Emerging infectious diseases pose a significant burden on human and animal health and global economies. Conventional approaches to epidemic control have most often been reactive. However, explosive human population growth, dramatic changes in land use, and increased global trade and travel require a shift toward a proactive, predictive approach. The PREDICT project aims to prevent, detect, and rapidly respond to the spillover of novel infectious pathogens from wildlife to humans.

While the linkage of human, animal, and environmental health is at the heart of our One Health approach – an increasingly important and recognized lens through which governments, NGOs, and practitioners view public health – the global health community still has three critically important needs:

1) Broader and deeper knowledge of pathogens with the potential to emerge from animals;
2) Targeted surveillance to maximize available resources;
3) Tools to characterize organisms that could be pathogens of significance and to predict where and how they might spillover to susceptible hosts.

**Challenge:** Develop a strategic framework to identify pathogens of pandemic potential that have not yet emerged.

**Opportunity:** Current infrastructure improvements and technological advances have dramatically and rapidly improved our ability to identify high-risk interfaces for disease transmission and to detect novel pathogens before widespread spillover occurs. These advances include improvements in information technology, molecular diagnostics, and risk modeling.

PREDICT has built a broad coalition of partners to discover, detect, and monitor pathogens at the wildlife-human interface using a risk-based approach. Our efforts integrate digital sensing and on-the-ground surveillance at critical points for disease emergence. PREDICT is at the cutting-edge of recent technological advances allowing rapid detection and diagnosis of high-risk viral families, even in settings where resources are limited.
The goal of the PREDICT project in Cambodia was to build local capacity to conduct surveillance and diagnostics for zoonotic pathogens in wildlife. PREDICT-Cambodia was a collaborative effort between the Pasteur Institute of Cambodia (IPC) and the Wildlife Conservation Society.

**Background**

Anthropogenic activities, such as wildlife trade and land conversion for agriculture, are recognized as drivers of zoonotic disease emergence. Cambodia is a key source, conduit, and consumer of wildlife. In the past decade, the country has seen economic development accompanied by large scale land-use change and increasing human-wildlife-domestic animal contact, which may increase opportunities for pathogen spillover from animals to people.

**Disease Surveillance**

- PREDICT conducted surveillance across Cambodia at sites where wildlife host species and humans are most likely to interact.
- Teams primarily sampled bats, rodents, and nonhuman primates in addition to carnivores and ungulates commonly hunted and consumed in rural areas.
- Efforts focused on such high-risk interfaces as wild animals in and around human dwellings, hunting, wild animals kept as pets, and markets trading wildlife.

**Indochinese Silvered langur** *(Trachypithecus germaini)* kept as a pet alongside domestic dogs in western Cambodia. Photo by L. Keatts. **Government animal health partner conducting a survey of wildlife for sale in a local market in northern Cambodia. Photo by WCS.** **PREDICT – Cambodia team member explaining the aims of PREDICT in a rural hunting community. Photo by L. Keatts.**

PREDICT characterized zoonotic disease risks at critical animal-human interfaces in Cambodia.
Using One Health Approach

Expanded national capacity for zoonotic disease surveillance:
- Trained 62 government staff from across sectors, operationalizing the One Health concept for wildlife surveillance.
- Trained the next generation of Cambodian veterinarians in wildlife disease surveillance.
- Assisted in the creation of the Zoonoses Strategic Plan for Cambodia.
- Introduced and trained government staff in innovative viral family polymerase chain reaction screening techniques for thorough and economical sample diagnostics.

Expanded surveillance for viruses in Cambodian wildlife:
- Conducted wildlife surveillance, in partnership with the NaVRI and FA at high-risk interfaces, including ecotourism sites, hunting, markets, wildlife animals in and around human dwellings, and sanctuaries.
- Sampled a total of 3887 animals including 300 nonhuman primates, 552 rodents, and 2503 bats at 82 sites across Cambodia.
- Initiated PCR screening for 21 viral families using novel techniques.
- Conducted a year-long series of consumption surveys at the human-wildlife-domestic animal interface in nine rural hunting communities across three provinces.

Capacity Building
- Trained Royal Government of Cambodia staff from animal health, forestry, and environment sectors in targeted zoonotic pathogen surveillance in wildlife.
- Conducted workshops and field training on wildlife surveillance for students from two veterinary schools.
- Established viral family testing protocols and next generation sequencing capacity at IPC, concurrently training partners in the National Veterinary Research Institute (NaVRI) to use these new techniques.

Partnerships for Sustainability
- Ministry of Agriculture and Forestry (MAFF)
- National Veterinary Research Institute (NaVRI)
- Forestry Administration (FA)
- Ministry of Health’s Communicable Disease Control Department (CDC)
- Royal University of Agriculture (RUA)
- Prek Leap National Agriculture Institute (PLNAI)

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