PUBLIC HEALTH

Why the Coronavirus Slipped Past Disease Detectives

Groups of scientists tasked with identifying pandemic-prone microbes were stretched too far and thin

By Charles Schmidt on April 3, 2020

Butcher sells a yak's head at a market in Beijing. Credit: Nicolas Asfouri *Getty Images*

In 2009 the U.S. government launched a program to hunt for unknown viruses that can cross from animals to humans and cause pandemics. The project, called PREDICT, was funded by the U.S. Agency for International Development, and it worked with teams in 31 countries, including China. It was just one part of an emerging global network for infectious-disease surveillance.

Despite this network and the efforts of thousands of scientists working to ward off dangerous new outbreaks, the coronavirus behind COVID-19 was unidentified when it launched into an unprepared world at the end of 2019. How did the virus slip by disease detectives looking for exactly this type of threat?

Experts say that like a fishing net with many holes, the surveillance network had numerous gaps, with too little money and manpower to be truly effective. “We’ve been gutting surveillance for too long,” says Michael Buchmeier, a virologist and associate director of the Center for Virus Research at the University of California, Irvine. “And by doing that, we’re creating blind spots in our ability to identify and contain threats of infectious disease in the world.” Indeed, in September 2019, just months before the COVID-19 pandemic began, USAID announced it would end funding for PREDICT. The agency claims it has plans for a successor effort, but it has not provided any additional details, and many worry that critical momentum is being lost.

An estimated 600,000 unknown viruses, possibly more, have the ability to jump from animals to people. To find such “spillover” microbes, researchers look in disease hotspots where wildlife and humans intermingle, such as forests that are razed for development or agriculture or markets that sell bushmeat. Sampling tends to focus on species with high viral loads, such as bats, rats and monkeys. And scientists run laboratory tests to find out if newly discovered viruses can infect human cells. Investigators also try to look at the various ecological and social drivers that can bring disease-carrying wild animals and humans together.

Researchers were well aware that coronaviruses, one of which caused severe acute respiratory syndrome (SARS), could be a recurring threat. That pathogen, SARS-CoV, first surfaced in China in 2002 and spread to nearly 30 countries before the outbreak died down the following year. In 2007 researchers from the University of Hong Kong

made this type of pathogen a “time bomb.” In southern China there was a culture of eating exotic animals that could pick up such viruses from the bats, they noted, and this practice made it easier for them to make the jump to people. Several other groups of scientists later echoed their fears, and the virus that causes COVID-19 turned out to be so similar to the 2002–2003 microbe that it was named SARS-CoV-2.

Kevin Olival is a disease ecologist at the EcoHealth Alliance, a New York City–based nonprofit research group that was part of PREDICT. He says that EcoHealth researchers and their partners, including a team at the Wuhan Institute of Virology in China, had identified numerous SARS-related coronaviruses in bats and were following up with laboratory experiments on several of them. But, he adds, how and where the SARS-CoV-2 spillover occurred is not known for certain. There was an early suspicion that the initial outbreak could have started at the Huanan Seafood Wholesale Market in Wuhan, which was closed on January 1. But “we don’t know if the spillover happened outside the market and then began spreading after it was brought there,” Olival says. It is also unclear if there was an intermediate animal host between the disease-carrying bats and humans.

Getting a better grasp on animal-human exchanges is critical to predicting these spillovers. According to Olival, what is needed is detailed knowledge of local ecology, maps of species distributions, an understanding of people’s behavioral interactions with other species and an awareness of the “cultural and economic drivers of the animal trade.” If these analyses sound complicated, that is because they are: Olival says such assessments take a lot of scientists and facilities, as well as training and money. As a result, they are only being carried out at a handful of sites around the world. Yet the information they provide is essential for protecting local communities. High-risk markets where wildlife is cut up and sold as food can be closed, for instance. Or people can be alerted when virus-shedding bats are more active around human food sources, such as fruit trees, so individuals can minimize their contact with the animals.

Rohit Chitale, an epidemiologist at the Defense Advanced Research Projects Agency, says the explosion of COVID-19 reflects a global failure to adequately invest in prevention. “There’s too much emphasis on treating infectious diseases after the fact,” argues Chitale, who is program manager of DARPA’s surveillance effort, called