

## **Spatiotemporal patterns of successful TB treatment outcomes among HIV co-infected patients in Kenya**

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Convergence of the Tuberculosis (TB) and HIV epidemics threatens the management of TB treatment. These has been evidenced by various studies describing how HIV cc-infection propagates unsuccessful TB treatment outcomes. Information on the spatiotemporal patterns of successful TB treatment outcomes remain less understood despite the multi-organizational TB treatment efforts. This study uses case notification data to evaluate the spatiotemporal patterns of successful TB treatment outcomes for HIV co-infected patients in Kenya. This study used the case notification data from the Kenya National TB control program to investigate successful TB treatment outcomes in forty-seven counties in the period 2012 - 2017. The population of study was HIV co-infected cases with known TB treatment outcome. Achi-squre test was performed to determine the association between treatment outcomes and risk factors; TB- type, age, gender, ART therapy and patient type. The study also assessed the geographic patterns and temporal trends by mapping the TB treatment success rate in each county for the six-year period. Using the Integrated Nested Laplace Approach (INLA), the TB treatment success of HIV co-infected patients was modeled. The spatial parameters assumed the BesagYork-Mollie (BYM) specification. The temporally structured effect was represented through a neighboring structure and the temporally unstructured effects using a Gaussian exchangeable prior. Among the 172233 HIV co-infected cases included in the analysis, 135973 (78.9%) achieved successful TB treatment outcomes. Female cases registered higher treatment success rates (80.1%) compared to the male cases (77.8%). The cases on Anti-Retroviral Therapy (ART) recorded a success rate of 79.9% against 69.1% for their counterpart not on ART. The spatial trend depicted increased treatment success in some parts of the country with a relatively high level of associated certainty, characterized by a spatial relative success above 1 and posterior probabilities above 0.8. The temporal trend of treatment success showed an increase in the treatment success of TB in HIV coinfectd cases. Overall, the success rate was still below 85% particularly for Homabay, Siaya, Kisumu, Migori and Busia counties in western Kenya. The successful TB treatment outcomes for HIV co-infected cases in Kenya were slightly below the 85% standard threshold set by the World Health Organization. Our study showed that even though co-infected cases have an increased risk of unsuccessful treatment outcomes, enhanced treatment monitoring improved the treatment outcome in most counties for the six-year period.

**Keywords:** TB-HIV co-infection; TB treatment outcome; spatiotemporal patterns; treatment success; Kenya.