

What's needed to do a better job of pre-empting disease outbreaks

By [William B Karesh](#)

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The concept of [One Health](#) is deceptively simple: it's the recognition that human, animal and environmental health are all inherently linked.



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Put into practice, it means approaching global health issues such as disease outbreaks and antibiotic resistance with the combined force of doctors, veterinarians, environmental scientists and civil society to tackle them more effectively across multiple fronts.

Taking on health issues from different angles simultaneously has the benefit of saving time, money and lives, rather than addressing a challenge in one area only to later find it emerge in another.

While this concept has proven particularly popular among veterinarians, the wider implementation of One Health practices has remained relatively low. For instance, our team [reviewed](#) more than 1 800 scientific articles on One Health published since I coined the term in [2003](#). Only seven papers describe an effort to measure the benefits of the approach.

[Research](#) coordinated by [EcoHealth Alliance](#), a global environmental health organisation, set out to show how we can better anticipate disease outbreaks by joining forces. This can allow us to keep ahead of new public health threats and take preventative measures to protect people and animals.

Focus on Rift Valley fever

We focused on Rift Valley fever, a viral and zoonotic disease, as a test case to demonstrate the value of adopting a One Health approach, and found both scientific and resource efficiency advantages.

Passed from mosquitoes to animals and from animals to humans with no known treatment, Rift Valley fever is one of the World Health Organisation's [eight priority diseases](#) and has all the elements that could quickly turn it into a global public health emergency.

In humans, mild [cases](#) can cause flu like symptoms that last from four to seven days. Rift Valley fever can also cause severe illness such as hemorrhagic fever with symptoms ranging from vomiting blood, passing blood in the faeces, or bleeding from the nose or gums. Almost half of the people who get this form of the disease die.

Rift Valley fever causes severe illness in animals. Around 90% of lambs that get infected die. The abortion rate among pregnant ewes that get infected is almost 100%.

Recent outbreaks in [Kenya](#), Rwanda and [South Africa](#) have put health authorities on high alert. Some authorities restricted the movement of livestock and even temporarily banned the [sale of meat](#). And there is increasing concern that Rift Valley Fever could spread to [Europe](#).

Rift Valley fever is an ideal candidate for a One Health approach because of its complex overlapping human, animal and environmental elements.

Given there is as yet no cure for the virus, the better equipped we are to preempt outbreaks, the quicker we can mobilise to prevent them from spreading and putting animals and people at risk.

[Our research](#) found that by tracking a disease with a combined, One Health approach, we could get a bigger, more accurate picture of the way it was spreading. This would allow us a greater opportunity to take preventative measures to protect people and animals, and save lives.

Modelling disease interactions

To show how this could work, we built a computer model of the complex disease interactions in people, cattle and mosquitoes based on real-world data from our field project to demonstrate possible outcomes.

We then ran simulations to compare two approaches: a One Health surveillance system with joint human-animal sampling at the same time and place, and the more traditional approach of independent human and animal surveillance conducted separately.

Our simulations demonstrated that the One Health sampling approach could detect associations in disease transmission between animals and people that would have been missed in typical, non-integrated study designs.

Our research in the field also found that a One Health approach saved up to 35% in spending on staffing and resources when compared to conducting separate surveillance or studies.

We also found that engaging the private sector, such as ranchers, farmers and their associations, which are often left out of One Health efforts, dramatically improved the efficiency and impact of the work.

Engaging small-scale farmers was particularly important. But, in Kenya, where Rift Valley fever was [first detected](#), and

throughout sub-Saharan Africa, convincing smallholder farmers to keep their flocks and herds vaccinated can be challenging if they do not see an imminent risk.

In many parts, outbreaks happen once every five to six years. So many farmers do not see the return on the cost of vaccinating animals annually as well as with every new lambing and calving season, which can be up to three times a year.

Ultimately, the only way for us to reduce the risk of Rift Valley fever ever becoming a pandemic is to vaccinate livestock.

We can be better prepared to tackle diseases before they take hold and avoid the devastating consequences, but only if environmental scientists, veterinarians and doctors work together and with the public. This is no easy or inexpensive task but our findings indicate that the returns on investment are manifold, for all of us who share one health.

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