Mathematical Models of Dengue Transmission Dynamics with Intervention Strategies BIOMATH 2024

Thato Setjhaba Motaung

School of Mathematics, Statistics and Computer Science, University of KwaZulu-Natal, South Africa matjhaba440@gmail.com

Prioritizing control implementation for dengue prevention and control for efficiency is crucial to the government, decision-makers, and policymakers, particularly in resource-limited communities where the disease is endemic. In this paper, a compartmental model will be presented to investigate the effects of preventive and control measures on dengue disease transmission. The vaccination is included as a control measure in the population and vector control measures to eradicate dengue in society. Qualitative analysis of the model is carried out to minimize dengue spread and control using Mathematical Modelling theory. We study the demographic factors that influence equilibrium prevalence and perform a sensitivity analysis on the basic reproduction number. Among several intervention measures, the effects of two potential control methods for dengue fever are estimated: introducing an open-space spraying method to the mosquito population and introducing vaccines to the human population. Numerical implementation is carried out on the model and the results of simulation showed that an efficient control of dengue disease relies on the combination of human preventive and vector control measures.

Keywords: Dengue; Dengue Mathematical Models, basic reproduction number, vaccination, vector control

MSC2024: ... (optional)

References

- M. Z. Ndiir, The effects of vaccination, vector controls and media on dengue transmission dynamics with a seasonally varying mosquito population, *Results in Physics*, vol. 34, p. 105298, 2022.
- [2] A. Sa'adah and D. K. Sari, Mathematical models of dengue transmission dynamics with vaccination and wolbachia parameters and seasonal aspects, Publisher, City, 2022.
- [3] D.D. Author, Chapter title, Book title, Publisher, City, 21-40, 2022.