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A hysteresis-like effect for insect control strategies

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This presentation will report joint work with Bismark Oduro and Mario Grijalva of Ohio University

Insecticide spraying remains one of the most widely used control strategies for vector-borne diseases such as Chagas disease. Drawbacks include harmful side effects of the insecticide and the fact that it confers only temporary protection to treated units. We investigate ODE-based models of type SIRS with a reservoir to elucidate strategies that would maximize the amount of protection in the long run for a given amount of available insecticide. The models indicate a hysteresis-like effect where two different endemic levels can be maintained at the same cost. The effect predicts that initially highly aggressive intervention will allow to maintain lower endemic levels at the same average cost in the long run. We prove that the effect is fairly robust under fine-graining of the basic model to incorporate more biological details.