Medical Xpress

Lyme disease imposes large cost on the northeast United States

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As people across the northeastern U.S. begin venturing back into the outdoors with the arrival of spring, they will make 1 billion fewer trips than they otherwise would have if Lyme disease didn't exist, a new Yale study concludes.

In an analysis published in the journal *Environmental and Resource Economics*, researchers found that perceived risks of contracting Lyme disease on average cause a person in the Northeast to forego eight 73-minute outdoor trips per year, costing them about nine hours of outdoor time per year. Although the cost of individual lost trips is small—about $2.75 to $5—the total cost roughly $2.8 billion to $5 billion annually due to the large number of people in the region.

"Lyme disease has been around for a few decades but it still has a big cost to society," said Eli Fenichel, an assistant professor at the Yale School of Forestry & Environmental Studies (F&ES) and senior author of the paper. "But the cost is not what people spend on doctors, or medicine, or even bug spray. These are costs that everybody incurs because we're all choosing second-choice activities to avoid getting Lyme disease."

"It's a lot of people making very small changes, but in such a densely populated region that has major impacts."

Lyme disease is caused by the bacterium Borrelia burgdorferi and is transmitted to humans through the bite of an infected blacklegged tick,

according to the U.S. Centers for Disease Control and Prevention (CDC). Prevalent across the northeastern U.S. and the Great Lakes region, the disease causes fever, headaches, fatigue, and skin rash. It can be prevented by use of repellents and removing ticks, as well as costly steps to remove tick habitat.

Or, as the researchers illustrate, individuals can simply find alternative activities to avoid tick habitat altogether.

To evaluate how the risk of Lyme disease impacts human behavior, the researchers analyzed data from the American Time Use Survey—a U.S. Bureau of Labor Statistics-based project that provides nationally representative estimates on how, when, and with whom people spend their time—and CDC data from 2003 to 2012.

After comparing those datasets, they found that the average individual in the average county spent 1.54 fewer minutes outside per day in response to an average of 72.17 Lyme disease cases reported to the CDC. This amounts to about 9.41 hours annually.

The research team say that though it is difficult to put a monetary cost on these lost opportunities, they calculate welfare loss based on the amount individuals are willing to spend to travel to recreate outdoors relative to spending leisure time at home—the location of most indoor leisure.

"People are giving up trips, and it's not just hiking and camping in the woods," said Kevin Berry, a former postdoctoral scholar at F&ES and the lead author of the study. "It's trips to the park, soccer games, or walks and bike rides in places where there are stands of trees and tall grasses... a wide variety of activities pretty much anywhere in this part of the Northeast that's outdoors."

The findings illustrate the importance of careful evaluation when evaluating the ecosystem services and, in some cases, ecosystem "disservices" of nature. Indeed, though the historical notion that forests are places for humans to fear has largely been replaced by recognition that these spaces provide important services—including recreational opportunities—there remain some risks that can undermine these potential benefits, including the threat of tick-borne Lyme disease.

Lyme disease is representative of many environmental problems, Fenichel said; environmental risks and harms can have seemingly minor impacts on individuals, but can impose profound costs on society.

"It's an issue that affects all of us, but it's one of those environmental challenges that are so difficult to handle as a society," Fenichel said. "It's a big issue in aggregate—up to $5 billion in this case—but to any one of us it's not a big issue. Everybody cares a little bit, but perhaps not enough to take action. Though, in aggregate we'd be much better off if we cooperate to deal with Lyme disease."

More information: Kevin Berry et al, The Allocation of Time and Risk of Lyme: A Case of Ecosystem Service Income and Substitution Effects, *Environmental and Resource Economics* (2017). DOI: 10.1007/s10640-017-0142-7

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