

# Intense human settlement and forest disruption linked to virus outbreak

December 3 2013, by David Tenenbaum

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(Medical Xpress)—A new study in the *American Journal of Tropical Medicine* shows that the deadly Nipah virus in Bangladesh is infecting people only in areas with significant deforestation and high population density. Although the virus is spread by a common fruit bat, villages with fairly intact forest did not get Nipah virus infections.

Nipah [virus](#) kills more than 70 percent of cases, mainly due to convulsions and swelling in the brain, and there is neither cure nor vaccine. Since 2001, about 200 cases of the virus have appeared in villages within a section of Bangladesh scientists call the "Nipah Belt."

More than a decade ago, an outbreak in Malaysia was traced to [fruit bats](#) that defecated into pig pens. The infected pigs spread the virus to pig farmers and pigs throughout the country when they were transported to slaughterhouses. The outbreak ended with the culling of more than 1 million pigs.

In predominantly Muslim Bangladesh, where pigs were absent, the epidemic was eventually traced back to sap collected from date palm trees to make a sweet, natural drink. Fruit bats also love the sweet sap, and they contaminated the drink when they urinated or defecated into the collecting jars.

Bamboo skirts wrapped around the collection pots can halt that route of infection—if they are used. But why were people getting infected in some villages but not others?

The answer emerged from a comparison of cases to controls—villages with Nipah virus to those without it. Using door-to-door surveys, GPS-assisted data collection and satellite remote sensing, Micah Hahn and her fellow researchers with EcoHealth Alliance in New York and the International Center for Diarrheal Disease Research, Bangladesh, applied statistical analysis to the location of fruit bat roosts, the structure of the landscape, and village population density.

Hahn received her joint Ph.D. in epidemiology and environment and resources from the University of Wisconsin-Madison, and is now working on a joint post-doctoral fellowship with the Centers for Disease Control in Fort Collins, Colo. and the National Center for Atmospheric Research in Boulder, Colo.

The key question, says Hahn, was "Why here, but not there? How does the environment help determine who gets Nipah virus, and who does not?" In Bangladesh, she notes, fruit bats and their habitat are everywhere. "The Nipah Belt includes some of the most suitable bat habitat in the country, but in Northeast Bangladesh, there are pockets of really great bat habitat, but no Nipah virus. If there are bats, why is there no Nipah virus?"

The answer came from the landscape, Hahn says. Fruit bats, as the name implies, eat fruits, and in smaller villages nested in denser forest, they could eat their fill in the forest with little human contact. But in places with decimated forest, "The bats are eating in people's backyards," where sap collectors are likely to be working.

"The immediate reaction may be to get rid of the bats," Hahn says, "so we won't have Nipah virus, but bats are important as seed spreaders for forest regeneration, they eat a lot of different fruits and fly long distances. The presence of bats alone is not a risk factor; there are villages with bats but that haven't had Nipah virus cases. This is not just

about having bats, the disease risk is a result of humans changing the landscape in ways that create opportunities for human-wildlife interactions."

Having located places where bats and people live together without a disease problem, "We need to see what are they doing differently with the landscape that ends up protecting them."

Eventually, Nipah could become a greater threat, Hahn says. "If the virus mutates so it passes more easily from person to person, it's a totally different story. So the goal is to try understand the disease ecology of Nipah so we can prevent anything like that from happening, or deal with it if it does."

Provided by University of Wisconsin-Madison

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