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 Tanzania was to strengthen surveillance and diagnostics to protect human and animal health. PREDICT-Tanzania was a collaborative effort between Sokoine University of Agriculture (SUA) and 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. Further, three-fourths of these originate in wildlife. In Tanzania, rapid population growth and land conversion have led to greater sharing of resources and increased interactions among wildlife, domestic animals, and humans. This wildlife-domestic animal-human interface may lead to spillover of infectious diseases from animals to people.

**Disease Surveillance**

PREDICT prioritized wildlife disease surveillance in areas of Tanzania where wildlife host species are likely to interact closely with domestic animals and people.

The field team sampled rodents, bats, and nonhuman primates in diverse environments throughout Tanzania at potential high-risk disease transmission interfaces between people and animals and initiated a participatory sample collection network with hunters in the Ruaha ecosystem to screen bushmeat for emerging viruses.

PREDICT captured and sampled fruit bats throughout Tanzania to learn more about infectious pathogens of bat-origin that may pose a threat to human and domestic animal health. Photos by PREDICT Tanzania team.
Partnerships for Sustainability

- Tanzania Wildlife Research Institute
- Tanzania National Parks
- Ministry of Health and Social Welfare
- National Institute for Medical Research
- Ministry of Livestock and Fisheries Development
- Muhimbili University of Health and Allied Sciences
- Ministry of Tourism and Natural Resources
- Center for Disease Control Tanzania Country Office and Global Disease Detection Regional Center in Nairobi

Making a difference for Global Health

Expanding the One Health Workforce in Tanzania

- Trained over 100 individuals in disease surveillance and diagnostics.
- Strengthened an East Africa network for wildlife health and diagnostics through coordination with government ministry, university, and research institute partners in Tanzania, Rwanda, and Uganda.
- Invited Tanzania partners to share and learn field surveillance techniques and protocols.

Optimizing Surveillance and Response

- Standardized animal sampling protocols to ensure safe and effective wildlife capture and sampling.
- Developed a liquid nitrogen-based cold chain for rural areas.

Providing Proof of Concept

- Sampled 1,753 animals (650 bats, 632 rodents & shrews, 251 nonhuman primates, and 220 animals of other taxa) at high-risk human-wildlife interfaces.
- 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.
- Prioritized the implementation of PCR for the Arenavirus family at SUA, due to the detection of novel Arenaviruses in rodents in rural and peri-urban areas.

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