Abstract

A HIV transmission between two major cities in Kenya was developed and analyzed using deterministic approach. The model assumed truck drivers as agents of HIV transmission and incorporated the Monod function as a saturation function linking the migration of truck drivers and their clients, the female sex workers through the cities. The model excluded births and natural deaths and only considered deaths resulting from HIV infection, thus, a closed community was assumed. The two patches were coupled together by a migration parameter facilitated by commuter movement of the truck drivers. The transmission kernel which is a function of the distance between the patches was ignored. The state variables were proved to be positive for all future time and bounded in the feasible region. The basic reproduction numbers were determined using the Next generation Matrix of the Jacobian matrix of the infectious classes. The model analysis showed that the overall reproduction number was greater than the reproduction numbers for both patches. The infection free equilibrium point was obtained and investigated as locally asymptotically stable using the signs of the eigen values. The Lyapunov criterion was used to display the infection free equilibrium point to be globally asymptotically stable. The model did not exhibit the endemic states. Sensitivity analysis revealed that the contact rate, infection rate is proportional to the model reproduction number and inversely proportional to the migration rate, progression rate and HIV induced death rate. Numerical simulation indicated the population dynamics of the patches, effect of migration on female sex workers and model reproduction number. The findings of the study were that the migration of the truck drivers between two closed patches contributed significantly to the spread of HIV. In this regard, it was recommended that, stakeholders should target the truck driving population and towns along the transport corridors to mitigate the growing HIV infections and integrate the truck drivers in the national health strategy.