

FIGURE 151e-5 Effects of temperature on variables associated with dengue transmission. Shown are the number of days required for development of immature *Aedes aegypti* mosquitoes to adults, the length of the dengue virus type 2 extrinsic incubation period (EIP), the percentage of *A. aegypti* mosquitoes that complete a blood meal within 30 min after a blood source is made available, and the percentage of hatched *A. aegypti* larvae surviving to adulthood. (Reproduced from CW Morin et al: *Climate and dengue transmission: evidence and implications. Environ Health Perspect* 121:1264, 2013.)

been mostly a disease of African nations. Climate models predict that, should competent vectors be present, conditions will be suitable for Chikungunya virus to gain a foothold in Western Europe, especially France, in the first half of the twenty-first century. In North America, areas favorable to West Nile virus outbreaks are expected to shift northward in this century. Current hotspots in North America are the California Central Valley, southwestern Arizona, southern Texas, and Louisiana, which have both compatible climates and avian reservoirs for the disease. By mid-century, the upper Midwest and New England will be more climatically suited to West Nile virus; by the end of the century, the area of risk may shift even further north to southern Canada.

Whether the disease will ultimately move northward will depend on reservoir availability and mosquito control programs, among other factors.

Lyme Disease In the past few decades, *Ixodes scapularis*, the primary tick vector for Lyme disease as well as for anaplasmosis and babesiosis in New England, has become established in Canada because of warming temperatures. With climate change, the range of the tick is expected to expand further (Fig. 151e-8).

Lyme disease, caused by the spirochete *Borrelia burgdorferi*, is the most commonly reported vector-borne disease in North America, with ~30,000 cases per year. The model used in Fig. 151e-8 showed 95%

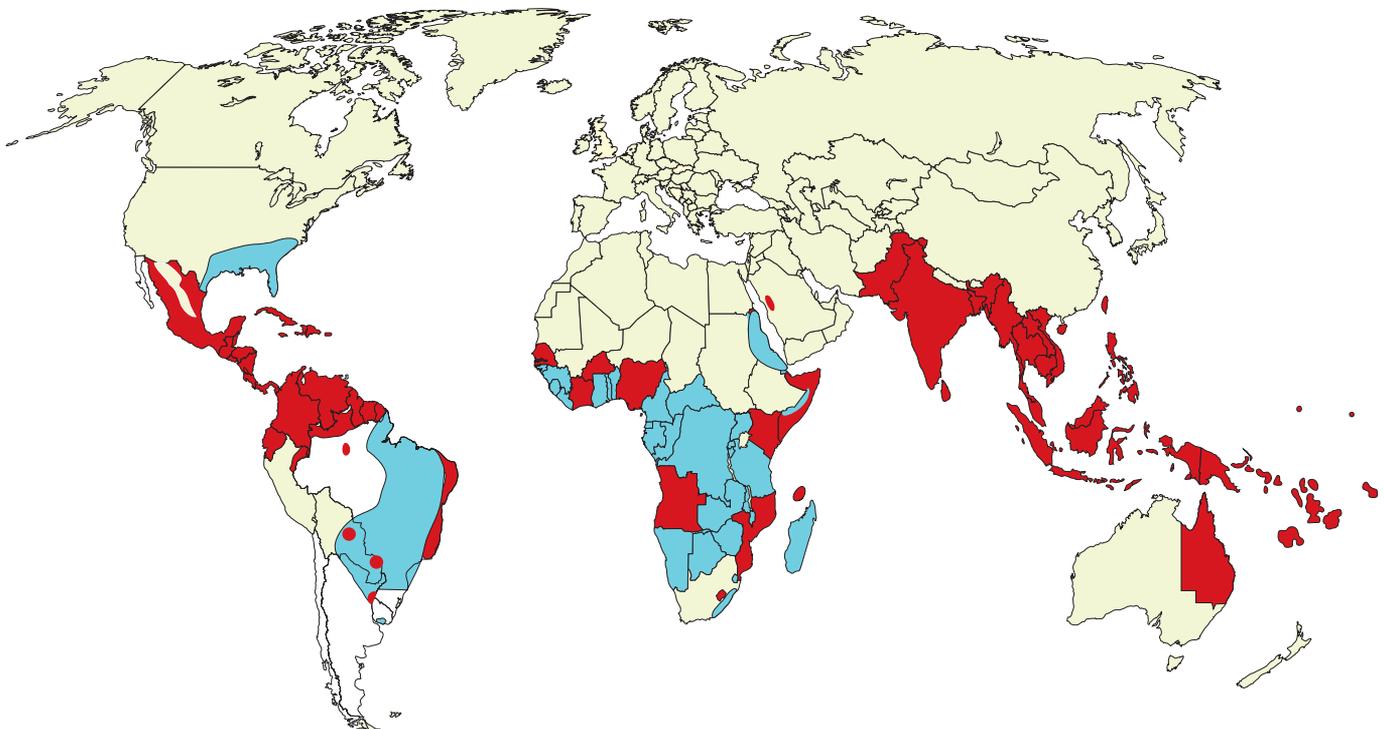


FIGURE 151e-6 Distribution of *Aedes aegypti* mosquitoes (turquoise) and dengue fever epidemics (red). (Map produced by the Agricultural Research Service of the U.S. Department of Agriculture.)