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 that have 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 for identifying 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 Nepal was to strengthen surveillance and diagnostics to protect human and animal health. PREDICT-Nepal was a collaborative effort between the Center for Molecular Dynamics (CMDN), EcoHealth Alliance, and the University of California, Davis.

Background

One Health recognizes that activities and conditions of humans, animals, and the environment affect each other. More than half of all infectious diseases are shared between humans and animals, and three-fourths of these originate in wildlife. In Kathmandu, Nepal, rapid urban growth spurred by conflict and a lack of urban planning stress the vulnerability of public health infrastructure, especially in areas of intensified new growth around former croplands, forest fragments, and along urban riverbanks. PREDICT-Nepal was initiated in 2011 to explore the risks of disease emergence at human-animal interfaces in urban ecosystems.

Disease Surveillance

PREDICT conducted surveillance in urban areas to characterize the viral diversity among taxonomic groups (bats, primates and rodents) considered high risk for disease emergence in Kathmandu, focusing surveillance in areas like informal settlements, highly-trafficked urban centers, and monkey temple complexes where animals and people are in close proximity and contact.

In addition, PREDICT conducted human-animal contact surveys at monkey temples and informal settlements to evaluate zoonotic disease transmission risks from wildlife associated with human-animal contact.
Capacity Building

- Strengthened Nepal’s wildlife disease surveillance capacity and optimized advanced molecular disease diagnostic laboratory for detecting known and novel viruses in wildlife.
- Established cost-effective methods to detect zoonotic viruses and novel viruses.
- Trained a cadre of veterinary and field personnel in non-invasive and invasive wildlife surveillance techniques.

Partnerships for Sustainability

- The Department of National Parks and Wildlife Conservation
- Ministry of Agriculture Development, Department of Livestock Services and Central Veterinary Laboratory
- Ministry of Health and Population, Department of Epidemiology and Disease Control
- Ministry of Health and Population, Department of Health Services National Public Health Laboratory
- USAID/Nepal
- Patan Academy of Sciences
- Tribhuvan University and the Institute of Agriculture and Animal Science
- The One Health Alliance of Nepal

Making a difference for Global Health

Expanding the One Health Workforce in Nepal

PREDICT trained veterinary doctors, ecologists, laboratory personnel, and managers to enhance expertise in field surveillance, biosafety, animal capture and handling, laboratory diagnostics, and information management.

- Trained 21 individuals in disease surveillance and 17 in laboratory safety and diagnostics.
- In collaboration with WHO/Nepal and local organizations, developed the One Health Alliance of Nepal (OHAN), a platform for connecting all health-related systems and stakeholders and to improve inter-agency communication and coordination for disease surveillance and response.

Providing Proof of Concept

- Sampled 768 animals (109 bats, 411 rodents and shrews, and 248 nonhuman primates) at high-risk interfaces for human-wildlife contact in Kathmandu.
- Implemented a novel diagnostic approach utilizing consensus (genus/family level) polymerase chain reaction PCR, an inexpensive tool producing specific, high resolution data and allowing for quicker detection of potential pathogens.
- Initiated testing for 10 viral families at CMDN and tested over 800 specimens.

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