Ongoing PREDICT 2 work in Laos: Synchronized surveillance between PREDICT and FAO at the Wildlife-Livestock-Human Interface

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Introduction

Through coordination with the Food and Agriculture Organization (FAO), PREDICT is conducting concurrent human and animal surveillance in Khong District, Southwest of Champasack Province, Laos, where local villagers continue to live in close contact with animals. PREDICT collects biological samples from wildlife (rodents and bats), while FAO collects samples from livestock (poultry, swine, buffalo and cattle) to search for potentially zoonotic viruses of pandemic threat to humans. At the same time, PREDICT will soon begin work with the Khong District Hospital to screen patients that present with one of the following syndromes will be asked to participate in study: fever of unknown origin, fever with rash, fever with hemorrhage, fever with respiratory symptoms, and encephalitis. Human participants will be required to provide informed consent, complete a questionnaire, and provide biological samples. PREDICT is responsible for the collection and laboratory analysis of all wildlife and human samples, while FAO is responsible for livestock samples.

Objectives

The PREDICT project is developing a global early warning system to detect, track, and predict the emergence of new zoonotic pathogens from animals that could pose a threat to human health. The program will gather biological and behavioral information from people with high levels of exposure to animals to identify viruses that may be acquired from animals and to understand which activities or behaviors can be targeted for intervention to alleviate risk. Furthermore, a large aspect of the program is to increase laboratory and field surveillance capacity within the country.

Field data, both biological and behavioral, and epidemiological information will be coalited for further analysis to identify geographic areas of disease risk and emergence, and behavioral patterns that affect exposure to disease.

In Lao PDR, PREDICT is implemented by Metabiota Inc., in close collaboration with National Animal Health Laboratory, Department of Livestock and Fisheries, Ministry of Agriculture and Forestry and National Center for Laboratory and Epidemiology, Department of Communicable Disease Control, Ministry of Health, FAO Laos and local stakeholders and communities.

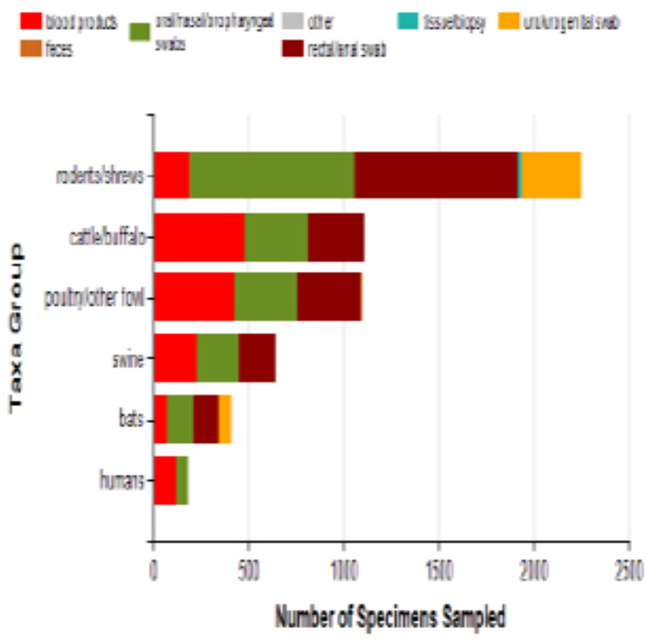

Chart 1. Specimens Type Obtained to date by Taxonomic Group

Methodology

- Biological samples collected from wildlife, livestock, and human are analyzed by specially-designed consensus PCR assays for the presence of influenza virus, coronavirus, paramyxovirus, filovirus, and flavivirus
- Human behavioral data is collected from individuals at high risk of viral exposure through interaction with wildlife and livestock, and who present at Khong District Hospital with syndromes of interest.
- All collected field and laboratory data are recorded in the same set of systems and linked together in EIDITH database developed by PREDICT
- Through partnerships and trainings, disease surveillance and laboratory capacity is being strengthened in Lao PDR.

Figure 1. Official MoU signing ceremony

Figure 2. Discussion with PAFO Deputy Director

Figure 3. Concurrent surveillance site

Results

Field and Lab capacity building:

- 25 people were trained in the standard of operations, safe animal capture and biological sampling in the field
- 10 people from NAHL and NCLE have been trained on PREDICT Laboratory protocols

Wildlife:

- 69 bats sampled and 410 specimens collected.
- 434 rodents/shrews sampled and 2250 specimens collected
- Swabs samples from all animals were tested for Corona-, Filo-, Flavi-, Influenzas, and Paramyxo-virused
- 10 samples are in progress for sequencing
- One known Coronavirus, a strain of Lonquan Aa mouse belong to betacoronavirus genus in 2 pacific rats

Humans:

- 30 participants enrolled in a community setting, with 180 biological samples (nasal swab, whole blood and serum) collected.
- Conducted human questionnaires with an additional 34 participants.
- Conducted ethnographic interviews with 13 participants (2 from a wildlife market).
- Conducted 1 focus group discussion in Na Pa Kieb village with people familiar with wildlife hunting practices in the area

FAO: Domestic Animal:

- Animal samples: 407 including buffalos, cattle, pigs, and poultry
- Samples collected: 2,825
- 587 samples are currently testing at the National Animal Health Laboratory.

Figure 4 Wildlife surveillance team.

Figure 5. Livestock surveillance team.

Conclusions

In close collaboration and strong engagement from lao government, PREDICT builds capacity from field surveillance to laboratory analysis. PREDICT uses one health approach in concurrent surveillance to collect samples and human behavioral information, by the final year project will coalite all data for risk characterization to inform policy makers and local people how to reduce the risk.

"For more information on the PREDICT program, access the PREDICT Year 3 Annual Report"
http://www.vetmed.ucdavis.edu/ohi/local_resources/pdfs/predict-2017-semiannual-report.pdf

Figure 8. Laboratory training at NAHL and NCLE

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Figure 6. Mapping where villagers go for hunting

Figure 7. Surveillance team member are removing bat from mist-net.

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References

[1]http://www.vetmed.ucdavis.edu/ohi/predict/index.cfm