Controlling outbreaks of vector-borne disease on a neighborhood scale

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Outbreaks of vector-borne disease such as Zika virus may occur when an infected individual introduces the virus to their residential neighborhood after traveling. Management strategies for controlling vector-borne disease typically involve large-scale application of larvicide or adulticide by truck or plane, as well as door-to-door control efforts that require obtaining permission to access private property. The efficacy of the latter efforts depend highly on the compliance of local residents. We present a model for vector-borne disease transmission in a neighborhood, considering a network of houses connected via mosquito dispersal. We use this model to compare the effectiveness of various control strategies and determine how optimal use of door-to-door control and aerial spraying depends on the level of resident compliance as well as mosquito movement. This is joint work with Jeffery Demers, Sharon Bewick, Folashade Agusto, Kevin Caillouët, and Bill Fagan.