

Editorial

Dengue and Dengue Hemorrhagic Fever in Northern Mexico and South Texas: Do They Really Respect the Border?

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Dengue is an acute infection caused by one of four virus serotypes (DENV-1, DENV-2, DENV-3, or DENV-4) and transmitted by *Aedes* species mosquitoes, principally *Aedes aegypti* in the Americas. In the fall of 2005, a DENV-2 epidemic causing dengue hemorrhagic fever (DHF), a severe and potentially fatal form of dengue, occurred in the adjacent border cities of Matamoros, Tamaulipas state, Mexico, and Brownsville, TX. In Tamaulipas, through the first 11 months of the year, there were 25,604 suspected cases of dengue; 12,365 more than reported from any other state in Mexico that year (<http://www.cenave.gob.mx/dengue/panorama/Panoramasesmana52.pdf>). Of these, health officials reported 7,062 laboratory-confirmed cases of dengue, including 1,832 (26%) classified as DHF. The peak of activity occurred in October, and the predominant serotype was DENV-2, a strain from Southeast Asia associated with DHF in the Americas.¹

As a result of this extensive dengue transmission in Tamaulipas state, Texas health officials soon detected their first case of autochthonously acquired DHF,² and eventually two additional autochthonous cases of dengue were reported. Results of a household-based epidemiologic study of dengue incidence and seroprevalence and risk factors was conducted in December 2005 among residents of Matamoros and Brownsville and are reported in this issue of the *Journal*.³ The estimated incidence of recent dengue infection was 32% and 4% among residents of Matamoros and Brownsville, respectively. Of significance was the estimated prevalence of past dengue infections of 77% and 39% among residents of these two cities, respectively. Although only a small number ($N = 2$) of locally acquired cases were detected by Texas health officials in 2005, extrapolation of the laboratory-based incidence data from Brownsville to its entire population of 167,493 indicated that between 1,675 and 10,050 residents had recent dengue infections. A similar comparison of the prevalence (39%) in 2005 suggested that between 46,898 and 83,746 residents had experienced a dengue infection some time in the past.

In the fall of 2004, during a period of endemic dengue transmission, a cross-sectional survey was conducted in these two cities,⁴ and dengue incidence and prevalence were measured. In Brownsville, the incidence was 2%, which, if extrapolated to the 2005 population of the city (using the 95% confidence interval), projected between 837 and 5,862 recent infections. Similarly, the prevalence was 40%, with a range from 56,948 to 75,372; these values are relatively similar to those obtained from Brownsville in 2005.

When these values are compared with the number of autochthonous dengue cases reported annually by Texas state health officials, it is apparent that many more people are becoming infected with dengue viruses annually than are reported. An analysis of the period from 1980 to 1999⁵ found that only 64 laboratory-confirmed cases of dengue were reported in Texas, whereas 62,514 suspected cases were reported in the three adjoining Mexican states of Coahuila, Nuevo Leon, and Tamaulipas. With the extensive dengue transmission occurring in northern Mexico where many south Texas residents frequently visit, these data help explain why, during the last 27 years, endemic dengue transmission in the United States has been limited to five south Texas counties.

Both of the aforementioned studies in the Matamoros-Brownsville area, as well as an earlier one⁶ conducted 200 miles west in the sister cities of Nuevo Laredo, Tamaulipas state, Mexico, and Laredo, TX, included studies of the risk factors for acquiring dengue infections. When combined, this study⁶ and the two recent studies^{3,4} reported several significant socioeconomic characteristics (e.g., absence of air conditioning, presence of an evaporative cooler, smaller lot sizes, presence of larval mosquito habitat, low family income, and non-use of mosquito repellent) that placed residents at risk to a dengue infection and that helped explain the lower incidence of dengue in the United States compared with adjacent areas of Mexico.

Although the number of reported autochthonous dengue cases is low, the number of dengue infections in residents of these circum-border cities is large and likely increasing with each dengue epidemic in northern Mexico. In addition, it is apparent that many residents are likely to acquire a second dengue infection in Mexico, placing them at risk of possibly developing DHF after they return to the United States.⁷

These outbreaks in south Texas support the position that there is a small, but significant, risk for dengue outbreaks in the continental United States,⁸ largely because of the dengue pressure and transmission coming from the south and the sporadic and focal distribution of *Ae. aegypti* in the southern United States. An area that is experiencing increased presence of this important vector of dengue viruses is Tucson and nearby areas of southern Arizona,⁹ where seven counties are infested, and concern has been expressed about possible autochthonous dengue transmission because of their proximity to Sonora state, Mexico.¹⁰

In 1997, to improve surveillance for dengue and other infectious diseases, the US Centers for Disease Control and Prevention and the border states joined together in collaboration with Mexican health officials at the regional, state, and national levels to create the Border Infectious Diseases (BIDS) Project along this international frontier, where an estimated 320 million people cross the northbound border legally annually.¹¹ This initiative has promoted enhanced,

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laboratory-based surveillance that has increased the temporal recognition of dengue transmission several times over the last decade. This program, supplemented with medical education for physicians in the clinical diagnosis of DHF and prompt, appropriate therapeutic response, is critical to early recognition of increased dengue activity and minimization of mortality caused by DHF.

Although we often take today's relative paucity of autochthonously acquired vector-borne diseases, such as dengue, for granted in the United States, only 85 years ago in 1922, there were reportedly 500,000 dengue cases in Texas.¹² Some of the significant socioeconomic characteristics that placed residents of this region at risk for dengue during the recent studies^{3,4,6} may have been present in Texas in the early 1920s.

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