158. A model for the propagation and control of pulmonary tuberculosis disease in Kenya

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Abstract

Pulmonary tuberculosis is among the leading infectious diseases causing mortality worldwide. Therefore, scaling up intervention strategies to reduce the spread of infections in the population is imperative. In this paper, a population-based compartmental approach has been employed to formulate a mathematical model of pulmonary tuberculosis that incorporates an asymptomatic infectious population. The model includes asymptomatic infectious individuals since they spread infections incessantly to susceptible populations without being noticed, thus contributing to the high rate of infection transmission. Qualitative and numerical analysis were performed to determine the impact of various intervention strategies on controlling infection transmission in the population. Sensitivity and numerical results indicate that increasing screening of latently infected and asymptomatic infectious individuals reduces infection transmission to the susceptible population. Numerical results demonstrate that the combination of vaccination, screening, and treatment of all forms of pulmonary tuberculosis is the most effective intervention in decreasing infection transmission. Furthermore, a combination of screening and treatment of all forms of pulmonary tuberculosis proves more effective than a combination of vaccination and treatment of symptomatic infectious individuals alone. Treating the symptomatic infectious population alone is identified as the least effective intervention for curtailing infection transmission in the susceptible population. These study findings will guide healthcare officials in making decisions regarding the screening of latently infected and asymptomatic infectious pulmonary tuberculosis patients, thereby aiding in the fight against epidemics of this disease.

Keywords: *Pulmonary tuberculosis, Latent infected, Asymptomatic infectious, Symptomatic infectious, Control reproduction number, Numerical Simulation*