

## ABSTRACT

This study is a deterministic model of miraa addiction based on three compartmental classes incorporating miraa specific attributes as well as the aspect of voluntary quitting. The model was based on SIS classical infectious model classes with Susceptible and Infected adopted as Light user and Addicted class. From the model flow chart, nonlinear differential equations are deduced. The basic reproduction number( $R$ ) was determined using next generation method. Positivity and boundedness of the solution was investigated and the system of equations was found to lie in the feasible region. Miraa equilibrium points were determined and the condition necessary for the existence of miraa persistent equilibrium point was found to be  $R_0 > 1$ . The conditions necessary for both local and global asymptotic stability of equilibrium points were determined. Sensitivity analysis of the  $R_0$  was investigated using partial differentiation and then confirmed using normalized sensitivity analysis. Simulations were carried out using MATLAB ODE 45 inbuilt solver. Sensitivity analysis results revealed that the  $R_0$  was directly proportional to the rate of quitting from addict to light user but inversely proportional to the rate of quitting from light user to susceptible. Therefore, the rate of individuals moving from light user class to susceptible classes has higher impact on reducing the burden of miraa addiction than the rate of individuals moving from addict to light-user.