Title: The Dynamics of Mosquito Populations

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ABSTRACT

Many infectious diseases of humans; including malaria, Zika, dengue, etc, are caused by parasitic organisms that are transmitted from human to human by disease vectors such as mosquitoes. Mathematical models can be used to improve our understanding of the biology of these disease vectors as well as the transmission dynamics of the diseases that they carry. Vector control by humans is a strategic tool for disease management because such control can introduce variability in the disease vector's population size which in turn has great impact on the disease transmission dynamics. The mosquito, an independent organism with survival instincts, has a clearly defined life cycle that requires it to drink blood from humans as well as lay eggs in aquatic environments. We present here, a modelling framework that uses the behavioural traits of the mosquito to build a set of models that explicitly quantify the net reproductive gains that accrue to the mosquito vector whenever it successfully draws blood from vertebrate hosts and humans. We show how directly interpreting the life style of the mosquito can lead to very realistic mathematical models that can be used to understand the population dynamics of mosquitoes and also indicate possible control mechanism.

Key words: Mathematical modelling, Mosquito-Human interactive Framework

Areas of Research: Mathematical Epidemiology, Mathematical Modelling in Biological