

Modelling the risk of Japanese encephalitis human infection in a urban area of Cambodia

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Japanese Encephalitis (JE) is the first cause of infectious encephalitis in humans in Southeast Asia, and considered a rural disease. However, the growing pig farming sector and the presence of JE mosquito vectors in peri-urban settings may lead to urban cases. We assessed the risk of JE peri-urban transmission through 2 complementary surveys performed in a Phnom Penh peri-urban area (Cambodia). We first estimated the force of infection (FOI) of JE in 2 cohorts of sentinel pigs settled in this area and using a generalized linear model. Then, we estimated the risk of JE transmission to humans associated with a pig slaughterhouse. The epidemiological system was modeled using a Susceptible Infectious Removed (SIR) model for pigs combined with a SEI model for mosquitoes, and SR for humans. The infection rate was estimated from a published pig serological dataset (Vaesna et al, 2011).

The estimated FOI were 0.03192 d^{-1} and 0.04637 d^{-1} . Considering a totally susceptible exposed human population, the cumulative number of new human clinical infections induced by this single slaughterhouse within 1 year would be around one. This number drastically increases with an increase of the mosquito population size and the proportion of viremic pigs transiting through the slaughterhouse.