919.17	45.29	−0.39	1760.38	1.85	0.6
Citywide N=223900	0.18	10733.77	62.23	−0.13	1424.17	0.99	0.36

Table 4.

CSA statistics for the 6 CSAs with the highest density of PGS per 1,000 people, and averaged values for the aggregation of the other 49 CSAs.

CSA	Downtown/ Seton Hill	Midway/ Coldstream	Greenmount East	Poppleton/The Terraces/ Hollins Market	Sandtown-Winchester/ Harlem Park	Southwest Baltimore	Other CSAs Combined
Total Number of Parcels	1402	3990	4672	5054	9713	2675	4008.16
Parcels Where PGS Allowed Pre*TransForm*	959	105	34	59	175	303	110.65
Parcels Where PGS Allowed Post-*TransForm*	511	99	30	27	12	133	93.51
% Change in PGS Eligible Parcels	−46.72	−5.71	−11.76	−54.24	−93.14	−56.11	−15.49
Total Number of PGS	13	9	7	4	11	18	3.78
Total Number Violating PGS	7	4	7	1	9	12	1.47
PGS Violation %	53.85	44.44	100.00	25.00	81.82	66.67	33.87
PGS/1,000 Parcels	9.27	2.26	1.50	0.79	1.13	6.73	0.99
PGS/1,00 0 People	2.00	0.95	0.83	0.79	0.74	1.01	0.36
Total Populatio n	6495	9500	8460	5070	14847	17783	10733.77
Percent Black	37.8	96.1	95.8	83.5	97.0	76.2	62.23
SES	−1.87	2.02	5.56	2.88	4.90	4.93	−0.13
Vacant Units	1610	2427	3121	1343	5609	6583	1424.19