

UPDATE: *TransForm Baltimore* Health Impact Assessment Violent Crime Literature Review and Local Analyses

Analysis date: 10/28/2011

Background

Rationale: The Baltimore City Health Department has shown consistent commitment to making Baltimore's neighborhoods healthier places to live. The *Healthy Baltimore 2015*¹ policy agenda explicitly identifies improving the health-promoting potential of neighborhoods among its top priorities. The *Health Impact Assessment (HIA) of Baltimore City's Comprehensive Zoning Code Rewrite*² identifies the potential for zoning policy to have positive health and safety impacts on Baltimore City neighborhoods through multiple mechanisms including impacting the location, distribution, and density of alcohol outlets in Baltimore City.

Literature Review

Realizing that the zoning code rewrite may help the city reach the *Healthy Baltimore 2015* goals of reducing alcohol outlets overall, we conducted a focused literature review of peer-reviewed scientific manuscripts to determine the relationship between alcohol outlets and violent crime and assess the level of evidence (i.e. associative to causal) (see Appendix 1). For generalizability, only studies of similar population size to Baltimore (i.e. cities with a >200,000 population) were included. Violent crime is defined as assaultive crimes including: homicide, rape, aggravated assault, robbery, and burglary. The review included associative (i.e. cannot address causality) studies including seven ecologic analyses and one case control and one causal study including one longitudinal ecologic study. All the studies showed a positive association between the presence and density of alcohol outlets and violent crime in U.S. cities with >200,000 population. We found two studies particularly compelling. Franklin et al (2010) was conducted in Washington, D.C., a city of similar size and proximal to Baltimore. Yu et al (2009), a longitudinal ecologic study, was compelling because of the casual implications. The study suggested that changes in alcohol outlet density impact crime rates. We presented the results of the literature review to local leaders and decision-makers at the planning and health departments.

Local Evidence

In addition to the literature review, key leaders at the health and planning departments asked for local evidence regarding the relationship between alcohol outlets and violent crime to support the local use of zoning changes. In collaboration with the Center for Child and Community Health Research (CCHR) and experts from the Bloomberg School of Public Health and the Baltimore City Planning Department, we sought to provide local evidence along two avenues. First, we began development of a rigorous scientific analysis and related manuscript to determine the relationship between alcohol outlets and violent crime among census tracts in Baltimore (this work is still in progress). Second using an HIA approach and assuming causality based on the strength of evidence (number of studies and the one longitudinal study), we conducted an exploratory case-control analysis to estimate the number of alcohol outlets likely to be affected by amortization, the local relationship between alcohol outlets and violent crime, and the potential local impact on violent crime by the amortization of all nonconforming off-premise alcohol outlets. The off-premise alcohol outlets identified for possible amortization have

¹ <http://www.baltimorehealth.org/healthybaltimore2015.html>

² <http://www.hiaguide.org/hia/transform-baltimore-health-impact-assessment>

been “nonconforming” (i.e. identified as an inappropriate use in residential settings) since the last zoning code rewrite in 1971.

Methods: Publicly available data on violent crimes was obtained from the Baltimore City Police Department for a two year period. Data on off-premise alcohol outlets (Class A) by conforming/non-conforming status was obtained from the Planning Department. Case neighborhoods were defined as neighborhoods with nonconforming off-premise alcohol outlets. Identification of the sampling frame for the selection of control neighborhoods involved multiple steps. From the universe of all Baltimore City neighborhoods (i.e. census block groups [n=710]), we excluded any neighborhood with a nonconforming off-premise alcohol outlet to identify a set of potential control neighborhoods (n=510). From the centroid (geographic center) of each potential control neighborhood, we drew a 300 foot buffer. We further excluded from our control set any buffers (or areas) that did not conform to the zoning distribution of identified case neighborhoods (defined as having a nonconforming off-premise alcohol outlet).

From this control set, we randomly selected control neighborhoods at a 1:1 ratio to case neighborhoods. Violent crime counts within a 300-foot buffer around the geographic center of each neighborhood were summed by case and control neighborhoods and compared. The 300-foot buffers were used as a conservative estimate of the distance over which a land use might influence crime (Groff 2011). To conduct the exploratory projection into potential crimes averted, the violent crime count in the control neighborhoods was considered the “background count” of crime and this background count was subtracted from the case neighborhoods to obtain a potential crimes averted count over a two year period.

Results for Estimated Impact of 100% Amortization: By amortizing 100% of nonconforming, off-premise alcohol outlets, we estimate 128 outlets would be affected. We found that the average violent crime counts were higher in neighborhoods containing non-conforming off-premise alcohol outlets (i.e. cases) as compared to similarly-zoned, randomly selected neighborhoods without outlets (i.e. controls) (Table 1). In an exploratory projection assuming a causal relationship, we estimated that across all 300-foot buffers, 871 violent crimes may be averted by amortization. In other words, we estimated that amortization could result in up to a 31% reduction in violent crimes over a two-year period among all 300-foot buffers around the closed outlets.

Table 1. Violent Crime Count Comparison between Neighborhoods Containing (vs. Not Containing) Nonconforming Off-Premise Alcohol Outlets, Baltimore City, 2008-2009 (n=222)

Neighborhoods ¹	Total Violent Crime Counts	Median	Range	Mean
Nonconforming Off-Premise Alcohol Outlets (n=111)	2810	5.5	0-101	12.7
Without Nonconforming Off-Premise Alcohol Outlets (n=111)	1939	2	0-134	8.7

¹ Neighborhoods are defined as census block groups.

² Total violent crime counts are defined as the two year (2008-2009) total count of violent crime within a 300 foot buffer around the geographic center of case and randomly selected control neighborhoods.

Conclusions: The focus of this report was to extend work conducted by the Center for Child and Community Health (CCHR) on a *Health Impact Assessment (HIA) of Baltimore City's Comprehensive Zoning Code Rewrite*. The current work provides the results of a focused literature review and local analyses to support the use of the zoning code rewrite to improve the health of Baltimore citizens and mitigate unintended negative health impacts through the amortization of alcohol outlets. The literature review suggests that there is a consistent, coherent and specific body of evidence with some support for causality supporting a relationship between alcohol outlets and violent crime. The exploratory local analyses suggest that neighborhoods with (vs. without) nonconforming outlets have higher violent crimes and given a causal relationship, that there may be as much as 31% reduction in crimes in local areas where alcohol outlets are amortized.

Scope, Considerations and Companion Strategies

The scope of this project did not include economic assessments or predictions for each individual outlet. The amortization of nonconforming off-premise alcohol outlets does not guarantee the overall reduction of alcohol outlets in Baltimore City as the stores may have the option to relocate or sell their license. The amortization of alcohol outlets also does not guarantee a reduction in violent crime.

In order to achieve a 15% reduction in alcohol outlets in Baltimore City as outlined in *Healthy Baltimore 2015*, additional strategies other than amortization are needed in the zoning code and in other city policies. Some of these additional strategies were included among the recommendations of the *TransForm Baltimore* Health Impact Assessment, and some of them have been incorporated into the latest version of the *TransForm* Baltimore draft new zoning code. Additional strategies include:

1. Incorporating dispersal standards for new, off-premise outlets – no off-premise alcohol outlet may locate within 300 feet of another alcohol outlet (on- or off-premise).³
2. Reducing the number of districts in which off-premise alcohol outlets are permitted by right and are instead 1) permitted conditionally or 2) not permitted.
3. Including in the conditional use consideration process factors such as:
 - a. Median count of crime in the area where the new liquor store is proposed
 - b. Health status of surrounding neighborhood

REFERENCES

Groff E. Exploring 'near': Characterizing the spatial extent of drinking place influence on crime. *Australian & New Zealand Journal of Criminology* 2011; 44:156.

³Currently the revised draft new code includes currently incorporates language on dispersal standards as part of the use standards for "retail sales-with alcohol". See: §14-331. Retail Goods Establishment – With Alcohol Sales of the draft new code for details.

APPENDIX 1

The Relationship between Liquor Stores and Crime in Large U.S. Urban Areas: A summary of the scientific evidence

This literature review builds on the Health Impact Assessment (HIA) of Baltimore City's Comprehensive Zoning Code Update. The purpose of the literature review is to provide a summary of the scientific evidence regarding the potential public health benefits of minimizing liquor outlet density.

Introduction & Background

- The National Prevention Strategy released by the U.S. Surgeon General's Office in March 2011 serves as the nation's blueprint for advancing health and wellness. It specifically highlights the importance of including health considerations in decision-making across multiple sectors in order to achieve healthier and safer community environments (National Prevention Council, 2011).
- In keeping with this emphasis on cross-sector collaboration, the *Health Impact Assessment of Baltimore City's Comprehensive Zoning Code Rewrite* (Thornton, et al, 2010) explicitly identifies the potential for zoning policy to have positive health and safety impacts on Baltimore City neighborhoods.
- The HIA identifies homicide and risk of violent injuries among the top causes of excess morbidity and mortality for Baltimore City residents. It also highlights a potential role for zoning policy changes to improve health and safety by regulating the location and concentration of liquor stores or outlets, which can impact neighborhood violence and associated health outcomes
- The Baltimore City Health Department has shown consistent commitment to working on making Baltimore's neighborhoods healthier places to live. The *Healthy Baltimore 2015* (BCHD, 2011) policy agenda explicitly identifies improving the health promoting potential of neighborhoods among its top priorities, which requires input and cooperation from across City government and beyond.
- The summary below results from a literature review on the association between liquor stores and crime and the relevance of these findings to the current zoning rewrite.

Strategy

- We identified peer-reviewed scientific articles examining the relationship between liquor outlets and violent crime in large U.S. urban areas by searching three electronic databases (PubMed, Scopus, and ISI Web of Knowledge) using two key word pairings: (alcohol or alcohol outlets) AND (violent or nonviolent crime). Of the 85 articles identified, 9 of them described findings from research studies on violent or assaultive crime conducted in U.S. cities with a population of more than 200,000 residents (see Literature Review References, p. 4 for citations). This subset of articles was deemed most relevant to Baltimore City because they focus on similarly urban areas and crime-related violence.
- Indicators: *Violent crime* is defined as assaultive crimes including: homicide, rape, aggravated assault, robbery, and burglary. Violent crime was chosen as the outcome of interest for the following reasons: 1) theoretical, i.e. within criminology there is a body of conceptual literature specifically linking alcohol outlets to crime; 2) reliability and validity of indicator, i.e. street crimes that are serious and more visible are more likely to be reported (vs. underreported or reported with bias); and 3) homicide and other violent crimes are a particular concern in Baltimore. Furthermore, violent crime rates are highly correlated with the rates of other types

of crimes, which means that where violent crime rates are higher, it is likely that the rate of other types of crime is higher as well.

- In keeping with research best practices, articles were graded as good, fair, and poor based on study design, outcomes measures, and consideration of confounders. The confounders most often identified included measures of age, race/ethnicity, gender, unemployment, population density, education, and arrest history.
- To summarize the evidence, we focused on the overall relationship between liquor outlets and crime and then specifically on the relationship between *off-premise liquor outlets* and whether the relationship varied by income of the neighborhood.

Summary of the Findings

1. **Overall:** The presence and density of liquor outlets (bars, taverns, liquor stores) are associated with violent crime in cities across the U.S. In fact, all 9 studies included in this targeted literature review found that increased liquor availability is associated with increased crime and/or risk of violence (see Literature Review References, for specific citations). Below we highlight findings from two of the 9 studies because they are particularly relevant to Baltimore because of proximity (Franklin et al 2010 was conducted in Washington, DC) and use of a longitudinal study design, which supports the notion that changes in liquor outlet density can result in changes in crime rates (Yu et al 2009).
 - a. In Washington DC, Franklin et al (2010) found that community-level liquor outlet density is significantly associated with assaultive violence, independent of other neighborhood factors including violent crime, and the prevalence of weapons and illicit drugs. The number of liquor outlets in a census tract was significantly related to robbery, assault, and sexual offenses. Comparison between on-premise outlets and off-premise outlets and violent crime revealed significant association between both types of outlets and robbery.
 - b. In Los Angeles, Yu et al (2009) found that the total liquor outlet density is positively related to the assault rate over the study period. The temporary reduction of 250 outlets and permanent loss of 150 outlets over a nine year period corresponded with a statistically significant drop in assaultive violence.
2. **Off premise liquor outlets:** Off premise liquor outlets double the risk of assaultive violence and are associated with increased homicide rates. Four of the 9 studies reviewed had findings specific to the relationship of off-premise liquor outlets with crime, and all found that higher concentrations of these types of outlets in particular were associated with increased crime. In addition to the two studies highlighted below, work by Franklin et al (2010) and by Gorman et al (2005) show an independent association of off-premise liquor outlets with violent crime. The studies below are particularly salient for their use of rigorous multilevel analysis methods (Branas et al 2009) and for using findings to estimate the expected change in violent crime rates associated with a specific change in liquor outlet density (Scribner et al 1997).
 - a. In Philadelphia, Branas et al (2009) demonstrated that being in an area of high off-premise liquor outlet availability significantly increased the risk of being shot in an assault by 2.00 times ($p < 0.05$). Being in an area of high on-premise liquor outlet availability did not significantly change this risk
 - b. A study from New Orleans by Scribner et al (1997) found that A 10% higher off-sale outlet density accounted for a 2.4% higher homicide rate.

3. **Income of the neighborhood:** The effect of liquor outlets on crime differs by income of the neighborhood.
 - a. Low income neighborhoods are most adversely affected by overconcentration of liquor outlets. In Detroit, Michigan, Gyimah -Brempong (2006) found that the crime effect of liquor availability in low income neighborhoods is significantly higher than in high income neighborhoods. At the mean of other variables, the elasticity of total crime with respect to liquor availability in low income neighborhoods in the sample is 0.908 while the elasticity is 0.295 in high income neighborhoods.

Conclusions and Recommended Next Steps

- There is consistent evidence from across the country in cities similar to Baltimore of the potential for negative effects of liquor outlets in terms of violent crime.
- In Baltimore, LaVeist and Wallace¹³ found that liquor stores are disproportionately located in predominantly black census tracts, even after controlling for census tract socioeconomic status.
- Census tracts that are both low income and predominantly African American have substantially more liquor stores per capita than other census tracts and have the worst health outcomes and highest mortality rates from homicide¹²
- Given the rare opportunity of the zoning rewrite to impact where such uses are located, this data provides general support for reducing the number of liquor outlets to support numerous public health goals and City policy objectives.

Literature Review References

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2. Franklin, F.A., LaVeist, T.A., Webster, D.W., & Pan, W.K. (2010). Liquor outlets and violent crime in Washington D.C. *Western Journal of Emergency Medicine*, XI(3), 283-290.
3. Gorman, D. M., Zhu, L., & Horel, S. (2005). Drug 'hot-spots', liquor availability and violence. *Drug and Liquor Review*, 24(6), 507-513.
4. Grubestic, T. H. & Pridemore, W. A. (2011). Liquor outlets and clusters of violence. *International Journal of Health Geographics*, 10(30).
5. Gyimah-Brempong, K. (2006). Neighborhood income, liquor availability, and crime rates. *Review of Black Political Economy*, 33(3), 21-44.
6. Reid, R. J., Hughey, J., & Peterson, N. A. (2003). Generalizing the liquor outlet-assaultive violence link: Evidence from a U.S. Midwestern city. *Substance use & Misuse*, 38(14),1971-1982.
7. Scribner, R., Cohen, D., Kaplan, S., & Allen, S. H. (1999). Liquor availability and homicide in New Orleans: Conceptual considerations for small area analysis of the effect of liquor outlet density. *Journal of Studies on Liquor*, 60(3), 310-316.
8. Yu, Q., Li, B., & Scribner, R. A. (2009). Hierarchical additive modeling of nonlinear association with spatial correlations--an application to relate liquor outlet density and neighborhood assault rates. *Statistics in Medicine*, 28(14), 1896-1912.
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Additional References for Report

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<http://www.healthcare.gov/prevention/nphpphc/strategy/report.pdf>
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<http://www.baltimorehealth.org/healthybaltimore2015.html>
4. Baltimore City Health Department (2008) Neighborhood Health Profiles.
<http://www.baltimorehealth.org/neighborhood.html>
5. LaVeist, T. A., & Wallace, J. M. J. (2000). Health risk and inequitable distribution of liquor stores in African American neighborhoods. *Social Science & Medicine*, 51, 613-617.

Appendix Table A1: Summary of Findings from Studies Meeting Inclusion Criteria for Review of the Scientific Literature Focused on U.S. Studies in Urban Areas (resident population ≥ 200,000 persons)

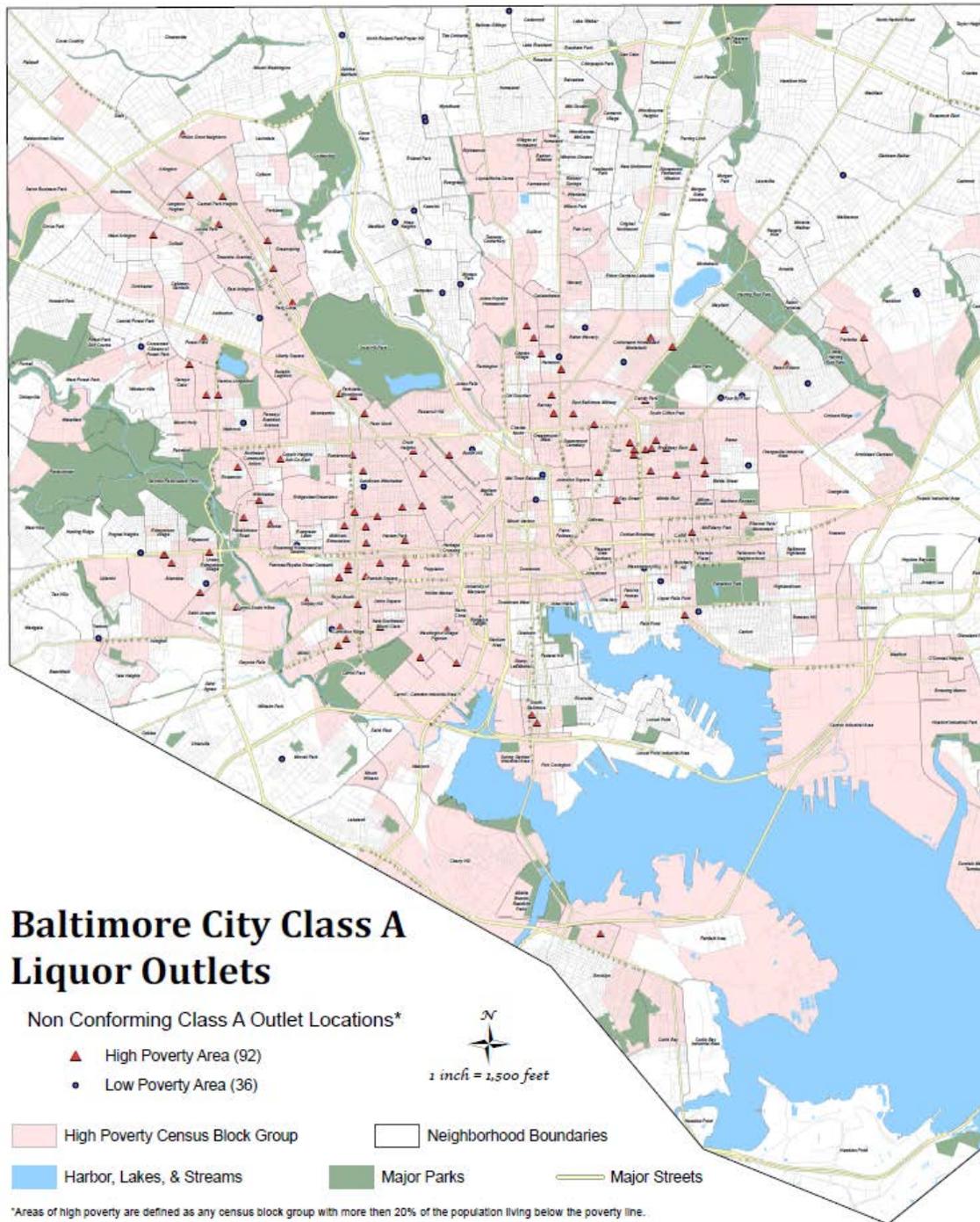
Author:	City:	Liquor Outlet:	Type of Crime:	Findings:	Confounders:	Study Design:
1. Branas, C.C. et al. (2009)	Philadelphia, PA	On vs. Off-premise liquor outlets	Gunshot assaults	Gun assault risk to individuals near off-premise liquor outlets is about the same or statistically greater than the risk they incur from heavy drinking.	Individual: Age, race, gender, ethnicity, unemployment, education, arrest history Neighborhood: liquor outlet availability, racial and ethnic make-up, SES ¹ , arrests for drug trafficking	Multi-level case control
2. Gyimah- Brempong, K. (2006)	Detroit, MI	Does not distinguish between on and off-premise outlets	Criminal homicide, rape, aggravated assault, and robbery; burglary, larceny and motor vehicle theft.	Positive association between liquor outlet density and violence. Dispersing liquor outlets more evenly throughout the city neighborhoods instead of concentrating them in poor neighborhoods could decrease aggregate crime rates.	Neighborhood: SES ¹ Age, population density, racial composition	Ecologic; Census tract
3. Franklin, F. A. et al. (2010)	Washington D.C.	On vs. Off-premise liquor outlets	Assaultive violence: robbery, assault, and sexual offenses.	Liquor outlet density is significantly associated with the violent crimes of assault and robbery.	Neighborhood: Racial composition, population density, drug-related arrests, weapons arrests, occupied households, crowded households	Ecologic; Census tract
4. Gorman, D.M., Zhu, L., & Horel, S. (2005)	Houston, TX	On vs. Off-premise liquor outlets	Assaultive violence: robbery, assault, and sexual offenses.	Both drug crime density in target and adjacent census tracts and off-sale liquor outlet density in target census tract are significant predictors of violent crime.	Neighborhood: Age composition, racial and ethnic composition, SES ¹ , measures of residential instability	Ecologic; Census tract
5. Grubestic, T.H. & Pridemore, W.A. (2011)	Cincinnati, OH	On vs. Off-premise liquor outlets	Simple and aggravated assault	Assaultive violence has a propensity to cluster around agglomerations of liquor outlets.	No confounders considered	Ecologic; Census tract
6. Reid, R. J., Hughey, J., & Peterson, N. A. (2003)	Kansas City, MO	Does not distinguish between on and off-premise outlets	Assaultive violence: robbery, assault, and forcible rape.	Liquor outlet density is significantly associated with violent crime.	Neighborhood: SES ¹ , racial and ethnic composition, age composition, % of female-headed households, population density	Ecologic; Census tract
7. Scribner, R., Cohen, D., Kaplan, S. & Allen, S. H. (1997)	New Orleans, LA	On vs. Off-premise liquor outlets	Homicide	Both off-sale liquor outlets per square mile and off-sale outlets per person demonstrate strong geographic associations with homicide rates.	Neighborhood: Racial composition, age composition, SES ¹ , gender composition, % of single-headed households	Ecologic; Census tract
8. Yu, Q., Li, B., & Scribner, R. A. (2009)	Los Angeles, CA	On vs. Off-premise liquor outlets	Assaultive violence: robbery, assault, and sexual offenses.	Positive association between liquor outlet density and violence.	Neighborhood: Racial composition, ethnic composition, age composition, population density	Ecologic; Census tract; Longitudinal ²
9. Zhu, L., Gorman, D.M., & Horel, S. (2004)	San Antonio, TX Austin, TX	On vs. Off-premise liquor outlets	Violent crime: murder, rape, robbery, and aggravated assault	Liquor outlet density is significantly associated with violent crime.	Neighborhood: Racial composition, SES ¹ , % of vacant homes, population density	Ecologic; Census Tract

¹ SES composition refers to measures of any or all of the following neighborhood characteristics: neighborhood median income, poverty rate, employment rate, median education attainment

² Changes over time in these covariates were accounted for.

APPENDIX 2

Appendix Figure A2. Distribution of Class A Nonconforming Off-Premise Alcohol Outlets in High vs. Low Poverty Baltimore City Neighborhoods



Stephanie Rawlings-Blake
 Mayor
 Thomas J. Stosur
 Director of Planning

