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Looking the other way: Preventing vector-borne disease among travelers to the United States

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Summary Millions of travelers visit the United States every year during warm months when risk of vector-borne disease is highest. The epidemiology and geographic distribution of the principal vector-borne diseases in the United States are reviewed and recommendations for visitors to reduce their risk of disease are described. Travel advice should focus on preventing Lyme disease, anaplasmosis and babesiosis in the northeast and north central States, West Nile virus disease in western plains States, and Rocky Mountain spotted fever and tularemia in the southeast; other diseases and itineraries requiring particular attention are described. All travelers to the United States should be advised to practice personal protection against arthropod bites, including appropriate use of insect repellents, especially when visiting rural and suburban areas during the warm months.

The vast majority of the medical literature on travel medicine is oriented towards preventing disease among American and European travelers who visit tropical countries. This review looks the other way to describe risks of vector-borne disease for travelers to the United States. In 2008, there were more than 50 million visits to the United States (http://tinet.ita.doc.gov/view/m-2008-I-001/table1.html). More than 25 million visits were by overseas residents; more than 12 million of these were residents of western Europe, about 6 million were from Asia, about 2.5 million from South America, 1.2 million from Caribbean islands, and hundreds of thousands from Oceania, Central America, the Middle East, Eastern Europe, and Africa (Table 1). The peak numbers of visits occurred during July and August; 47% of visits from overseas countries began during May through September, the months of peak vector-borne disease incidence in the United States (Fig. 1). Many travelers to the United States limit their visit to urban centers, but outbreaks of arboviral disease have occurred in recent years in New York City, Chicago and other urban areas. Those travelers who venture into rural areas of the United States may encounter a broad variety of vector-borne pathogens.

While the overall risk of acquiring vector-borne disease by travel to the United States is probably low, it is not negligible. To provide a perspective, substantial expense and effort are invested justifiably in protecting European and North American travelers to South America against Yellow fever, when the risk for any given traveler acquiring Yellow fever in South America is probably less than 5 per 100,000 travelers.[1,2] In comparison, from one study, the

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Table 1 Number of visits to the United States, 2008. Source: U.S. Department of Commerce, Office of Travel and Tourism Industries. http://tinet.ita.doc.gov/view/m-2008-I-001/index.html.

Region of Residence	Number of Visits	Percent of Total %
Western Europe	12,198,081	24
Eastern Europe	584,602	1
Middle East	680,974	1
Asia	6,178,602	12
Oceania	851,619	2
Africa	315,235	<1
South America	2,555,599	5
Caribbean Islands	1,201,149	2
Central America	775,590	2
Mexico	6,235,336	12
Canada	18,925,264	37
Total	50,502,051	100

risk of acquiring tickborne illness among about 30,000 visitors to Nantucket Island can be estimated conservatively at about 300 per 100,000 travelers.[3] While the most common tickborne illnesses in the northeastern United States (such as Lyme disease, anaplasmosis, and babesiosis) are generally not as serious as Yellow fever, the risk of illness is sufficiently high to warrant attention of healthcare providers to prevention, diagnosis, and treatment among travelers. Some other diseases endemic in the United States, such as Rocky Mountain spotted fever, plague, and Eastern equine encephalitis, have a high risk of fatal outcome. This paper describes the epidemiology and geographic distribution of the principal vector-borne diseases in the United States and provides recommendations for visitors to reduce the risk of infection. Travelers should be advised to use insect repellents and take other precautions against exposure to disease vectors particularly when engaging in outdoor activities in rural areas of the United States during the summer months.

Lyme disease

Lyme disease is the vector-borne disease reported most frequently in the United States. The incidence of Lyme disease has been increasing since 1992.[4] In 2007, 27,444 cases were reported to the United States Centers for Disease Control and Prevention (CDC) (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5653a1.htm). The disease is endemic in rural and suburban areas of the northeastern and north central States and in focal areas along the Pacific coast (Fig. 2). The risk of acquiring Lyme disease in the southern and western plains States is minimal to nonexistent.

Lyme disease is caused by infection with the spirochete *Borrelia burgdorferi* which is transmitted to humans through the bite of infected *Ixodes scapularis* and *Ixodes pacificus* ticks. In northeastern and north central areas of the United States the nymphal stages of *I. scapularis* seek blood meals during warmer months, primarily from May through early July. Although it generally takes more than 36 h of infected tick attachment and feeding before the spirochete is transmitted, the nymphal stages of the ticks are small and therefore often not recognized nor removed soon enough to prevent infection.[5,6] Thus the risk of acquiring Lyme disease is highest when people engage in outdoor activities in brushy or wooded areas of endemic regions during the early summer. Adult ticks can also

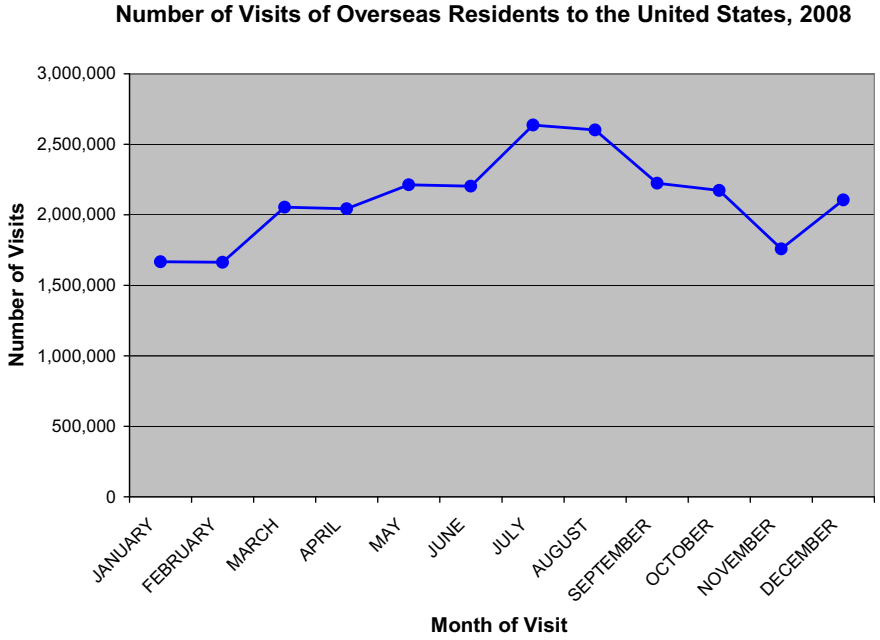

Figure 1 Number of visits of overseas residents to the United States by month of visit, 2008. Source: U.S. Department of Commerce, Office of Travel and Tourism Industries. http://tinet.ita.doc.gov/view/m-2008-I-001/index.html.