

# A Case of Multi-vector and Multi-host Epidemiological Model: Bartonella Infection

R. Anguelov

*Dept of Mathematics and Applied Mathematics, University of Pretoria, South Africa*

H. Brettschneider and A. D. S. Bastos

*Dept of Zoology and Entomology, University of Pretoria, South Africa*

We consider a compartmental model for the Bartonella infection on rodents. More precisely, on the co-occurring populations of *Rattus rattus* and *Rattus norvegicus* where the vectors are two species of ectoparasites, namely ticks and fleas. As usual for such models a key stage is the modelling of the forces of infection. While the vital dynamics and the progression of the infection within each of the four species are sufficiently well known to determine the rest of the transfer rates, there is practically no data on the probability of infection. In order to determine appropriate values for the coefficients of the forces of infection we solve an optimal control problem where the objective function is the norm of the difference between the observed and the predicted by the model equilibrium infection prevalence rates in the four species. Within this setting the conjecture that the higher prevalence of the infection in *Rattus norvegicus* can be explained solely by their higher ectoparasite load is tested and disproved.

→ ∞ ◇ ∞ ←