

Study finds that wildlife supply chains for human consumption increase coronavirus spillover risk to people

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Civet in a farm in Dong Thap, Viet Nam. Credit: WCS Vietnam

A new study found that animals sampled in the wildlife-trade supply chain bound for human consumption had high proportions of

coronaviruses, and that the proportion of positives significantly increases as animals travel from traders, to large markets, to restaurants.

The study, which appears in the pre-print journal bioRxiv, is by a team of scientists from WCS, the Department of Animal Health of the Viet Nam Ministry of Agriculture and Rural Development, Viet Nam National University of Agriculture, EcoHealth Alliance, and One Health Institute of the University of California, Davis.

Wildlife in the trade [supply chain](#) are often under stress and confined at high densities with other animals from multiple sources which likely results in increased shedding of coronaviruses. The authors forewarn of the potential risk of viral spillover into people through the wildlife trade.

The authors indicate that stress and poor nutrition likely contribute to decreasing animal immune functions resulting in increased shedding and amplification of coronaviruses along the supply chain. The findings in rodents illuminate the potential for coronavirus shedding in other wildlife supply chains (e.g. civets, pangolins) where similarly large numbers of animals are collected, transported, and confined.

The purpose of the study was to gain a better understanding of coronavirus presence and diversity in wildlife at three wildlife-human interfaces including live wildlife trade chains, wildlife farming, and bat-human interfaces. This work represents an important demonstration of capacity and a significant contribution from Viet Nam to the field, laboratory, and scientific approaches critical to understanding and addressing zoonotic disease threats. The consensus PCR approach for viral detection is a cost-effective tool for detecting both known and novel viruses and co-infections in a variety of taxa, sample types, and interfaces.

Researchers collected samples at 70 sites in Viet Nam, and detected six

distinct taxonomic units of known coronaviruses. There is no current evidence to suggest these particular viruses were a human-health threat, but the laboratory techniques used in the study can be utilized to detect important emerging or unknown viruses in humans, wildlife, and livestock in the future.

The team found high proportions of positive samples among field rats destined for [human consumption](#). The proportion of positives significantly increased along the supply chain from traders (21 percent), to large markets (32 percent) to restaurants (56 percent). Coronaviruses were detected on two-thirds of the surveyed wildlife farms, and six percent of rodents raised on the farms were positive. A bat and a bird coronavirus were found in rodent fecal samples collected from wildlife farms suggesting either environmental mixing or viral sharing among species. Coronavirus detection rates in rodent populations sampled in their 'natural' habitat are closer to 0-2 percent.

Said Amanda Fine, WCS Health Program Associate Director, Asia, and a co-author of the study: "Wildlife supply chains, and the conditions the animals experience while in the supply chain, appear to greatly amplify the prevalence of coronaviruses. In addition, we documented exposure of rodents on wildlife farms to both bat and bird coronaviruses. These high prevalence rates and diversity of coronaviruses, added to the species mixing we see in the wildlife trade, creates more opportunities for coronavirus recombination events as well as spillover."

The authors warn that the trade in wildlife facilitates close contact between people and multiple species of wildlife taxa shedding coronaviruses. This provides opportunities for intra- and inter-species transmission and potential recombination of coronaviruses.

The wildlife supply chain from the field to the restaurant provides multiple opportunities for such spillover events to occur. To minimize

the public health risks of viral disease emergence from wildlife and to safeguard livestock-based [production systems](#), the authors recommend precautionary measures that restrict the killing, commercial breeding, transport, buying, selling, storage, processing, and consuming of wild animals.

The emergence of SARS-CoV, MERS-CoV, and now SARS-CoV-2 highlight the importance of the coronavirus viral family to affect global public health. The world must increase vigilance through building and improving detection capacity; actively conducting surveillance to detect and characterize coronaviruses in humans, wildlife, and livestock; and to inform human behaviors in order to reduce zoonotic viral transmission to humans.

Hoang Bich Thuy, WCS Viet Nam Country Program Director and co-author explains: "Since the outbreak of COVID-19, the Government of Viet Nam has been taking strong actions to enforce wildlife trade laws and is considering the prohibition of [wildlife trade](#) and consumption as directed by the Prime Minister in his Official Letter No. 1744/VPCP-KGVX dated 6 March 2020 of the Government Office. This research provides important baseline information and suggests areas for targeted studies to provide more evidence for the development of new policies and/or revision of the legal framework in Viet Nam to prevent future pandemics by mitigating risks of transmitting pathogens from animals to humans at key nodes along the wildlife supply chain. Successful interventions will be those that support a significant reduction in the volume and diversity of species traded, and the number of people involved in the trade of [wildlife](#)."

More information: Nguyen Quynh Huong et al. Coronavirus testing indicates transmission risk increases along wildlife supply chains for human consumption in Viet Nam, 2013-2014, (2020). [DOI: 10.1101/2020.06.05.098590](#)

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