

Application of Machine Learning Algorithms for Localized Syringe Services Program Policy Implementation – Florida, 2017



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Introduction

People who inject drugs (PWID) are at an amplified vulnerability for experiencing a multitude of harms related to their substance use, including viral (e.g. HIV, Hepatitis C) and bacterial infections (e.g. endocarditis). Implementation of evidence-based interventions, such as syringe services programs (SSPs), remains imperative, particularly in locations at an increased risk of HIV outbreaks. This study aims to identify communities in Florida that are high-priority locations for SSP implementation by examining state-level data related to the substance use and overdose crises.

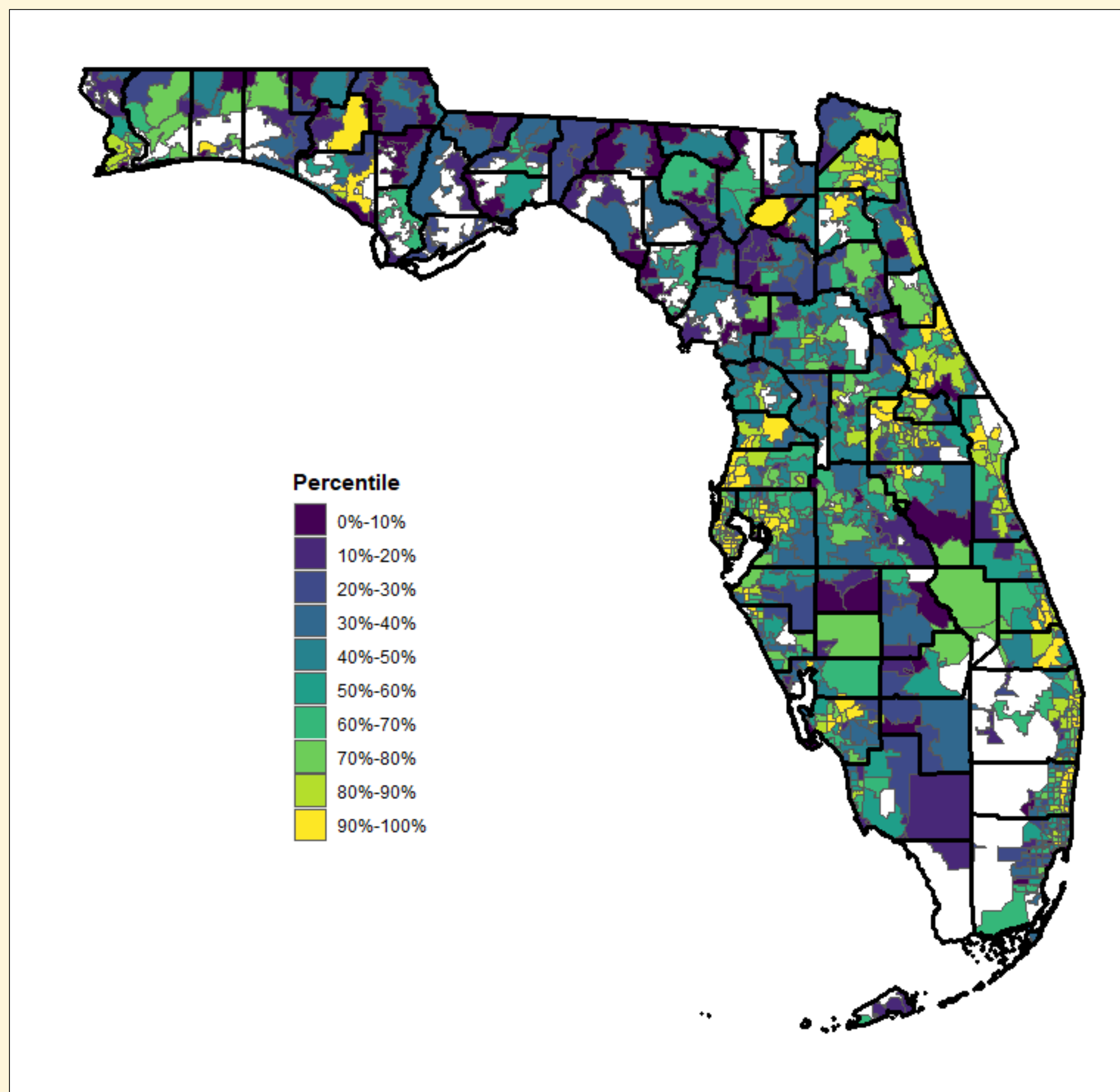
Methods

State-level surveillance data were aggregated at the ZIP Code Tabulation Area (ZCTA) (n=983) for 2017. We used confirmed cases of acute HCV infection as a proxy of injection drug use. Data were split into training (70%) and testing (30%) datasets. Least Absolute Selection and Shrinkage Operator (LASSO) regression was used to develop a machine learning model to identify significant indicators of acute HCV infection and high-priority areas for SSP implementation due to their increased vulnerability to an HIV outbreak.

Results

The final model retained three variables of importance: 1) the number of drug-associated skin and soft tissue infection hospitalizations, 2) the number of chronic HCV infections in people aged 18-39, and 3) the number of drug-associated endocarditis hospitalizations. High-priority SSP implementation locations were identified in both urban and rural communities outside of current Ending the HIV Epidemic counties.

County	Number of ZCTAs identified as high priority
Pinellas	13
Duval	8
Palm Beach	8
Pasco	8
Broward	7
Orange	7
Volusia	6
Lee	6
Hillsborough	5
St. Lucie	4
Hernando	3
Bay	2
Brevard	2
Clay	2
Manatee	2
Miami-Dade	2
Sarasota	2
Seminole	2
Osceola	2
Charlotte	1
Escambia	1
Martin	1
Okaloosa	1
St. Johns	1
Sumter	1
Union	1
Washington	1
Total	99



Left: Table 1. Descriptive statistics of Florida counties containing high-priority ZCTAs*
Right: Figure 1. Map of predicted acute HCV percentiles by ZCTA produced by the LASSO model. Solid black lines indicate county lines; solid gray lines indicate ZCTA boundary; white space represents water or protected land (e.g. Everglades).

Conclusion

SSPs are long researched, safe, and effective evidence-based programs that offer a variety of services that reduce disease transmission and assist with combating the overdose crisis. Opportunities to increase services in needed regions across the state now exist in Florida as supported by the expansion of the Infectious Disease Elimination Act of 2019. This study provides details where potential areas of concern may be and highlights regions where future evidence-based harm reduction programs, such as SSPs, would be useful to reduce opioid overdoses and disease transmission among PWID.

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