

Bibliography for GIS Uses in Violence Epidemiology

Lizette Romano

Department of Environmental Health Sciences, University of California Los Angeles

ENVHLT 207: Introduction to Geographic Information Systems

Dr. Michael Jerrett, PhD

February 16, 2023

Bibliography for GIS Uses in Violence Epidemiology

Violence is a problem that low-income communities are exposed to and an epidemic (American Public Health Association, 2018). Violence is a social determinant of health with detrimental effects (Office of Disease Prevention and Health Promotion, n.d.). Exposure to crime and violence is an adverse childhood experience (ACE) and can lead to other health problems (Metzler et al., 2017).

Lardier et al. (2021) identified the relationship of aggravated assault occurrences with three factors; vacant and abandoned properties, alcohol density of establishments with licenses C and D, and police calls for violent crimes, using ArcGIS 10.6. The data was spatially joined in ArcGIS and a negative binomial regression was done with the four variables in STATA to determine associations. Data for the four variables and individuals was geocoded then aggregated into 107 census blocks. Spatial proximity to the three factors mentioned previously was significantly associated with aggravated assault occurrences, but there was no statistically significant spatial autocorrelation. The study concluded that built environment improvements improved community violence; it would have been helpful to include these built environment amenities, or lack of, in the map. Another critique is that the bar graphs are hard to read, and the map is not visually intuitive.

Lasecki et al. (2017) used ArcMap 10.4.1 to define intentional injuries and detect potential risk factors in Mobile County based on census blocks. They used point level data from a trauma center to determine the place where injuries occurred and a kernel density analysis on a second map to show statistically significant spatial clusters of incidents of intentional injury. 1,009 of 3,109 incidences were geocoded. They did an ordinary least squares analysis to compare alcohol density proximity and socioeconomic factors including unemployment, single-

parent households, and education level to the incidence in each census block group. Alcohol density was not significant, but the other factors were. One limitation was that census block group boundaries may not be as predictive as “hotspot boundaries” in determining intentional injury; it would be good if the researchers presented a second map using the hotspot boundaries for comparison. One critique of their map is that they did not label built environment amenities.

Walker et al. (2014) used GIS to identify urban areas at high risk of experiencing clusters of interpersonal violence and injury. They used injury data with injury severity scores over 15 from a trauma center. They mapped variables for injury location, victim age; sex, date and time of incident, and type of weapon that caused the injuries to determine relationships. They used a kernel density estimation to produce a male and female non-inferential map. The proportion of socioeconomic variables to violent injury locations was found using a deprivation index and separated into quartiles. They suggest that proximity to alcohol serving businesses may be important. Due to the cutoff used, they had a lot of gun violence wounds cases; it would be helpful to include this in their title or clarify this limitation from the beginning. One critique is that they could have included low-income or high-density housing as a layer in their map since they stated that their findings followed a similar pattern. They mentioned features of the built environment but only included a few.

The website I chose is the Baltimore Police Department Crime Map. The map is updated every morning using publicly available data from the past week (Baltimore Police Department, 2023). It allows users to select total counts of crime in the past week, month, or year. The map allows for filtering based on crime type, council districts, police districts, legislative districts, and neighborhoods. It allows users to zoom in to see public spaces including plazas, parks, schools, transportation, and highways and streets.

One critique of the map is that when zoomed out to the states level, the icon for the crime with the highest counts covers the city. The map does not have a legend to show what icons are. Another critique is that when the map is zoomed in to the streets level, you can't see places that sell alcohol as a feature which is important since alcohol establishment density in communities is related to increased rates of gun violence (Jennings et al., 2014).

References

- American Public Health Association. (2018). *Violence is a public health issue: Public health is essential to understanding and treating violence in the U.S.* <https://apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2019/01/28/violence-is-a-public-health-issue>
- Baltimore Police Department. (2023). *Crime Stats*. Baltimore Police. <https://www.baltimorepolice.org/crime-stats>
- Lardier, D.T., Opara, I., Lin, Y., Roach, E., Herrera, A., Garcia-Reid, P., & Reid, R.J. (2021). A Spatial Analysis of Alcohol Outlet Density Type, Abandoned Properties, and Police Calls on Aggravated Assault Rates in a Northeastern U.S. City. *Substance Use & Misuse*, 56(10), 1527-1535. DOI: 10.1080/10826084.2021.1942053
- Lasecki, C.H., Mujica, F.C., Stutsman, S., Williams, A.Y., Ding, L., Simmons, J.D., and Brevard, S.B., & Mobile, Alabama. (2017). Geospatial mapping can be used to identify geographic areas and social factors associated with intentional injury as targets for prevention efforts distinct to a given community. *Trauma Acute Care Surg*, 84(1), 70-74. DOI: 10.1097/TA.0000000000001720
- Jennings, J. M., Milam, A. J., Greiner, A., Furr-Holden, C. D., Curriero, F. C., & Thornton, R. J. (2014). Neighborhood alcohol outlets and the association with violent crime in one mid-Atlantic City: The implications for zoning policy. *Journal of Urban Health*, 91(1), 62–71. <https://doi.org/10.1007/s11524-013-9821-z>
- Metzler, M., Merrick, M. T., Klevens, J., Ports, K. A., & Ford, D. C. (2017). Adverse childhood experiences and life opportunities: Shifting the narrative. *Children and Youth Services Review*, 72, 141–149.

Office of Disease Prevention and Health Promotion (n.d.). *Crime and Violence*. Healthy People 2030. <https://health.gov/healthypeople/priority-areas/social-determinants-health/literature-summaries/crime-and-violence#cit8>

Walker, B.B., Schuurman, N., & Hameed, S.M. (2014). A GIS-based spatiotemporal analysis of violent trauma hotspots in Vancouver, Canada: identification, contextualisation and intervention. *BMJ Open* 2014, 4, e003642. DOI:10.1136/bmjopen-2013- 003642