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A Model for Chagas Disease with Vector Consumption and Transplacental Transmission

Chagas disease is caused by the parasite *Trypanosoma cruzi*, which is spread primarily by domestic vectors in the reduviid family, and affects humans and domestic mammals throughout rural areas in Central and South America. An epidemiological model for Chagas disease in a hypothetical village setting will be presented. The model consists of a nonlinear coupled system of four differential equations, one of which has a delay, that describes the rate of change of the total number of the vectors, infected vectors, infected humans, and infected domestic mammals. In addition to birth, death, and parasite transmission due to vectors, the model takes into account insecticide spraying, transplacental transmission, and consumption of the vector by domestic mammals. Steady state analysis of the model with constant coefficients provides a stability condition on the model parameters. In representative examples, the theory and computer simulations reveal that the endemic equilibrium is locally asymptotically stable.