

US and Mexico must work to prevent future outbreaks of mosquito-transmitted diseases

December 17 2015



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Despite the increasing risks of mosquito-transmitted epidemics in the United States and Mexico, policymakers in both countries have made little effort to prevent future outbreaks, according to a new policy brief by tropical-disease and science policy experts at Rice University's Baker Institute for Public Policy.

The number of mosquito-transmitted epidemics in the U.S. and Mexico is predicted to increase as the mosquito populations carrying so-called arthropod-borne viruses (arboviruses) move northward due to climate change and general migration of flies and infected individuals.

The paper, "Mosquito-Transmitted Epidemics: Dengue, Chikungunya and West Nile in the United States and Mexico," provides a range of recommendations to address this developing public health issue. The paper was co-authored by Kirstin Matthews, fellow in science and technology policy, and Jennifer Herricks, postdoctoral fellow in disease and poverty.

The West Nile, dengue and chikungunya diseases are all caused by arboviruses transmitted primarily via mosquitos. In total, the transmissions result in more than 100,000 annual infections in the U.S. and Mexico. The diseases are not always associated with poverty and rural areas. West Nile virus outbreaks in the U.S. have been found in urban as well as suburban settings.

"Viruses and mosquitos do not acknowledge national boundaries, crossing from the United States to Mexico and back without regard to man-made or natural borders," the authors wrote. "Effective control of arboviruses requires both vector-control polices as well as the development of effective vaccines to protect populations. To combat West Nile, dengue and chikungunya in the United States and Mexico, governments need to coordinate and collaborate to increase public awareness about risks and preventive measures as well as improve disease surveillance."

Currently, the Centers for Disease Control and Prevention (CDC) works with the Mexican government through its Puerto Rico-based Dengue Branch and its U.S.-Mexico Unit, the authors said. These CDC divisions work with partners in Mexico, including the Mexican Secretariat of Health, to investigate infectious disease outbreaks and train public-health workers on activities related to dengue surveillance and diagnosis. "In addition to these efforts, both countries should devote additional resources toward vaccine development to prevent disease outbreaks in the future and protect public health," Matthews and Herricks wrote.

It may not be cost-effective to implement mass preventive measures such as vaccinations and mosquito spraying, the authors said. Instead, targeted vaccination programs to communities in the U.S. and Mexico with past, current or increased risk of future outbreaks would be more effective, they said. However, the low incidence and sporadic nature of outbreaks in the U.S., especially for chikungunya, make finding an appropriate population to test vaccine efficacy difficult. "But these challenges are not unique to arbovirus vaccines, as similar discussions regarding adequate and appropriate designs of clinical trials have been ongoing, most recently related to the testing of experimental Ebola treatments and vaccines," they wrote.

In addition, vector-control measures could inadvertently lead to increased infection rates by creating insecticide-resistant mosquito populations, the authors cautioned. "Therefore, the best strategies would include active surveillance with local campaigns for vector control and, when available, vaccinations of at-risk populations once the viruses are detected in human, animal or mosquito populations," they wrote.

Mexico has taken the first step in ensuring successful vaccine introduction by convening a Mexican Dengue Expert Group, which consists of [public health](#) and [public policy](#) experts from the Mexican Federal Ministry of Health in partnership with the Carlos Slim Foundation. This group analyzed an array of issues, including disease tracking systems, economics, regulatory issues, communications and immunization systems. As a result, a series of recommendations was developed and distributed to aid Mexico in the early adoption of a dengue vaccine. "The United States should take a similar approach in preparing to introduce new technologies to address emerging diseases such as arboviruses," Matthews and Herricks wrote.

More information: [bakerinstitute.org/research/mo ... ed-states-and-mexico](http://bakerinstitute.org/research/mo...ed-states-and-mexico)

Provided by Rice University

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<https://medicalxpress.com/news/2015-12-mexico-future-outbreaks-mosquito-transmitted-diseases.html>

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