Abstract category (D)

Socioeconomic and Demographic Predictors of Syphilis Rate Across All U.S. Counties: A Nationwide Epidemiological Analysis

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Background:
Syphilis remains a significant public health concern in the United States, with incidence rates steadily increasing over the past two decades. Despite the availability of effective antibiotic treatments, gaps in disease surveillance, healthcare access, and social determinants of health contribute to persistent disparities in syphilis burden. Previous research has identified individual-level risk factors such as high-risk sexual behaviors and co-infection with other sexually transmitted infections (STIs), but fewer studies have explored the broader socioeconomic and demographic determinants that shape syphilis prevalence at a population level. Understanding how county-level characteristics such as poverty, employment, racial composition, and healthcare access affect syphilis transmission is crucial for developing targeted public health interventions. This study leverages comprehensive county-level data from all (3,144) U.S. counties to identify key socioeconomic and demographic predictors of syphilis incidence, offering valuable insights into structural factors driving disease disparities.

Methods:
We conducted a cross-sectional analysis of syphilis incidence rate utilizing county-level data from diverse sources (CDC and Census). Descriptive statistics were generated, and a multivariable linear regression model was employed to examine associations between syphilis rate and demographic, socioeconomic, and healthcare factors.

Results:
Our analysis revealed several significant predictors of syphilis rate at the county level. Female gender was positively associated with syphilis rates ($\beta = 2.33$, 95% CI: 0.87–3.79). Racial disparities were observed, with Black race showing a non-significant association ($\beta = 0.06$, 95% CI: -0.21–0.33), whereas Native American populations exhibited a significant positive association ($\beta = 6.87$, 95% CI: 3.82–9.92). Conversely, counties with higher proportions of immigrants demonstrated a negative association with syphilis rate ($\beta = -1.02$, 95% CI: -1.85– -0.20). Socioeconomic factors also played a critical role; counties with higher poverty rates were significantly associated with increased syphilis rate ($\beta = 2.49$, 95% CI: 1.43–3.54). Lack of insurance coverage was associated with syphilis rate ($\beta = 1.67$, 95% CI: 0.10–3.28), suggesting that access to healthcare may serve as a protective factor.

Conclusion:
This large-scale analysis highlights key demographic and socioeconomic determinants of syphilis incidence across the U.S. Our findings suggest that poverty, employment status, and limited healthcare access are significant risk factors, while higher immigrant populations may be associated with lower syphilis rate. These insights underscore the need for targeted public health interventions that address social determinants of health to mitigate syphilis transmission and improve disease prevention efforts.