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Optimal Insecticide-treated Bed-net Coverage and Malaria Treatment in a Malaria-HIV Co-infection Model

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Optimal Insecticide-treated Bed-net Coverage and Malaria Treatment in a Malaria-HIV Co-infection Model

Jemal Mohammed-Awel and Eric Numfor

We propose and study a mathematical model for malaria-HIV co-infection transmission and control in which malaria treatment and insecticide-treated nets are incorporated. The existence of a backward bifurcation is established, and the occurrence of such backward bifurcation is influenced by disease-induced mortality, treated bed-net coverage and malaria treatment parameters. To further assess the impact of malaria treatment and insecticide-treated bed-net coverage, an optimal control problem is formulated with malaria treatment and insecticide-treated nets as control functions. Using reasonable parameter values, numerical simulations suggest the possibility of eliminating malaria and reducing HIV prevalence significantly.