

Spatial Epidemiology of HIV | 2017

Access to Syringe Services Programs in a Bi-Metropolitan Setting

BACKGROUND

Human Immunodeficiency Virus (HIV) is a highly stigmatized life-threatening disease that has rippled across the United States since the early 1960s.¹ Predominantly known for its disproportionately high rates in men who have sex with men (MSM), anyone is susceptible to the devastating effects of HIV if they contract this virus.² Despite nationally decreasing trends in the incidence of HIV, sporadic outbreaks have been arising across the country in the wake of the opioid crisis.^{2,3} Experts suggest that this may be attributed to the proliferation of fentanyl, one of the most potent synthetic opioids we have today.^{3,4} Fentanyl is not only powerful, but due to its addictive properties and rapid metabolism in the body, people who inject drugs (PWID) need more consistent injections.⁴ The high frequency of fentanyl injection increases one's susceptibility to a potential overdose as well as their probability of transmitting blood-borne diseases through the repeated use of unclean syringes and the 'works'.^{3,4} The recent HIV outbreaks among homeless PWID communities substantiate these assumptions.^{2,3} Many cities have decided to act on this re-emerging health threat by expanding syringe services programs (SSP).² At these locations, PWID can exchange their used/contaminated needles for sterile syringes while typically being offered referrals or information on recovery services.² Nonetheless, we as public health professionals must recognize that **place matters** and ensure access to these crucial interventions among communities most affected by HIV. To date, there have been no studies that have explicitly juxtaposed the spatial epidemiology of HIV against the current positioning of fixed and mobile SSP sites in Baltimore City, MD and Washington, D.C.. Located within a bi-metropolitan setting, these rapidly diversifying cities are crucial intervention points as they are known for their relatively high prevalence of injection drug use (IDU).² Therefore, this study aimed to characterize the geographic accessibility to SSP among communities that are disproportionately burdened by HIV. In the effort to promote health equity, this study will further attempt to identify target localities for future SSP offerings in Baltimore City and Washington, D.C..

SPATIAL QUESTIONS & OBJECTIVES

- Do localities that are disproportionately burdened by HIV have equitable access to syringe services programs (SSP) within their geographic context?
- To identify localities that are disproportionately affected by HIV yet have low access to current SSP offerings in which should be targeted in future public health interventions.

METHODS

Prior to the beginning of these analyses, IRB approval was achieved under the designation of 'non-human subjects' research. Those 2017 ZIP Code level HIV data were retrieved from the Maryland Department of Public Health and AIDSvu for Baltimore City and Washington, D.C., respectfully. Those tabular data were properly formatted in Microsoft Excel then joined with ZIP Code shapefiles derived from MD iMAP and Open Data DC. These preliminary steps were conducted in order to create the underlying choropleth maps that display the spatial epidemiology of HIV. The cross-street addresses for all syringe services program (SSP) locations were derived from Baltimore Health and DC Health, respectfully. These addresses were uploaded into Google Maps, the longitude and latitude coordinates were abstracted, and the points were placed on the map using the 'Add XY' function. Proximity buffers were generated at 0.25 mile, 0.50 mile, and 0.75 mile Euclidean distances around each SSP site as a preliminary measure of spatial accessibility. To get a more accurate measure of accessible, 0.25 mile, 0.50 mile, and 0.75 mile service areas were generated using a network analysis of street centerlines. All spatial analyses were conducted in ArcGIS 10.7.1.

Baltimore City, MD

Zip Codes

RESULTS

The spatial epidemiology of HIV is more widespread in Washington, D.C. as opposed to Baltimore City. In Baltimore City, there was one ZIP Code whose prevalence rate peaked 3,500 HIV-positive individuals per 100,000 population. As one progresses from the perimeter of Baltimore City towards the Inner Harbor, it appears as though there is a general trend of increasing HIV prevalence. However, in Washington, D.C. a majority of the ZIP Codes on the southeastern side of the District have an HIV prevalence rate of 3,500 cases per 100,000 population or greater. In this instance, the spatial epidemiology of HIV generally increases as one approaches the southeastern side of the District without relief on the perimeter. As compared to Washington, D.C., it appears as though Baltimore Health has done a sufficient job of ensuring SSP coverage to localities most strongly affected by HIV. Furthermore, it is evident that disproportionately affected communities residing in the southeastern Zip Codes of Washington, D.C. do not have equitable access to SSP within their geographic context.

DISCUSSION

These analyses demonstrate the importance of place when instituting public health interventions. It appears evident that individuals who reside in the disproportionately affected ZIP Codes in the southeastern side of Washington, D.C. do not have equitable access to SSP. Therefore, it may be recommended that DC Health should prioritize the positioning of SSP sites within these disproportionately affected ZIP Codes. These programmatic offerings could take the form of mobile SSP that cycle through these neighborhoods on a weekly or bi-weekly schedule. Baltimore Health appears to provide sufficient coverage of the most affected Zip Code; however, more work needs to be done among other localities that are still disproportionately affected. Nonetheless, it must be recognized that the suggestions derived from this study are limited due to the level of analysis. Currently, HIV remains to be a highly stigmatized disease; therefore, point data and census tract level data are typically unavailable to the public. Underlying choropleth maps using those data would provide more robust insights. Furthermore, the 2017 vintage of those data used may present a second limitation. Given the lag in data availability, the spatial epidemiological trends may be dated in coordination with the current positioning of SSP. Despite these limitations, a significant strength of this study is the use of multiple analytical tools for accessing geographic accessibility while exploring novel spatial objectives within the context of Baltimore City, MD and Washington, D.C..

Cartographer: Ian R. Roy, M.P.H. (cand.)

Department: Public Health & Community Medicine

Course: PH262: Geographic Information Systems (GIS) for Public Health

Instructor: Dr. Thomas J. Stopka

Date: May 1st, 2020 (Spring 2020)

Data Sources: Maryland Department of Public Health, Baltimore Health, AIDSvu, DC Health, MD iMAP, & Open Data DC

Projected Coordinate System: NAD 1983 State Plane Maryland FIPS 1900

Geographic Coordinate System: GCS North American 1983

References

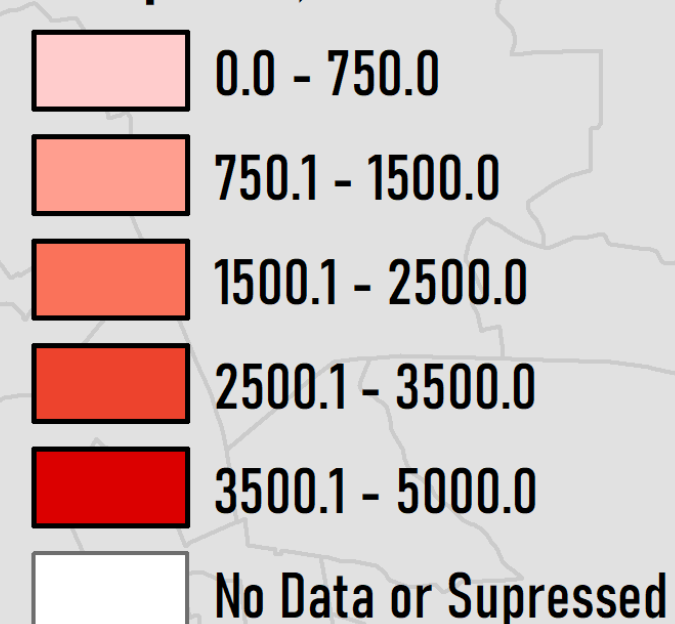
- Minzi, M., & Surratt, H. (2016). HIV stigma among substance-abusing PLWH: Implications of HIV treatment, ARV adherence and diversion. *Drug and Alcohol Dependence*, 146, 1175. doi:10.1016/j.drugalcdep.2014.09.392
- Abassi, J. (2017). CDC says more needle exchange programs needed to prevent HIV. *The Journal of the American Medical Association*, 317(4), 350. doi:10.1001/jama.2016.19542
- CDC. (2019). HIV transmission. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services.
- CDC. (2019). Fentanyl. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services.

Washington, D.C.

Zip Codes

HIV Prevalence

Rate per 100,000



Syringe Services Programs

Type

- Fixed
- Mobile

Euclidean Proximity

- 1/4 Mile
- 1/2 Mile
- 3/4 Mile

Walk Time Distance

- 5 Minutes or Less (1/4 Mile)
- >5 Minutes to 10 Minutes (>1/4 Mile to 1/2 Mile)
- >10 Minutes to 15 Minutes (>1/2 Mile to 3/4 Mile)



* The north arrow and scale bar are applicable to the total map frame

