

Mathematical Model of Vector Infection (Malaria)

Malaria is a mosquito-borne infection of humans caused by a type of microorganism called a protist. In this project, you will develop and analyze a mathematical model of a malarial outbreak.

Background

Malaria is an example of a vector transmitted disease. A vector is an organism that transmits an infection from a host to another host. For malaria, a female *Anopheles* mosquito is the transmission vector. These types of infections differ from typical SIR-type infections due to the different mode of infection.

Some Model Requirements

- Your model will consider two populations, Humans and Mosquitos, which are each divided into two groups: Susceptible and Infected.
- Susceptible humans are infected by an infected mosquito at a rate proportional to the number of susceptible humans and the number of infected mosquitoes.
- Susceptible mosquitos are infected by an infected human at a rate proportional to the number of infected humans and the number of susceptible mosquitoes.
- The human and mosquito populations are constant.
- Both susceptible and infected mosquitoes die at a rate proportional to their current population.
- Newborn mosquitoes are all susceptible.
- Both susceptible and infected humans dies at a rate proportional to their current population.
- Newborn humans are all susceptible.

Some Questions to Answer

- Under what conditions would there be an outbreak?
- When would the infection become endemic?
- What are possible mechanisms to control the disease? How do they effect the model and can they eliminate malaria?