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Monkeypox risk mapped

Hunting rope squirrels for food could be fuelling cases of monkeypox in the Congo basin



Monkeypox lesions on the arm and leg of a child.

Image credit: CDC

Researchers probing risk factors for human cases of monkeypox in the Democratic Republic of Congo (DRC), a 'hotspot' of the disease, found that people living near dense forests favoured by rope squirrels are more likely to contract the virus.

"Our finding... is consistent with the fact that rope squirrels are the only natural host that have been demonstrated to transmit the monkeypox virus directly to humans in Africa," write Trevor Fuller and colleagues this month in *EcoHealth*.

The study suggests that the scant resources available for surveillance should focus on areas with a high density of rope squirrels to prevent monkeypox from spreading beyond the region, which has seen incidence rates of the disease soar over the past three decades.

This trend was documented in a previous [study](#) co-authored by scientists working with Fuller. The research also suggested that transmission of the virus from person to person may be on the rise, encouraged by the fall in immunity levels since the 1970s when vaccination against the closely related smallpox virus ended.

For the current study, Fuller and colleagues worked in the DRC's Kasai Oriental Province, in Sankuru district — a rural area where about one million people live 3–5 km from the forest, subsisting on agriculture and hunting. Bushmeat from rope squirrels and other wild animals makes up most of the protein in the diet of Sankuru residents.

But the monkeypox virus can survive for at least seven hours when rope squirrel meat is kept at outdoor temperatures, putting people at risk for contracting the disease. "Rope squirrels may be a particularly potent source of monkeypox infections because they occupy areas frequented by older children who are unvaccinated against smallpox," note the authors.

They focused their research on environmental factors behind the transmission of monkeypox without considering features of the virus or the population at risk. Using data collected through active surveillance for the disease and satellite remote sensing, they put together models to analyse the relationship between human cases and the local environment — the climate and vegetation, as well as the density of human residents and areas suitable for animals known to carry the virus.

Although initially the authors considered four groups of animals that could play a part in the transmission of the disease, initial modelling ruled out two of them. They then assessed forest density and habitat suitability for the remaining two species — dormice and rope squirrels — alongside rainfall and temperature as possible predictors of monkeypox cases in the area.

Forest vegetation and the presence of rope squirrels were the most important predictors of the monkeypox virus, say Fuller and colleagues. "The odds of contracting human monkeypox are 32% greater near dense forests with rope squirrels in Sankuru than in nonforested sites."

Climatic factors were not significant predictors of risk, but the authors say their influence may be shown more clearly with analyses at a larger geographical scale.

A total of 201 human cases of monkeypox had been recorded in 156 parts of the district between 2005 and 2007. According to the model, areas at risk of the disease are concentrated in central parts of Sankuru which lie near primary forest and have the highest population density.

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Fuller and colleagues created ecological risk maps at a fine scale (1 km²) that can help local public health staff to plan control efforts. "Future surveillance could prioritize oil-palm forests that are rope squirrel habitat for increased monitoring, and should measure poxvirus seroprevalence in other species that share the same habitat."

Enhanced monitoring is a key part of efforts to prevent the virus from spreading beyond Africa. Currently, cases of monkeypox are being reported from the DRC, and occasionally from nearby Republic of Congo and Sudan. There has been one outbreak of the disease outside the continent, in 2003, when 71 pet owners in the USA caught the virus from rodents imported from Ghana.

Reference and link

1. Fuller T, Thomassen HA, Mulembakani PM, Johnston SC, Lloyd-Smith JO, Kisalu NK, et al. Using remote sensing to map the risk of human monkeypox virus in the Congo Basin. *EcoHealth* 2010. doi: [10.1007/s10393-010-0355-5](https://doi.org/10.1007/s10393-010-0355-5)

[US Centers for Disease Control and Prevention information](#) about monkeypox

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