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UC Santa Barbara Researchers Examine the Consequences of Non- Intervention for Infectious Disease in Highly Endangered African Great Apes

Infectious disease has joined poaching and habitat loss as a major threat to the survival of African great apes as they have become restricted to ever-smaller populations. Despite the work of dedicated conservationists, efforts to save our closest living relatives from ecological extinction are largely failing, and new scientific approaches are necessary to analyze major threats and find innovative solutions.

In response to this crisis, researchers at UC Santa Barbara's National Center for Ecological Analysis and Synthesis (NCEAS) have conducted a pioneering study that illustrates how severely disease threatens the long-term survival of wild gorillas and chimpanzees. It also explores the status of potential interventions that may help ensure their continued existence. The article, "Consequences of Non-Intervention for Infectious Disease in African Great Apes," was recently published in the online journal PLoS ONE. The study indicates that mortality rates comparable to those recently reported for disease outbreaks in wild populations are not sustainable.

Sadie Ryan, the lead author, is assistant professor of ecology at SUNY-ESF in Syracuse, N.Y.; and Walsh is a quantitative ecologist at the University of Cambridge, England.

Modeling demonstrated that recovery times to current population levels from a single disease outbreak, under very optimistic rates of recovery, would range from five years for a flu-like outbreak, to 131 years for an Ebola virus outbreak that killed 96 percent of the population, according to the study.

Population resilience is central to assessing disease threat because gorillas and chimpanzees reproduce more slowly than virtually any other animal on earth, including humans.

"These disease mortality rates are particularly troubling, given the rising pathogen risk due to increasing human contact with wild apes, associated with their habituation for tourism, poaching, and the increase in population pressure around protected areas," said Ryan. "These small populations of great apes are the last vestiges of our closest relatives, so there is a huge emotional response when it comes to the question of intervention. Should we or can we wait, or should we use proactive intervention by vaccinating ahead of time?"

Both "naturally" occurring pathogens, such as Ebola and Simian Immunodeficiency Virus (SIV), and respiratory pathogens transmitted from humans, such as the common cold and flu viruses, have been confirmed as important sources of mortality in wild gorillas and chimpanzees, and the rate of pathogen spillover from humans to African apes is known to be increasing.

Although awareness of the threat has spread throughout the scientific community, interventions such as vaccination and treatment remain very controversial, the researchers noted.

Because of the scarcity of diagnostic data on exactly which pathogens infect apes and at what rates, Ryan and Walsh found it difficult to rigorously quantify how increased tourism would translate into increased disease pressure on ape populations.

As a result, they assessed and compared potential future disease spillover risk -- in terms of vaccination rates among humans that may come into contact with wild apes, and the availability of vaccines against potentially threatening diseases -- with

non-interventionist responses, such as limiting tourist access to the primates, community health programs, increased vigilance, and reactive veterinary intervention.

Based on their findings, Ryan and Walsh suggest that the great ape conservation community "pursue and promote treatment and vaccination as weapons in the arsenal for fighting the decline of African apes." They recommend that field studies on safe and efficient methods for delivering treatments and vaccines orally be conducted, along with evaluating the cost-effectiveness of all ape conservation strategies.

"We looked at the rates of vaccination in human populations both in host countries and potential tourists, and at the potential vaccines in development that could be used for great apes," Ryan said.

"But we need to do more research when outbreaks occur by mobilizing the entire research community in order to better understand what is going on."

To view the paper, visit:

www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0029030

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† Top image: Ebobo, an adult male silverback western gorilla (*Gorilla gorilla*), lives near the headquarters of Nouabale Ndoki National Park in Republic of Congo.

Credit: Peter Walsh

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