Abstract

Malaria is one of the major causes of deaths and ill health in endemic regions of sub-Saharan Africa and beyond despite efforts made to prevent and control its spread. Epidemiological models on how malaria is spread have made a substantial contribution on the understanding of disease changing aspects. Previous researchers have used Susceptible –Exposed-Infectious-Recovered (SEIR) model to explain how malaria is spread using ordinary differential equations. In this paper we develop mathematical SEIR model to define the dynamics of the spread of malaria using Delay differential equations with four control measures such as long lasting treated insecticides bed nets, intermittent preventive treatment of malaria in pregnant women (IPTP), intermittent preventive treatment of malaria in infancy (IPTI) and indoor residual spraying. The model is analyzed and reproduction number derived using next generation matrix method and its stability is checked by Jacobean matrix. Positivity of solutions and boundedness of the model is proved. We show that the disease free equilibrium is locally asymptotically stable if $R_0<1$ ($R_0 -$ reproduction number) and is unstable if $R_0>1$. Numerical simulation shows that, with proper treatment and control measures put in place the disease is controlled.