
A Stability Analysis and Optimal Control of Dengue Disease Transmission Models

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In this work, we formulate a non-linear system of differential equations that models the dynamics of transmission of dengue fever. The model exhibits the traditional threshold behavior. We prove that when the basic reproduction number is less than unity, the disease-free equilibrium is locally and globally asymptotically stable and when the basic reproduction ratio is great than unity the endemic equilibrium is globally asymptotically stable under certain conditions. The stability of equilibria is derived through the use of Lyapunov stability theory and LaSalle's invariant theorem. In addition we introduce an optimal control which are prevention investment, the investment in vaccination of human and the investment related to insecticide treatment. Numerical simulations are provided to illustrate the theoretical results

Mots-clés: Dengue, basic reproduction number, Lyapunov function, stability, optimal control