

Maya Reed, Mithra Cama, Jackson Smith

Texas Department of State Health Services, Texas Center of Infectious Diseases

Introduction

The Texas Center for Infectious Disease (TCID) is the only Tuberculosis (TB) hospital located within the United States. While Tuberculosis rates have fluctuated over the past few decades, Texas has seen a steady increase in TB cases since the COVID-19 pandemic. Drug-resistant TB remains a major public health concern due to its impact on treatment outcomes, particularly in high-burden areas such as Texas.

The Social Vulnerability Index (SVI) is a tool developed by the Centers for Disease Control (CDC) to quantify and identify communities that may be more vulnerable to infectious disease outbreaks based on socioeconomic and demographic factors. This study evaluates how SVI and comorbidities may influence drug resistance and whether these factors vary by birth status.

Differences in risk factors may contribute to the variation of drug resistance between the U.S-born and Foreign-Born populations, suggesting the predictors of resistance vary.

Methods

2015-2025 Tuberculosis patient data from TCID were collected and cleaned in Excel, then categorized to include drug resistance status, SVI for counties, and birth status (U.S-Born vs. Foreign-born).

Logistic regression analyses were conducted in RStudio to evaluate the association between certain predictors and drug resistance. An Interaction between birth status and SVI was included to examine the different influences on drug resistance across populations.

Odds ratios (OR) and 95% confidence intervals were used to determine associations, and statistical significance was defined as $p < 0.05$.

DATA CLEANING
Excel

MODELING + ANALYSIS
R-Studio

VISUALIZATION
Graphs

Results

Subgroup analysis revealed the distinct relationship between drug resistance and birth status. Drug resistance prevalence was significantly higher among foreign-born patients (31%) compared to U.S-born patients (13%) ($\chi^2 = 37.98, p < 0.0001$)

Logistic regression analysis identified different predictors of resistance within each group:

- U.S-born: Higher SVI was associated with increased odds of drug resistance (OR = 5.39, $p = 0.016$)
- Foreign Born: Substance Abuse was associated with decreased odds of drug resistance (OR = 0.44, $p = 0.0005$)

Other comorbidities, including HIV, Diabetes, Hep-C were not statistically significant predictors of drug resistance in either group. Trend analysis further demonstrated patterns over time, with increasing drug resistance among U.S-born patients while resistance among foreign-born patients showed a decreasing trend.

Drug-Resistance Prevalence by Birth Status

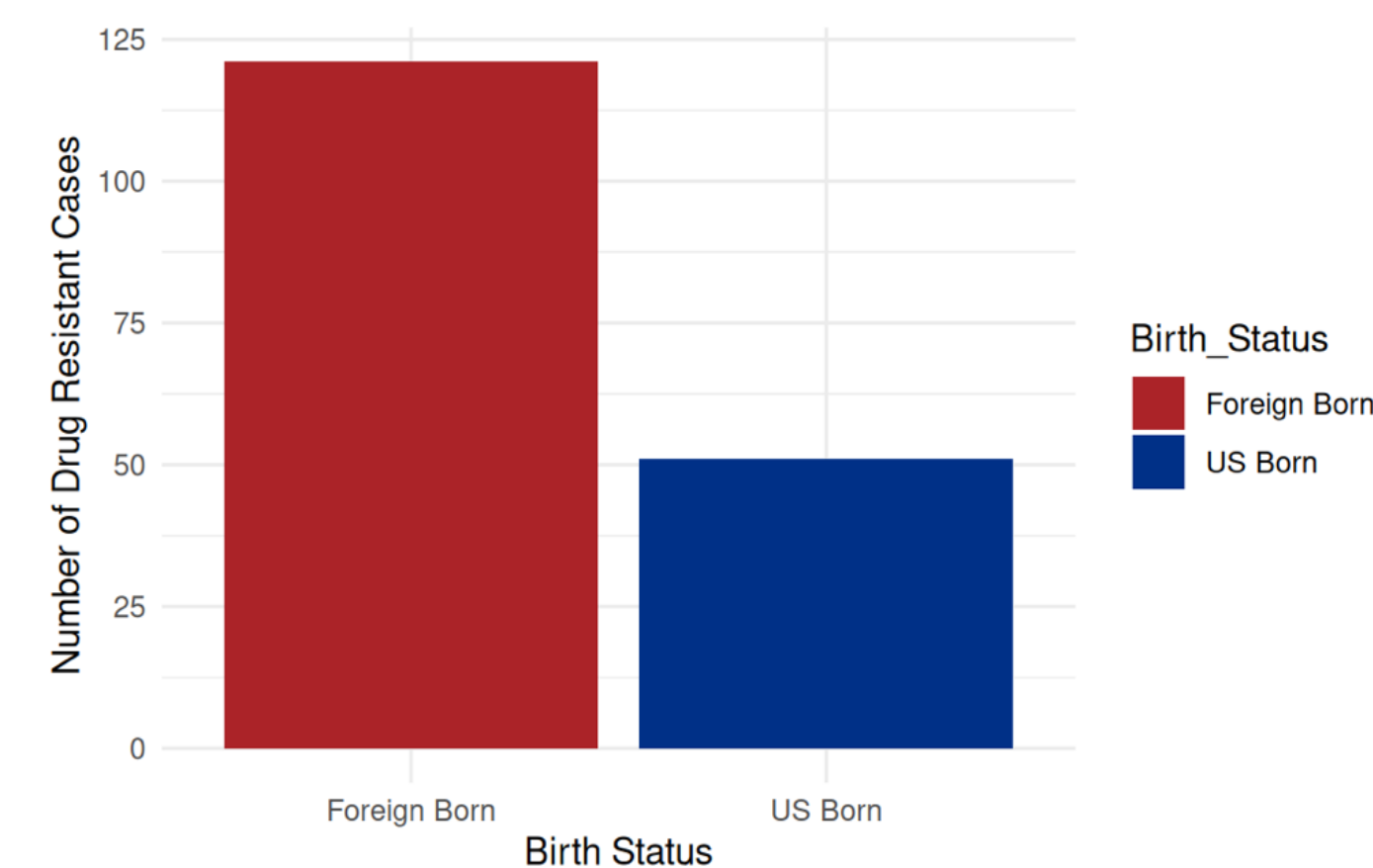


Figure 1: Foreign-born patients accounted for more drug-resistant TB cases overall than U.S-born patients

Predictors of Drug-Resistance

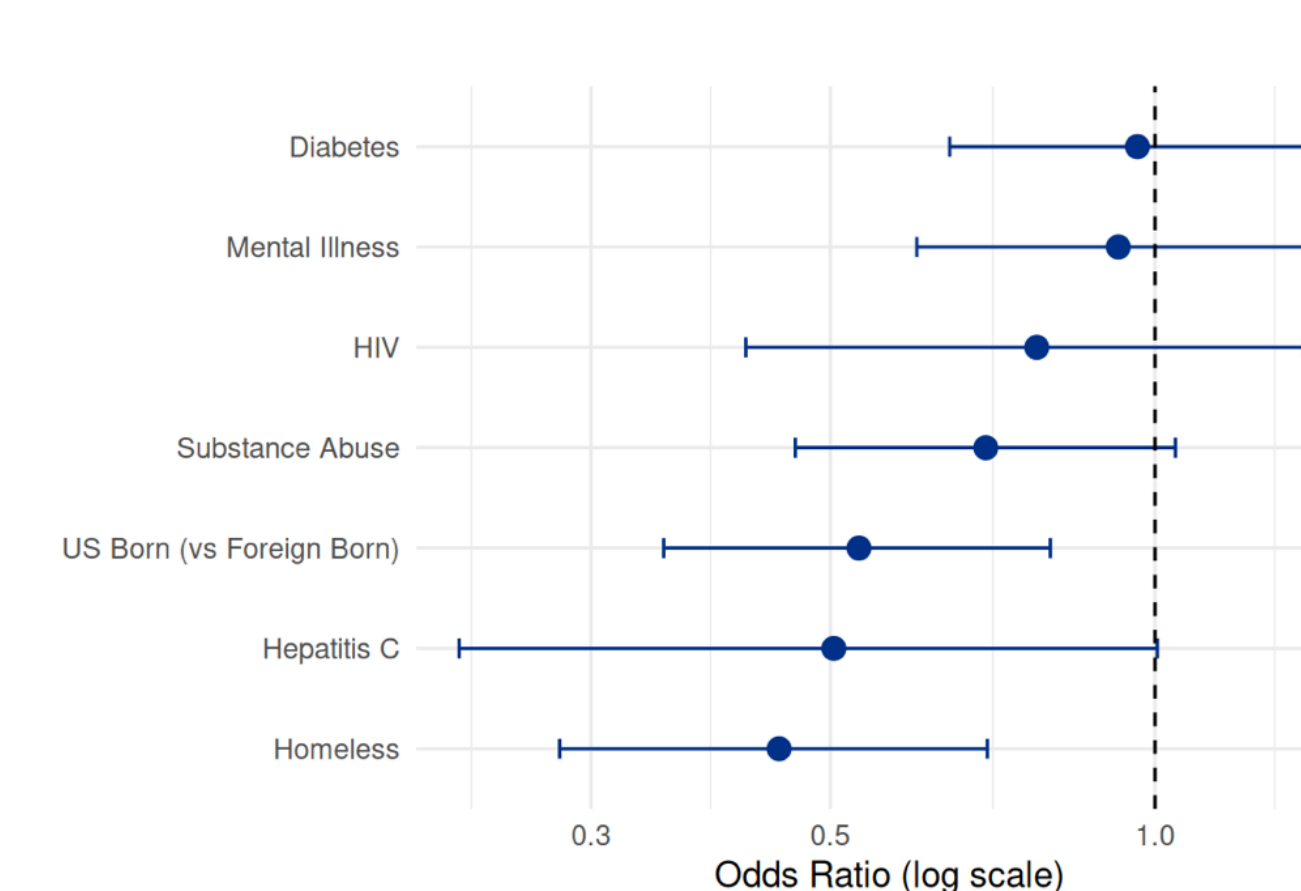


Figure 2: Forest plot of estimated odds ratios for drug resistance predictors.

Year vs. Drug-Resistance by Birth Status

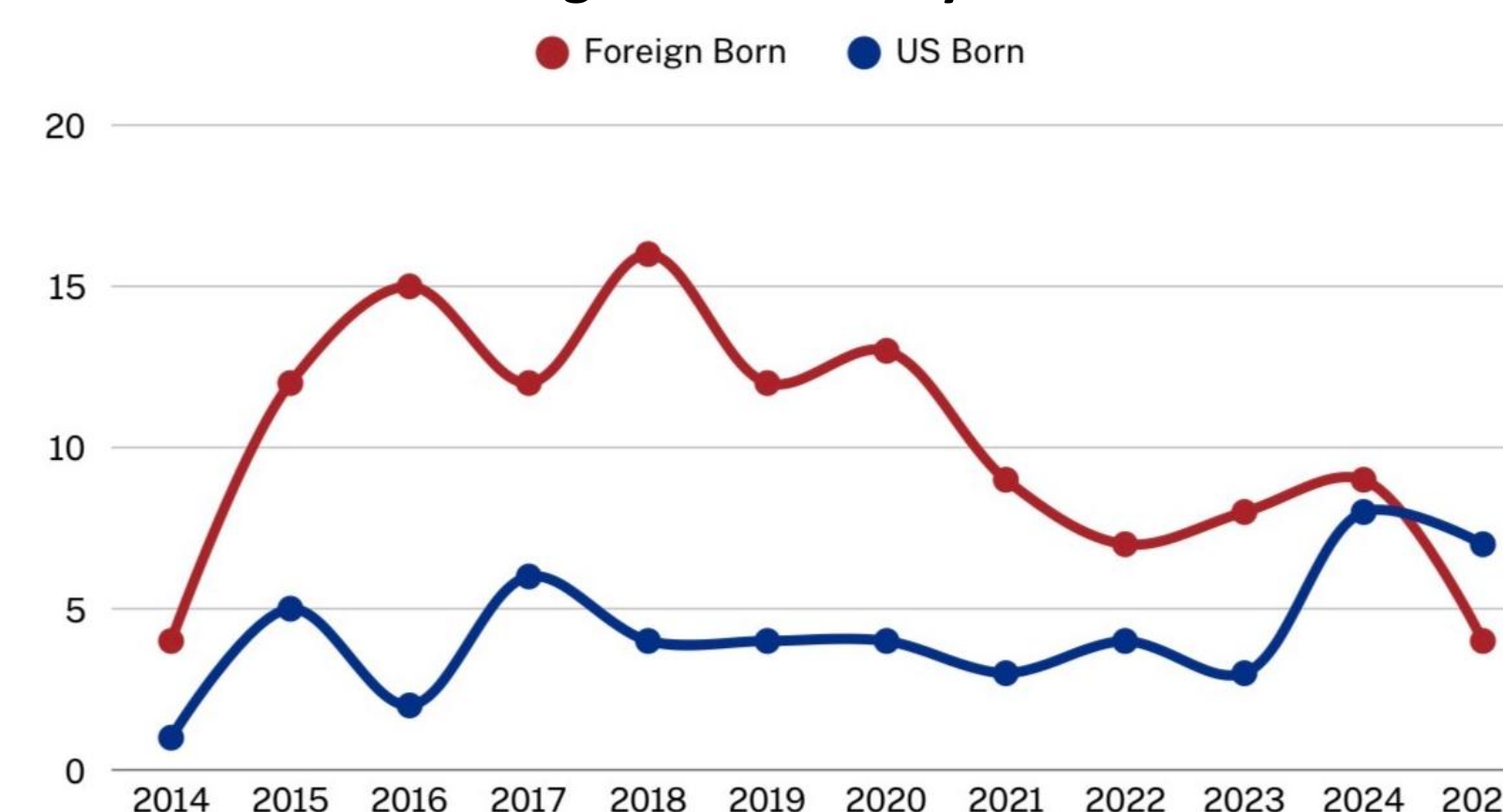


Figure 3: Across most years, foreign-born patients have more drug-resistant TB cases than U.S-born patients; the gap narrows in recent years, with U.S-born higher in 2025.

SVI Score by Drug-Resistance and Birth Status

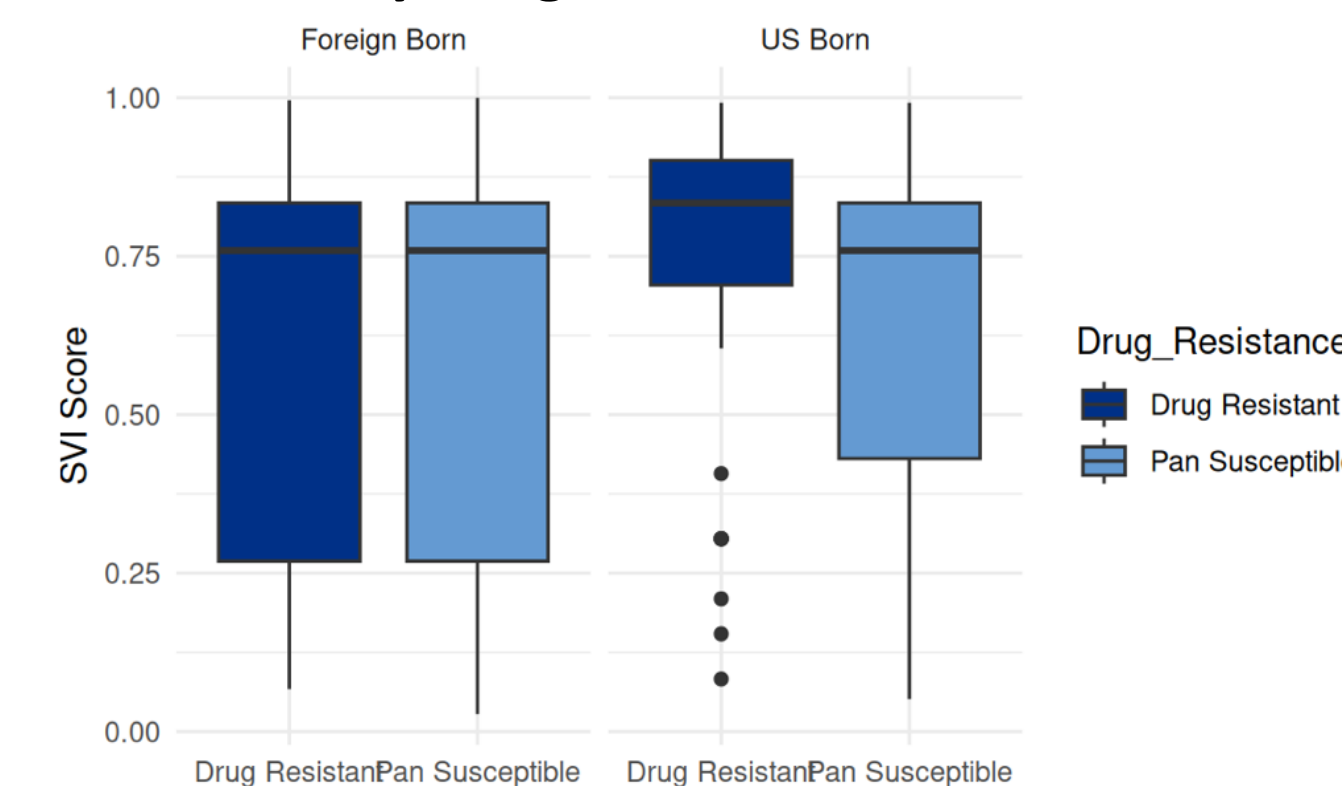
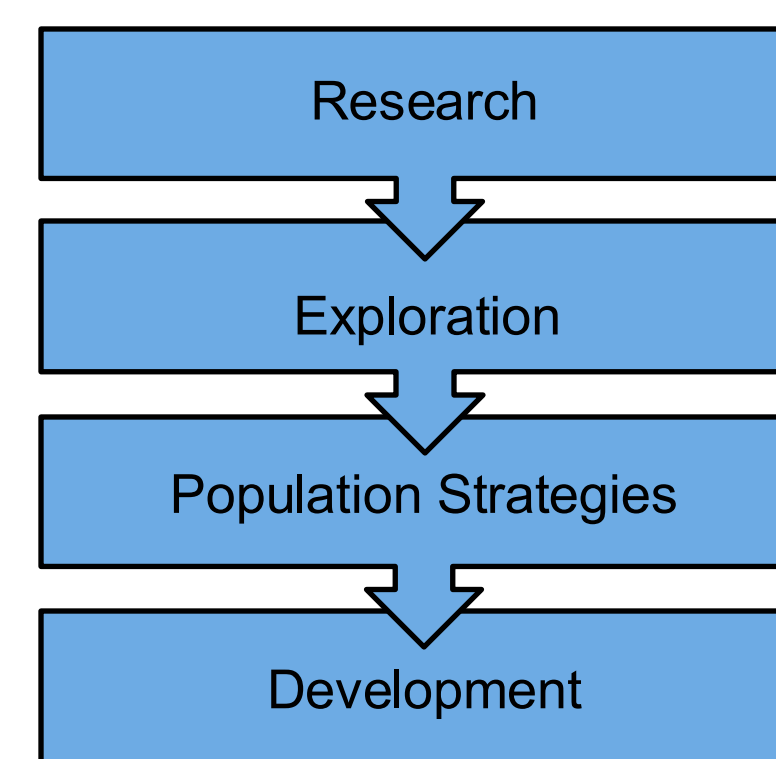


Figure 4: Among U.S-born patients, drug-resistant cases cluster at higher SVI, while foreign-born patients show similar distributions.

Conclusion

Future Directions



The findings from this study highlight stark differences in the predictors drug-resistance among tuberculosis patients at TCID. Drug-resistance was more prevalent among foreign-born patients, suggesting that gaps in global public health systems could allow for issues with medication adherence. Subsequently, U.S-born patients showed higher rates of drug-resistance associated with residing in Texan counties with higher SVI scores.

Drug-resistant TB is more costly to manage and treat, extends treatment length, and oftentimes requires hospitalization. Our results display the relationship of sociodemographic status and the incidence of drug-resistance. Emphasizing the importance of ensuring vulnerable communities have resources to provide patient's access to consistent TB therapy. Public health programs should consider assessing for risk factors of TB when working with clients who are foreign-born or facing socioeconomic barriers.