

Lao – Lux lab / Vaccine preventable diseases 2021-2022

Head of Laboratory: Dr. Antony BLACK

Email: a.black@pasteur.la



Executive summary

The Vaccine-preventable disease (VPD) laboratory has a remit to build capacity for investigations of human and animal infectious diseases that are of relevance for Lao PDR. Our activities are in collaboration with the Clinical and Applied Virology group at the Luxembourg Institute of Health (LIH), Luxembourg, headed by Judith Hübschen. We work closely with local partners and focus on the epidemiology and seroprevalence of vaccinepreventable infectious diseases, as well as animal and zoonotic diseases. As such, we can provide stakeholders in public and animal health with estimates of the burden of infections, promote outbreak control and vaccination programs, and propose measures to optimize national health strategies. Our evidence-based results and recommendations are communicated to stakeholders and partners in the form of written and oral reports and policy briefs. In this year's

report, we show data from several completed studies.

The laboratory continues to support the Virology team at IPL for the SARS-CoV-2 testing and also took the lead on a collaborative study to determine the seroprevalence of antibodies against SARS-CoV-2 in Lao PDR in 2020. In collaboration with Pasteur Paris, University of Health Sciences, Lao Tropical and Public Health Institute and the National Centre for Laboratory and Epidemiology, we found no evidence for significant circulation of SARS-CoV-2 in Lao PDR during or before September 2020. This likely results from decisive measures taken by the government early in the pandemic, social behavior, and low population density. High anti-N antibodies/low anti-S antibodies in bat/wildlife contacts may indicate exposure to cross-reactive animal coronaviruses with the threat of emerging novel viruses. These data show the importance of control measures but also demonstrate the vulnerability of the Lao population to SARS-CoV-2 outbreaks. The results and recommendations were communicated directly with the Lao Ministry of Health and have been published as a manuscript.

We completed the analysis and reporting of a serostudy for vaccine-preventable infectious diseases in Saravan Province, in the south of Lao PDR. We found that hepatitis B exposure and chronic infection were high in adults and that diphtheria and tetanus seroprevalence were low, indicating poor vaccine coverage. Measles serology indicated an immunity gap, especially at young ages and we concluded that routine vaccination in Saravan needs strengthening, particularly infants and vulnerable groups. We also investigated the prevalence of hepatitis C virus (HCV) infection in the participants. The seroprevalence of HCV was very high, especially in participants from Samuoi district. PCR and genotyping of the virus did not suggest any large scale transmission events and further studies are recommended to determine the source and risk factors of infection. These

important public health issues in Saravan were reported to the provincial authorities, the Lao Department of Communicable Disease Control, WHO and others and have been accepted for publication as two separate manuscripts.

Lastly, we report a study done in collaboration with the University of Cambridge, UK and others, looking for antityphoid antibodies in different Lao populations. Typhoid is a vaccine-preventable infectious disease that occurs in areas with poor sanitation. Typhoid vaccination is not routine in Lao PDR but has taken place during outbreak situations. Our data show evidence for high rates of infection in young children. We reported the data to the Lao Ministry of Health and have submitted the data for publication.

In September 2021, Vilaysone Khounvisith from the laboratory began her PhD, registered with the Swiss Tropical and Public Health Institute in Basel. This collaboration between Switzerland, IPL, LIH and the Lao Tropical Public and Health Institute (LTPHI) will allow Vilaysone to receive further training in biostatistics and epidemiology and other courses, whilst carrying out her project looking at the relationship between water, sanitation and hygiene levels and infectious diseases in Lao PDR.

In collaboration with the LTPHI, we supervised two Masters's students who completed their dissertations on hepatitis B virus in Lao healthcare workers and tetanus/ diphtheria seroprevalence in Lao adolescents. These studies will be detailed in a future report.

From September we were joined by Lard Salivanh, a Lao military healthcare worker, who will train on research skills with our lab for 6-9 months in the framework of the Arboshield program. Overseas visitors to the laboratory were limited this year due to COVID-19 related travel restrictions.

In her joint capacity as a scientist from the laboratory and a

member and Executive Secretary of the Nation Immunization Technical Advisory Group, Dr. Phonethipsavanh Nouanthong supported the National Immunization Program in several activities. These included; providing technical support, new vaccine review, protocol development and training for trainers at national and subnational levels; joining supportive supervision during the COVID-19 vaccination roll out; helping the National Center Laboratory and Epidemiology to review the COVID-19 epidemic burden and vaccine access; assessing vaccination effectiveness/modeling in collaboration with the University of Health Science, Lao PDR.

Publications

Virachith S, Pommelet V, Calvez E, Khounvisith V, Sayasone S, Kounnavong S, Mayxay M, Xangsayarath P, Temmam S, Eloit M, Escriou N, Rose T, Vongphayloth K, Hübschen JM, Lacoste V, Somlor S, Phonekeo D, Brey PT, Black AP. *Low seroprevalence of COVID-19 in Lao PDR, late 2020. Lancet Reg Health West Pac.* 2021 Aug;13:100197.

Cheung D, Khounvisith V, Sitbounlang P, Douangprachanh S, Virachith S, Arounlangsy P, Hübschen JM, Paboriboune P, Black AP. *Knowledge, attitude and practice towards liver cancer and liver cancer screening among HBV and HCV patients in Vientiane, Lao People's Democratic Republic: a cross-sectional study.* Clinical and Experimental Hepatology. August 2021.

Hefele L, Xaydalasouk K, Kleine D, Homasana A, Xayavong D, Syphan S, Hübschen JM, Muller CP, Black AP. *Seroprevalence of measles and rubella antibodies in vaccinated and unvaccinated infants in the Lao People's Democratic Republic.* Int. J. Inf. Dis, July 2021

Snoeck C, Evdokimov K, Xaydalasouk K, Mong Khoune S, Sausy A, Vilivong K, Pauly M, Hübschen JM, Billamay S, Muller C, Black AP. *Epidemiology of acute respiratory viral infections in*

children in Vientiane, Lao People's Democratic Republic. J. Med. Virology, April 2021.

Xaydalasouk K, Sayasinh K, Hübschen J, Khounvisith V, Keomany S, Muller C, Black AP. *Age-stratified seroprevalence of vaccine-preventable infectious disease in Saravan, Southern Lao People's Democratic Republic. International Journal of Infectious Diseases. April 2021.*

Fuchs F, Pauly M, Black AP, Hübschen JM. *Seroprevalence of ToRCH pathogens in Southeast Asia. Microorganisms. March 2021.*

Pollack E, Kunlaya K, Keokhamphoui C, Souksakhone C, Chanthavilay P, Sayasone S, Black AP, Nouanthong P. *Suboptimal knowledge of hepatitis B infection and concerns regarding HBV vaccination among blood donors in Lao People's Democratic Republic (PDR). Lao Medical Journal, 2021.*

Khampanisong P, Pauly M, Nouanthong P, Vickers MA, Virachith S, Xaydalasouk K, Black AP, Muller CP, Hübschen JM. *Waning of Maternal Antibodies against Measles Suggests A Large Window of Susceptibility in Infants in Lao People's Democratic Republic. Pathogens, 2021.*

Meetings and presentations

European Scientific Conference on Applied Infectious Disease Epidemiology, online 16 November 2021 "Analyses of blood donor samples from eight provinces in Lao PDR suggest considerable variation concerning HBV exposure and carriage" Poster presentation by Lisa Hefele.

Global health: viruses, liver and cancers 2021, online 18- 24 July 2021. Attended by Siriphone Virachith

Japan Collaborative Group for Lao Health Science and Medicine, annual meeting. Online 7th November 2021. "The COVID-19 outbreak in Laos" Oral presentation by Siriphone Virachith.

Training is given by Vaccine-preventable disease Lab staff

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Supervision of two Masters students from LTPHI;

- Sonephet Vantava “Tetanus and diphtheria seroprotection in adolescents from Bolhikhamxay and Vientiane Capital”
- Khanxayaphone Phakhounthong “Hepatitis B virus exposure, seroprotection and current infection in Lao Healthcare workers” Supervision of Master student from Vu University;
- Trude Dekker “Trends and factors determining hepatitis B birth dose and pentavalent vaccination coverage over time”



Sonephet Vantava
(LTPHI student)
and Bounta
Vongphachanh
(Vaccine
Preventable
Disease
Laboratory
technician)



Vilaysone
Khounvisith from
Vaccine
Preventable
Disease
Laboratory, with
fellow students
from Swiss
Tropical Public
Health Institute.

Team:

Scientists:

1. Dr. Phonethipsavanh Nouanthong
2. Dr. Siriphone Virachith

Junior scientists:

1. Dr. Vilaysone Khounvisith

Technicians:

1. Latdavone Khenkha
2. Bounta Vongphachanh
3. Nouna Innoula

Project carried on in the lab

- +Low seroprevalence of COVID-19 in Lao PDR, late 2020
- +Age-stratified seroprevalence of vaccine-preventable infectious disease in Saravan, Southern, Lao PDR
- +Detection of Hepatitis C in the general population in Saravan Province, Lao PDR
- +An age-stratified serosurvey against purified *Salmonella enterica* serovar Typhi antigens in the Lao PDR
- +Luxembourg-Laos Partnership for Research and Capacity Building in Infectious Disease Surveillance – PaReCIDS; a summary of activities from 2016 to 2021 and future plans.