

Mosquito monitoring saves lives and money, analysis finds

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Cutting surveillance for mosquito-borne diseases would likely translate into an exponential increase in both the number of human cases and the health costs when a disease outbreak occurs, according to an analysis by Emory University.

The Public Library of Science (PLOS) publishes the research, led by Emory disease ecologist Gonzalo Vazquez-Prokopec, Oct. 26.

"Our analysis shows that halting mosquito surveillance can increase the management costs of epidemics by more than 300 times, in comparison with sustained surveillance and early case detection," Vazquez-Prokopec says.

The research was prompted by a U.S. government proposal last spring to slash funding for the vector-borne disease program of the [Centers for Disease Control and Prevention](#). Congress ultimately voted to retain the program's budget at the same levels for 2011.

"This analysis provides scientific-based evidence of the need for more funding of mosquito surveillance, not less," says Uriel Kitron, a co-author of the study and the chair of Emory's Department of Environmental Studies.

Diseases spread by mosquitoes and other blood-sucking vectors are a major public health risk worldwide. They include a wide variety of bacterial, parasitic and viral infections, such as malaria, [West Nile Virus](#),

[dengue fever](#) and [Lyme disease](#).

The Emory analysis used data from two outbreaks of dengue fever in Cairns, Australia, that occurred in 2003 and 2009. (Dengue fever, an extremely debilitating [viral disease](#) spread by mosquitoes, can be fatal.) A mathematical model was applied to the Cairns data to evaluate the economic impact of hypothetical epidemic curves, plotted against different response times. A response within two weeks of the introduction of the pathogen was assumed to occur with active disease surveillance in place, and delays of six-to-eight weeks were assumed when active disease and vector surveillance were eliminated.

In Cairns, where mosquito surveillance is active, the reactions to the dengue fever outbreaks were rapid. The costs of the epidemics – including vector control, case diagnosis, blood screening and work days lost to disease – totaled U.S.\$150,000 for the 2003 outbreak and \$1.1 million for the 2009 outbreak.

The analysis showed that a delayed response of four-to-six weeks to both Cairns dengue outbreaks would have resulted in drastically escalated costs of up to U.S.\$382 million. A slight increase in the virulence of the strain could have multiplied the cost by another 10 times.

Cairns has a tropical climate similar to South Florida, where a dengue fever outbreak occurred in 2009, Vazquez-Prokopec notes. "Predictions based on our analysis show that, if the Miami area had not had a surveillance system in place, the costs to control the Florida outbreak could have been higher than the entire U.S. budget for mosquito surveillance," he says.

While the modern-day United States has been relatively unscathed by vector-borne disease, it is not immune to a host of new and emerging pathogens, the researchers warn.

The emergence of West Nile Virus (WNV) in New York City in 1999 spurred better mosquito surveillance, and serves as an example of the consequences of a delayed response. By the time a correct diagnosis was made and proper controls were initiated, the pathogen had spread throughout the country. By the end of 2008, WNV had generated 28,961 known cases and 1,130 fatalities.

Provided by Emory University

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