A Project of USAID’s Emerging Pandemic Threats Program

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.
PREDICT in Lao PDR developed local capacity to detect, prevent, and respond to zoonotic disease outbreaks of wildlife origin, through strategic partnerships with government. PREDICT-Lao PDR was a collaborative effort between the Wildlife Conservation Society, the National Animal Health Laboratory of Lao PDR, and the Institute Pasteur Cambodia.

**Background**

In Lao PDR, illegal wildlife trade is significant and expanding. Through this trade, humans come into direct contact with wildlife, particularly in markets that provide many opportunities for zoonotic pathogen transmission. Wildlife hunting in rural villages also represents an important interface for human-wildlife contact.

**Disease Surveillance**

- Worked closely with local partners
- Samples were collected from priority taxonomic wildlife groups (bats, primates, and rodents) at high risk human-wildlife interfaces across Lao PDR, focusing on:
  - Wildlife trade (markets selling wildlife)
  - Subsistence hunting in indigenous villages
Using One Health Approach

Expanded the One Health framework for effective surveillance:

- Personnel from the human health, livestock health, and wildlife health sectors worked together to standardize methods for collection and testing of wildlife samples.
- Collected **10609 samples from 2693 animals** from high risk human-wildlife interfaces across Lao PDR (1,530 rodents, 956 bats, 45 primates, and 162 from other species, including civets) including wildlife markets and hunting villages.
- Family level screening PCR for 17 viral family families conducted, including Alpha-, Arena-, Astro-, Corona-, Filo-, Flavi-, Hanta-, Henipa-, Herpes-, Influenza-, Rhabdo-, Lyssa-, Seadorna-, Paramyxo-, Pox-, Bunya-, Retroviridae.
- Sequencing of viruses detected through family level screening.

Improved zoonoses surveillance:

- Improved knowledge for the national task force for zoonoses surveillance and increased awareness of emerging infectious diseases through field trainings and a series of workshops.
- A total of **110 government personnel and 8 students** from the National University of Laos received training.
- Introduced innovative techniques for testing viral families at NAHL laboratory, using synthetic DNA plasmid controls and broadly reactive consensus PCR assays to detect zoonotic viruses.

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