

Mapping could help stop Ebola's spread

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Fruit bats (Pteropodidae) are considered the likely host of the Ebola virus. Credit: Satit Srihin

In the fight against Ebola, mapping fruit bat habitats could be one important step, says a geoinformatics researcher at Sweden's Royal Institute of Technology.

Like the Black Death that ravaged medieval Europe, the Ebola virus' progress through remote areas of West Africa is enabled by lack of understanding about the disease, including its causes and transmission.



Mapping technology however will give responders to the crisis in Africa the upper hand in stopping the spread of the deadly disease, says Skog, a researcher in geoinformatics at Sweden's KTH Royal Institute of Technology.

Skog's research has produced a method that medical professionals can use to visualise the geographical distribution of a disease over time. In his research, Skog has explored the relationship between geography and disease distribution in major epidemics of the past, including the Black Death, the Russian Flu pandemic of 1889, the Asiatic Influenza of 1957 and the swine flu. He says the historical data provides a basis for predicting the course of future epidemics and pandemics.

"My research and method can also be used to report the current state of a pandemic, or predict how extensive the spread will be. And where the disease will strike next," Skog says.

In fact, the way in which Black Death spread during the mid 14th, century bears a no small resemblance to today's Ebola epidemic, he says. Both diseases were hosted by small mammals – black rats and fruit bats, respectively. But ultimately it was humans that enabled its spread.

"The Black Death was very much depending on total lack of knowledge regarding the etiology of the disease and how to avoid further transmission," Skog says. "That is also the case for the mainly remote locations where Ebola now is spread."

Fruit bats are believed to be the natural hosts of Ebola. These bats are among the creatures that residents of rural West Africa hunt for "bush meat". The disease is also spread by the droppings of the bat, and it is believed to have spread to other types of bush meat, as well as monkeys and pigs that are raised for slaughter.



"The local population is getting part of their nourishment from bush hunting, leading to contact with the virus that is transmitted via body fluids," Skog says, suggesting that closer study of the fruit bat could provide vital answers.

"A guess of mine is that the number of infected fruit bats is a determining factor for an Ebola outbreak," he says. "Are there any known factors that may have changed the ecosystem in favor of the bats? Are the bats affected by the virus too? Do fruit bats always carry the Ebola virus or is the virus fatal to them as well? If so the percentage of infected bats will vary over the years also depending on the immunology of the species."

There are a number of geoinformation technology options available to public health organizations that have sent field crews to respond to the crisis. These, Skog says, including equipping field workers with handheld GPS devices that feed a central database with data and findings regarding locations of bodies, possible infections and diagnosed cases personnel.

"The data can easily be centrally monitored and used for decisions and policies to mitigate the spread," he says. "Using satellite imagery, population centers can be localized. Collected disease data can also be compared and analysed with environmental and climatologic data to support other efforts to control the spread."

For instance, assuming that fruit bats are the reservoir for the <u>ebola virus</u>, Skog says it would be of interest to find out if the first detected cases in an outbreak are located in or close to a fruit bat habitat. "If the environmental and climatologic parameters for <u>fruit bat</u> habitats can be defined, there is a chance these habitats could be mapped using existing map data and satellite or airborne imagery," he says.



"Then risk areas could be monitored and preventive measures could be performed by health authorities. If the natural reservoir is in fact some other animal, positioning the first cases in each outbreak would still give a clue about what to look for."

Provided by KTH Royal Institute of Technology

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