

Abstract

Most hosts harbor multiple pathogens at the same time in disease epidemiology. Multiple pathogens have the potential for interaction resulting in negative impacts on host fitness or alterations in pathogen transmission dynamics. In this paper we develop a mathematical model describing the dynamics of HIV-malaria coinfection. Additionally, we extended our model to examine the role treatment (of malaria and HIV) plays in altering populations' dynamics. Our model consists of 13 interlinked equations which allow us to explore multiple aspects of HIV-malaria transmission and treatment. We perform qualitative analysis of the model that includes positivity and boundedness of solutions. Furthermore, we evaluate the reproductive numbers corresponding to the submodels and investigate the long term behavior of the submodels. We also consider the qualitative dynamics of the full model. Sensitivity analysis is done to determine the impact of some chosen parameters on the dynamics of malaria. Finally, numerical simulations illustrate the potential impact of the treatment scenarios and confirm our analytical results.