

## Abstract

Schistosomiasis commonly known as bilharzia is regarded by WHO as a neglected tropical disease. It affects the intestines and the urinary system preferentially, but can harm other systems in the body. The disease is a health concern among majority of the population in Mwea irrigation scheme in Kenya and indeed, other tropical countries. In this study, a deterministic analysis of the effectiveness of non-clinical approaches in reducing the transmission of bilharzia in the region is carried out. A SIRS based mathematical model that incorporates media campaigns as a control strategy of reducing transmission of the disease is formulated. The model considers behavior patterns of hosts as the main process of transmission of the disease. The dynamics of these processes is expressed in terms of ordinary differential equations deduced from the flow chart which are solved numerically. The reproduction number  $R_0$  and equilibrium points both DFE and EE are obtained. The stabilities of these equilibrium points are analyzed in reference to the reproduction number ( $R_0$ ). Secondary data from Mwea by Okonjo et al., 2017 and Ngigi et al., 2019 were used in the developed SIR based mathematical model and in the prediction of the dynamics estimated in the model for a period of five years. Numerical simulation was carried out for a period of five years and results represented graphically. The results of the simulation show that the infected decreases from 75108 to about 35000 and the susceptible from 325142 to about 50000 respectively in a period of five years. From the analysis, the disease free equilibrium (DFE) point is asymptotically stable when  $R_0 < 1$ . Sensitivity analysis of various parameters was carried out using partial differentiation and their results tabulated. The results show that the sensitivity index of most parameters are negative, therefore they are inversely proportional to  $R_0$  which will reduce schistosomiasis infection. The results revealed that incorporation of media campaigns as a control strategy significantly reduces transmission of the disease. The results will be useful to MOH to enhance media campaigns to prevent spread of schistosomiasis in Mwea irrigation scheme and other endemic areas.