Workshop Summary

Prioritizing Zoonotic Diseases for Multisectoral One Health Collaboration in Thailand

Bangkok, Thailand

CENTERS FOR DISEASE™
CONTROL AND PREVENTION

กรมปศุสัตว์

Department of National Parks, Wildlife and Plant Conservation

กรมควบคุมโรค
Department of Disease Control

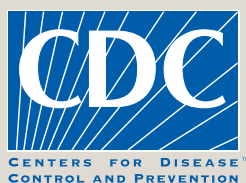กรมวิทยาศาสตร์การแพทย์
Department of Medical Sciences

Photo 1. Female Asian Elephant (*Elephas maximus*) and daughter walking through jungle.

DISCLAIMER

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Photo 2. Pagoda at Wat Phra That Doi Suthep, Chiang Mai, Thailand.

PARTICIPATING ORGANIZATIONS

- Ministry of Agriculture and Cooperatives—Department of Livestock Development
- Ministry of Natural Resources and Environment—Department of National Parks, Wildlife and Plant Conservation
- Ministry of Public Health—Department of Disease Control
- Ministry of Public Health—Department of Medical Sciences
- Chulabhorn Royal Academy—Faculty of Veterinary Medicine and Applied Zoology
- Chulalongkorn University—Faculty of Medicine
- Kasetsart University—Faculty of Forestry
- Kasetsart University—Faculty of Veterinary Medicine
- Mahidol University—Faculty of Veterinary Sciences
- International Health Policy Program, Thailand
- Health Security Partners
- Food and Agriculture Organization of the United Nations (FAO)—Regional Office for Asia and the Pacific
- World Organization for Animal Health (WOAH)—Sub-Regional Representation for Southeast Asian
- World Health Organization (WHO), Thailand
- United States Agency for International Development (USAID)
- United States Centers for Disease Control and Prevention (CDC)

Photo 3. Cattle breeders lead their herd back to the corral in Nakhon Si Thammarat, Thailand.

EXECUTIVE SUMMARY

Photo 4. Participants from the One Health Zoonotic Disease Prioritization Workshop in Thailand.

The purpose of the One Health Zoonotic Disease Prioritization workshop for Thailand was to prioritize zoonotic diseases of greatest concern using a multisectoral, One Health approach with equal input from representatives of human, animal (livestock and wildlife), and environmental health sectors and other relevant partners.

The specific workshop goals were to use a multisectoral, One Health approach to:

1. Prioritize zoonotic diseases of greatest concern for Thailand, and

2. Develop next steps and action plans to address the priority zoonotic diseases in collaboration with One Health partners

During the workshop, participants developed a list of zoonotic diseases for prioritization for Thailand, defined the criteria for prioritization, and determined questions and weights relevant to each criterion. A total of five zoonotic diseases were identified as a priority by participants using a mixed methods prioritization process, the One Health Zoonotic Disease Prioritization (OHZDP) process, developed by the U.S. Centers for Disease Control and Prevention (CDC)[1] (Appendix A).

After the participants selected the priority zoonotic diseases (Table 1), they developed next steps and action plans to address the priority zoonotic diseases in collaboration with One Health partners.

The priority zoonotic diseases for multisectoral, One Health collaboration for Thailand are:

- Zoonotic avian influenza
- Emerging coronaviruses (COVID-19, SARS, MERS)
- Nipah virus infection
- Rabies
- Ebola

This report summarizes the OHZDP process used to prioritize zoonotic diseases of greatest concern for Thailand, as well as next steps and action plans to jointly address these zoonotic diseases using a multisectoral, One Health approach including human, animal, and environmental health ministries and other relevant sectors.

Table 1. Description of priority zoonotic diseases selected by voting members in Thailand using a multisectoral process in the OHZDP workshop conducted in May 2022.

Zoonotic Disease	Agent	Human Disease Burden	Animal Disease Burden	Availability of Diagnostics, Treatment, and Prevention
Zoonotic Avian Influenza	Virus	No reports in the last 10 years.	No reports in the last 10 years.	There is in-country lab diagnostic capacity that follows WOAH, FAO, and CDC protocols. There is government-led routine surveillance in both humans and animals. Chemoprophylaxis and treatment are available in people. The primary control measure in animals is culling and compensation.
Emerging Coronaviruses (COVID-19, SARS, MERS)	Virus	COVID-19: More than 4 million cases reported since 2020 (as of May 12, 2022).[2] SARS: 8 imported cases were identified in 2003.[3] MERS: At least 3 imported cases were reported in 2015–2016	SARS-CoV-2: 3.14% (5/159) of dogs and cats had anti-N-IgG antibodies against SARS-CoV-2 reported in one 2021 study.[4] In another 2021 study, SARS-CoV-2 was detected in 3/35 (9%) dogs and 1/9 (11%) cats living in households with people with confirmed COVID-19.[5] SARS: No reports in animals in Thailand. MERS: No reports in animals in Thailand.	Thailand possesses diagnostic capacity for human and zoonotic coronavirus detection at university and government labs. For COVID-19, treatment and control measures are available at both local and national levels. For SARS and MERS, there is capacity for investigation and rapid response at the national level. Thailand also has a national referral hospital for infectious diseases at the Ministry of Public Health.
Nipah Virus Infection	Virus	There are no known reports of Nipah virus infection in Thailand.	While Nipah-related viruses have been discovered in bats,[6,7,8] Nipah virus has not been detected in animals in Thailand.	Thailand possesses diagnostic capacity for Nipah virus detection at university and government labs. There is capacity for investigation and rapid response at the national level. There is no specific treatment, but treatments for other encephalitis diseases may be applied.
Rabies	Virus	There were 3 human rabies cases reported in 2021, and 1 case reported in 2022 as of May 12, 2022.[9,10]	Rabies circulates endemically in domestic animals, primarily dogs and cattle. Occurrence is unknown in wildlife.	Thailand possesses diagnostic capacity for rabies detection at university and government labs. There is pre-exposure and post-exposure prophylaxis for people available at all levels. Rabies vaccines for companion animals are widely available. Surveillance programs for animal and human rabies are in place.
Ebola	Virus	No reports in the last 10 years.	No reports in the last 10 years.	Thailand possesses diagnostic capacity for Ebola virus detection university and government labs. There is capacity for investigation and rapid response at the national level. There is no specific treatment, but treatments for other contagious hemorrhagic diseases may be applied.

INTRODUCTION

Zoonotic diseases are diseases that spread between animals and people. Most known human infectious diseases and about three-quarters of newly emerging infections originate from animals. Zoonotic diseases that occur in large numbers can impact society in three main ways. Specifically, they:

- Threaten the health of animals resulting in illness, loss of productivity, and death
- Threaten the livelihood of the population dependent on livestock as a major source of income
- Threaten the health of people, with ability to cause a large number of illness and death, which is associated with significant social and economic losses

To best address zoonotic disease threats, a multisectoral, One Health approach is needed. One Health means a collaborative, multisectoral, and transdisciplinary approach—working at the local, regional, national, and global levels—with the goal of achieving optimal health outcomes, recognizing the interconnection between people, animals, plants, and their shared environment.

Photo 5. A fruit vendor paddles her small boat through a waterway in the Damnoen Saduak Floating Market.

To begin addressing zoonotic disease challenges in Thailand, an OHZDP workshop was held May 10–12, 2022, at the Amari Don Muang Airport Hotel in Bangkok. The purpose of this workshop was to prioritize zoonotic diseases of greatest concern using a multisectoral, One Health approach with equal input from representatives of human, animal (livestock and wildlife), and environmental health sectors and other relevant partners.

The specific workshop goals were to use a multisectoral, One Health approach to:

1. Prioritize zoonotic diseases of greatest concern for Thailand; and

2. Develop next steps and action plans to address the priority zoonotic diseases in collaboration with One Health partners.

To build in-country capacity to conduct future OHZDP workshops, nine local partners were trained by CDC and FAO on the One Health Zoonotic Disease Prioritization process from the following relevant One Health sectors and partners:

- Ministry of Public Health—Department of Disease Control
- Ministry of Public Health—Department of Medical Sciences.
- Ministry of Agriculture and Cooperatives—Department of Livestock Development
- Ministry of Natural Resources and Environment—Department of National Parks, Wildlife and Plant Conservation

WORKSHOP METHODS

The OHZDP process uses a mixed methods prioritization process developed by the CDC's One Health Office. The methods have been previously described in detail (Appendix A). Workshop organizers began to prepare and plan for this workshop months in advance. During the workshop, participants first reviewed the initial zoonotic disease list to focus on for prioritization. A zoonotic disease was selected if it was known to be spread between humans and animals of concern for Thailand. Zoonotic diseases on human or animal reportable disease lists were included on the initial list. A list of 34 zoonotic diseases, shown in Table 2 of Appendix C, was considered during the workshop.

During the workshop, participants developed five criteria for ranking the 34 zoonotic diseases. Once the five criteria were developed, one categorical question was developed for each criterion through group discussion. The questions were developed to best measure each criterion. All questions had ordinal, binomial, or multinomial answers. The ordinal nature is necessary for the scoring process and each answer choice was given a score, which was determined by the participants. Voting members then individually ranked their preferences for the relative importance of each criterion. Each individual voting member's ranking was then inputted into the OHZDP Tool by a facilitator and a group weight for each criterion was calculated. Facilitators and participants answered each question for each zoonotic disease using data that were identified through an extensive literature search, as well as information from World Health Organization (WHO), World Organisation for Animal Health (WOAH), ProMED, and other relevant sources. Data on disease transmission, severity, pandemic and epidemic potential, economic impact, prevention and control, and environmental impact were collected for each zoonotic disease. If information for a particular zoonotic disease was not available for Thailand, regional or global data were used.

Photo 6. Thai farmer carrying seedlings for his rice fields.

Hundreds of articles were collected with zoonotic disease-specific information on transmission, severity, pandemic and epidemic potential, economic impact, prevention and control, and environmental impact for the country, region, and globally. These references were compiled and shared with all workshop participants.

After scoring all zoonotic diseases, decision tree analysis was used to determine the ranked zoonotic disease list. Each weighted criterion was applied across each question's answers for each zoonotic disease. The scores for all five questions for each zoonotic disease were summed. The largest raw score was then normalized giving that zoonotic disease a normalized score of 1. See Appendix C for a complete listing of raw and normalized scores for all zoonotic diseases that were considered for prioritization.

The zoonotic diseases with their raw and normalized scores were presented to the participants for discussion. Workshop participants then used the ranked OHZDP list to discuss and decide on a final priority list of five zoonotic diseases (Table 1). After the participants decided on the priority zoonotic diseases, they developed next steps and action plans to address the priority zoonotic diseases.

CRITERIA AND QUESTION DESCRIPTIONS DEVELOPED

The criteria for ranking zoonotic diseases selected by the voting members in Thailand are listed in order of importance below. A description of how the questions assessed the criteria is also listed below. For the full question and answer choices, see Appendix D.

Rank	Criteria	Weight	Question Description
1	Severity of Disease	0.34	What is the fatality rate in humans and animals?
2	Transmissibility and Spread	0.24	How is the disease transmitted and spread?
3	Economic, Social and Environmental Impact	0.15	Has the disease impacted economy, society, and the environment?
4	Measures, Treatment and Diagnosis	0.15	Does the zoonotic disease have measures for surveillance, prevention, treatment, and diagnosis?
5	Incidence and Prevalence	0.12	Have there been cases reported in humans, livestock, or wildlife in the past 5 year in Thailand?

PRIORITY ZOONOTIC DISEASE LIST FOR THAILAND

The five priority zoonotic diseases (Table 1) for multisectoral, One Health collaboration for Thailand are:

- Zoonotic avian influenza
- Emerging coronaviruses (COVID-19, SARS, MERS)
- Nipah virus infection
- Rabies
- Ebola

Photo 7. Long-tailed macaques (Macaca fascicularis) in Bangkok, Thailand

NEXT STEPS AND ACTION PLANS

After finalizing the list of priority zoonotic diseases, workshop participants discussed next steps and action plans to address the priority zoonotic diseases using a multisectoral, One Health approach.

A summary of the recommendations organized by theme follows:

One Health Coordination

Goal: Strengthening Interagency Cooperation

Next Steps	Indicators to measure when the next steps are achieved	Sector(s) Responsible
1.1 Appoint/revise the One Health committee with clear roles and responsibilities. Relevant sectors include Ministry of Public Health (MOPH), Department of National Parks, Wildlife and Plant Conservation (DNP), Ministry of Interior (MOI), Thailand One Health University Network (THOHUN), Thai Red Cross Society, Zoological Park Organization (ZPO), and international organizations	Revised One Health Committee terms of reference and/or roles and responsibilities: new appointments to the working group	Coordinating Unit for One Health Department of Disease Control Department of Livestock Development Department of National Parks Wildlife and Plant Conservation Department of Promotion Other relevant agencies
1.2 Ensure multi-level meetings continue	Number / Minutes of meetings	
1.3 Improve Memorandum of Understanding (MOU)	Revisions to the MOU	
1.4 Organize a workshop for relevant agencies with local entities to enhance work at the subnational level (community engagement, private sector engagement)	Number of meetings; number of attendees; knowledge assessment of participants using pretest and post tests	
Timeframe for Progress Check	1 year	

Joint Surveillance Using a One Health Approach

Goal: Joint surveillance using a One Health approach

Next Steps	Indicators to measure when the next steps are achieved	Sector(s) Responsible
2.1. Develop and implement an integrated disease surveillance approach plan for people, animals, wildlife, and the environment	An integrated disease surveillance plan is developed for people, animals, wildlife, and the environment	Coordinating Unit for One Health Department of Disease Control Department of Livestock Development Department of National Parks Wildlife and Plant Conservation Department of Promotion Other relevant agencies
1.2 Ensure multi-level meetings continue	Number / Minutes of meetings	
1.3 Improve Memorandum of Understanding (MOU)	Revisions to the MOU	
1.4 Organize a workshop for relevant agencies with local entities to enhance work at the subnational level (community engagement, private sector engagement)	Number of meetings; number of attendees; knowledge assessment of participants using pretest and post tests	
Timeframe for Progress Check	1 year	

Next Steps	Indicators to measure when the next steps are achieved	Sector(s) Responsible
1.1 Appoint/revise the One Health committee with clear roles and responsibilities. Relevant sectors include Ministry of Public Health (MOPH), Department of National Parks, Wildlife and Plant Conservation (DNP), Ministry of Interior (MOI), Thailand One Health University Network (THOHUN), Thai Red Cross Society, Zoological Park Organization (ZPO), and international organizations	Revised One Health Committee terms of reference and/or roles and responsibilities: new appointments to the working group	Department of Disease Control Department of Livestock Development Department of National Parks
Timeframe for Progress Check	1 year	
2.2. Develop an integrated disease surveillance system (Lab and Epi Information Technology)	An integrated surveillance system is developed	Public Health Department of Livestock Development Department of National Parks
Timeframe for Progress Check	3 years	
2.3. Build laboratory capacity to be ready for disease detection that complies with international standards of biosafety and biosecurity systems	Establishment of an effective and sufficient laboratory network to be able to detect diseases in compliance with international standards of biosafety and biosecurity	Ministry of Public Health (Department of Science, Department of Disease Control, Department of Livestock Development, University, Private Laboratory)
Timeframe for Progress Check	1 year	

Disease Prevention, Treatment, and Control

Goal: Collaboratively develop disease prevention, treatment, and control across sectors

Next Steps	Indicators to measure when the next steps are achieved	Sector(s) Responsible
3.1. Organize a meeting to review plans, information, manuals, measures and laws on prevention, treatment, and control of communicable diseases in Thailand to identify gaps (via Gap Analysis) and assess all measures available in Thailand (PVS, IHR, EID).	A meeting to review plan every 2 years with rotation of meeting host among relevant partners	Department of Disease Control Bureau of Disease Control and Veterinary Services Wildlife Conservation Bureau University Networks
3.2. Revise and update manuals, measures, techniques, laws, and plans for prevention treatment and control of communicable diseases in the areas that are still lacking (e.g., checkpoints/contacts must be standardized)	Well accepted plans, measures, and manuals among agencies	
3.3. Inform relevant and responsible agencies (One Health Coordination Center Working Group, National EID Faculty)	Officially inform responsible agencies (official letter sent and presented at the committee meeting)	
3.4. Conduct a joint simulation exercise	A joint simulation exercise to be conducted every 2 years	
Timeframe for Progress Check	2 years	

Promoting Public, Local Community and Private Sector Engagement

Goal: The government, people, community, and private sector have effective and sustainable collaboration on disease surveillance, prevention, and control

Next Steps	Indicators to measure when the next steps are achieved	Sector(s) Responsible
4.1: Collaboratively identify relevant networks	Ø	Department of Disease Control
4.2: Develop a prevention plan at local level that integrates private, public, and local community inputs and develop standardized processes	There is comprehensive surveillance, control, and disease prevention plan, which covers workforce, financial resources, and implementation	Department of Livestock Development

Local Administrative Organizations at each level/area |
4.3: Promote plan through several channels to raise awareness, including in the public sector and local community	More than 70% of the population gain knowledge and understanding of the measures	
4.4: Develop manuals/guidelines for operations	Standard operating procedures are developed	
4.5. Organize a meeting to follow up on work progress and conduct simulation exercises	A follow-up meeting is held and results are available	
4.6. Conduct lessons learned and experience sharing session	A meeting with minutes is held	
Timeframe for Progress Check	Short term, 2 years, until the end of the process. Assessed every 5 years.	

Knowledge Management, Research and Innovation Development

Goal: Develop a body of knowledge for zoonotic research and innovation.

Next Steps	Indicators to measure when the next steps are achieved	Sector(s) Responsible
5.1. Develop and constantly update a zoonosis database in all relevant government agencies	Each department has an up-to-date database system	Ministry of Public Health, Department of Disease Control

Ministry of Agriculture

Department of Livestock Development

Ministry of Natural Resources and Environment

Department of National Parks |
| 5.2. Establish a database center to collect and organize a body of knowledge, research, and innovation from experts in each field related to zoonosis | Development of a database center | Coordinating Unit for One Health |
| 5.3. Develop a mechanism for coordinating academic cooperation and a network of laboratory institutions, researchers, and research institutes to support and promote knowledge management, research, and innovation in the field of zoonosis | Network and research mapping established | Coordinating Unit for One Health |
| **Timeframe for Progress Check** | About 3 months to arrange a meeting to check progress. Completion goal within 5 years. | |
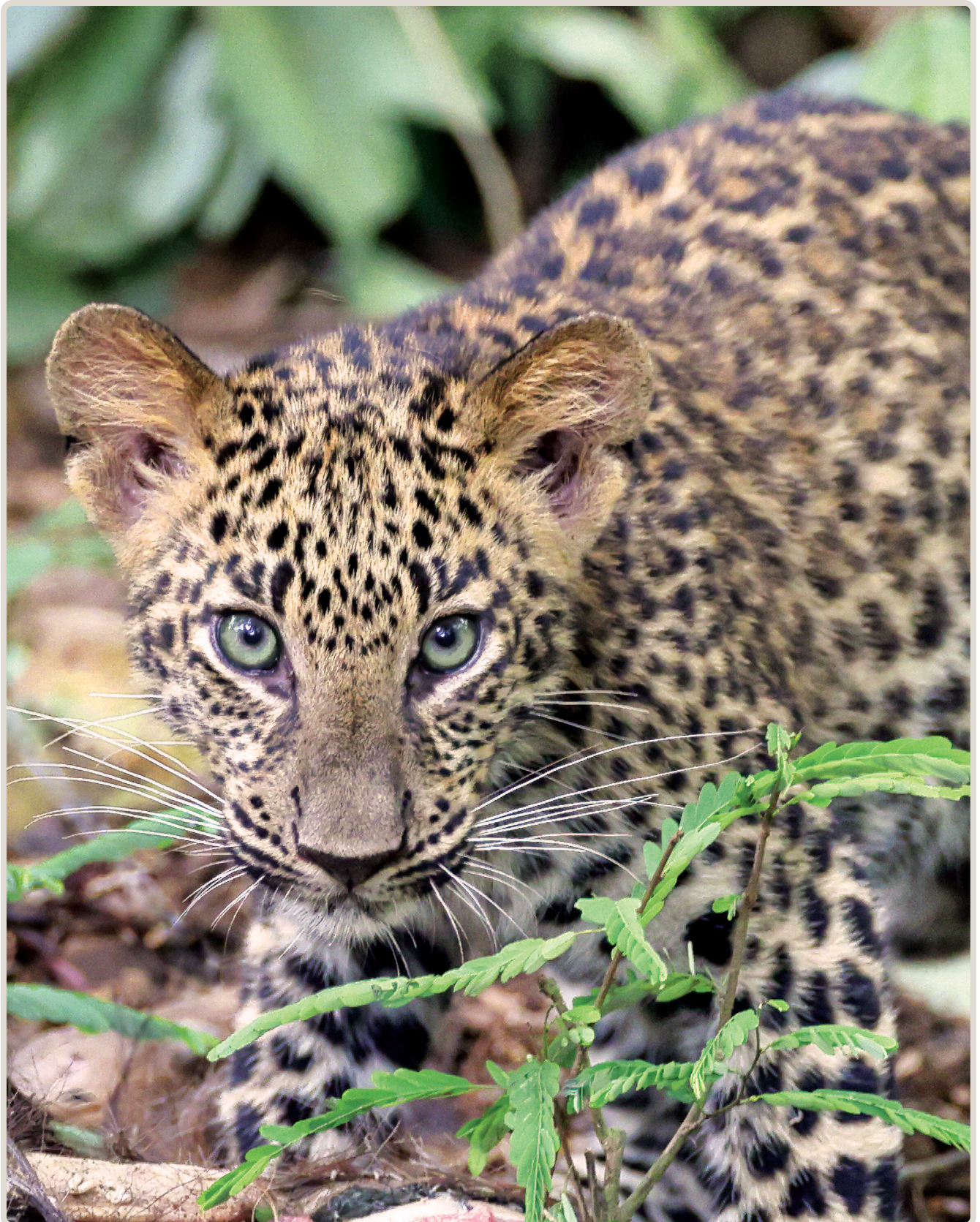
Photo 8. Young Indochinese Leopard (*Panthera pardus delacouri*) in Thailand.

APPENDIX A: Overview of the One Health Zoonotic Disease Prioritization Process

U.S. Centers for Disease Control and Prevention: Overview of the One Health Zoonotic Disease Prioritization Workshop https://www.cdc.gov/onehealth/what-we-do/zoonotic-disease-prioritization/

ONE HEALTH ZOONOTIC DISEASE
PRIORITIZATION PROCESS OVERVIEW

Goals of the One Health Zoonotic Disease Prioritization Process

▶ To use a multisectoral, One Health approach to
1. Prioritize zoonotic diseases of greatest concern
2. Develop next steps and action plans to address the priority zoonotic diseases in collaboration with One Health partners

OHZDP Workshop Process

BEFORE THE WORKSHOP

Prepare and Plan for the Workshop

- Contact the CDC One Health Office at least 3 months before scheduling a workshop.
- Identify Core Planning Team and obtain financial resources to accommodate for workshop logistics, venue, materials, travel, and translation.
- Identify workshop participants (facilitators, voting members, advisors) from human, animal, and environmental health sectors and other related partners.
- Generate an initial list of zoonotic diseases to be considered for prioritization using reportable disease lists, literature, and input from all represented One Health sectors.
- Conduct a literature review on the initial list of zoonotic diseases by reviewing publications, reports, grey literature, etc.

DURING THE WORKSHOP

Develop Criteria

- 5 criteria will be used to prioritize the list of zoonotic diseases; criteria are locally appropriate and address the needs of each unique location.

Develop Questions

- 1 categorical question will be developed to measure each criteria.

Rank Criteria

- Each voting member will rank criteria in their preferred order, allowing each sector to address their sector's priorities and needs. Individual rankings are combined to produce a combined ranked list of criteria.

Prioritize Zoonotic Diseases

- Score each zoonotic disease by answering the categorical questions for each weighted criterion and entering this data into the OHZDP Tool.
- The ranked zoonotic disease list from the OHZDP Tool is used to facilitate discussion among the participants to finalize the priority zoonotic disease list.

Discuss Next Steps and Action Plans for Multisectoral, One Health Engagement

- Discuss next steps and action plans for identifying areas for One Health engagement for prevention and control of the prioritized zoonotic diseases.

AFTER THE WORKSHOP

- Stakeholders advocate and implement recommended next steps and action plans to implement a One Health approach for the priority zoonotic diseases.

OHZDP Workshop Outcomes

- A list of priority zoonotic diseases of greatest concern agreed upon by all represented One Health sectors
- Recommendations for next steps and action plans for multisectoral, One Health engagement to address the priority zoonotic diseases
- Understanding of the roles and responsibilities of all represented One Health sectors
- The creation or strengthening of multisectoral, One Health coordination mechanisms and networks
- A report highlighting the outcomes of the workshop to help advocate for One Health priorities

www.cdc.gov/onehealth/global-activities/prioritization.html

APPENDIX B: One Health Zoonotic Disease Prioritization Workshop Participants for Thailand

Voting Members

Name	Organization	Title/Position
Dr. Thanawadee Thantithaveewat	Department of Disease Control	Medical Officer, Expert Level
Dr. Wathee Sitthi	Department of Disease Control	Medical Officer, Senior Professional Level
Dr. Decha Pangjai	Department of Medical Sciences	Medical Scientist, Expert Level
Dr. Noppawan Buamithup	Department of Livestock Development	Veterinary Officer, Expert Level
Dr. Prasit Chaitaweesub	Department of Livestock Development	Veterinary Officer, Expert Level
Dr. Bundit Nuansrichay	Department of Livestock Development	Veterinary Officer, Senior Professional Level
Ms. Somying Thunhikorn	Department of National Parks, Wildlife and Plant Conservation	Forest Technical Officer, Expert Level
Dr. Patarapol Maneeorn	Department of National Parks, Wildlife and Plant Conservation	Veterinary Officer, Senior Professional Level
Dr. Bencharong Sangkharak	Department of National Parks, Wildlife and Plant Conservation	Veterinary Officer, Senior Professional Level

Advisors/Observers

Name	Organization	Title/Position
Dr. Supaporn Wacharapluesadee	Faculty of Medicine, Chulalongkorn University	Medical Technologist Expert
Dr. Prateep Duengkae	Faculty of Forestry, Kasetsart University	Researcher
Dr. Paisin Lekcharoen	Faculty of Veterinary Science, Chulalongkorn University	Veterinarian
Dr. Karoon Chanachai	United States Agency for International Development	Regional Animal Health Advisor
Dr. Chantanee Buranathai	Sub-Regional Representation for Southeast Asia, World Organization for Animal Health (WOAH)	One Health Coordinator
Dr. Weerapong Thanapongtharm	Department of Livestock Development	Veterinary Officer, Expert Level
Dr. Sith Premashthira	Department of Livestock Development	Veterinary Officer, Senior Professional Level
Dr. Waraporn Phimpraphi	Faculty of Veterinary Medicine, Kasetsart University	Vice Dean for Graduate School and Continuing Ed
Dr. Plyyonk Sagaraseranee	Department of Disease Control	Advisor
Dr. Pravit Choomkasien	Department of Disease Control	Advisor
Dr. Kridsada Chaichoun	Department of Veterinary Sciences, Mahidol University	Vice Dean for Policy Planning and Quality Development
Dr. Pasakorn Akarasewi	Department of Disease Control	Advisor
Dr. Supamit Chunsutthiwat	Department of Disease Control	Advisor

Name	Organization	Title/Position
Dr. Cheerasak Pipatpongsopon	Coordinating Unit for One Health	Advisor
Dr. Parntep Ratanakorn	Chulabhorn Royal Academy	Dean of Faculty of Veterinary Medicine and Applied Sciences
Dr. Angkana Lekagul	International Health Policy Program	Researcher
Dr. Paul White	WHO Thailand	Epidemiologist
Dr. André Furco	WOAH Thailand	Technical Expert - One Health
Ms. Rattana Theerawat	Department of Disease Control	Public Health Technical Officer
Dr. Jutamart Jattuchai	Health Security Partners	Regional One Health Program Advisor
Dr. Wimonrat Tanomsridachchai	International Health Policy Program	Researcher
Dr. Tiwaporn Ngarmlert	One Health Branch, CDC Thailand	M&E Officer

Trained In-Country Facilitators

Name	Organization	Title/Position
Dr. Teerasak Chuxnum	Department of Disease Control	Veterinary Officer, Senior Professional Level
Dr. Onphirul Yurachai	Department of Disease Control	Veterinary Officer, Professional Level
Dr. Ratana Tacharoenmuang	Department of Medical Sciences	Medical Scientist, Professional Level
Dr. Peerada Siriwatcharawong	Department of Livestock Development	Veterinary Officer, Professional Level
Dr. Intuorn Teeranuwat	Department of Livestock Development	Veterinary Officer, Practitioner Level
Dr. Pawares Panyasomboonying	Department of Livestock Development	Veterinary Officer, Practitioner Level
Dr. Wansane Toanan	Department of National Parks, Wildlife and Plant Conservation	Veterinary Officer, Senior Professional Level
Dr. Supalak Prajan	Department of National Parks, Wildlife and Plant Conservation	Veterinary Officer, Senior Professional Level
Dr. Kirana Noradechanon	Department of National Parks, Wildlife and Plant Conservation	Veterinary Officer, Professional Level

External Facilitators or Other Key Staff

Name	Organization	Title/Position
Dr. Ria Ghai	CDC One Health Office	Epidemiologist
Dr. Yin Myo Aye	FAO RAP	Regional One Health and Tripartite Specialist
Dr. Tosapol Dejyong	FAO RAP	International Animal Health and Value Chain Specialist
Dr. Yooni Oh	FAO RAP	Regional Project Coordinator
Dr. Gael Lamielle	FAO RAP	Regional Surveillance Coordinator
Ms. Somruethai Na Nan	CDC Thailand	One Health Manager
Dr. Ong-orn Prasarnphanich	CDC Thailand	One Health Branch Chief

Workshop Organizers

Name	Organization	Title/Position
Dr. Ratanaporn Tangwangvivat	Department of Disease Control; Coordinating Unit for One Health	Coordinating Unit for One Health Chief
Dr. Papassorn Pinyopornpanish	Department of Disease Control; Coordinating Unit for One Health	Veterinary Officer, Practitioner Level
Dr. Chadaporn Phiancharoen	Department of Disease Control; Coordinating Unit for One Health	Veterinary Officer, Practitioner Level
Dr. Chiti Hoonaukit	Department of Disease Control; Coordinating Unit for One Health	Coordinating Unit for One Health Manager
Dr. Kotchaya Sinchai	Department of Disease Control; Coordinating Unit for One Health	Coordinating Unit for One Health Coordinator
Ms. Suwanna Kalong	Department of Disease Control; Coordinating Unit for One Health	Financial Officer
Ms. Pornpanarat Posurb	Department of Disease Control; Coordinating Unit for One Health	Project Coordinator
Ms. Ausadang Kongyu	Department of Disease Control; Coordinating Unit for One Health	Project Coordinator
Ms. Pimpitcha Kleeblumjeak	Department of Disease Control; Coordinating Unit for One Health	Project Coordinator
Mr. Jesadakorn Sripaison	Department of Disease Control; Coordinating Unit for One Health	Project Coordinator
Ms. Grace Goryoka	U.S. Centers for Disease Control and Prevention, One Health Office	Public Health Advisor
Ms. Hayley Belles	U.S. Centers for Disease Control and Prevention, One Health Office	Health Scientist
Dr. Ria Ghai	U.S. Centers for Disease Control and Prevention, One Health Office	Epidemiologist
Ms. Somruethai Na Nan	CDC Thailand	One Health Manager
Dr. Ong-orn Prasarnphanich	CDC Thailand	One Health Branch Chief
Dr. Yin Myo Aye	FAO RAP	Regional One Health and Tripartite Specialist
Dr. Tosapol Dejyong	FAO RAP	International Animal Health and Value Chain Specialist
Dr. Yooni Oh	FAO RAP	Regional Project Coordinator
Dr. Gael Lamielle	FAO RAP	Regional Surveillance Coordinator

APPENDIX C: Ranked Zoonotic Disease List in Thailand from the One Health Zoonotic Prioritization Tool

Rank#	Disease	Etiologic Agent	Raw Score	Normalized Final Score
1	Zoonotic avian influenza (bird flu)	Influenza A virus	1.102	1.000
2	COVID-19	SARS-CoV-2	1.063	0.964
3	Nipah virus infection	Nipah virus	1.022	0.927
4	Rabies	Rabies virus	0.984	0.893
5	Ebola	Ebola virus	0.920	0.835
6	Bovine spongiform encephalopathy	Prion protein	0.920	0.834
7	MERS-CoV	MERS-CoV	0.917	0.832
8	Hendra virus infection	Hendra virus	0.871	0.790
9	Severe acute respiratory syndrome	SARS-CoV	0.868	0.787
10	Plague	*Yersinia pestis*	0.829	0.752
11	Q fever	*Coxiella burnetii*	0.791	0.717
12	Yellow fever	Yellow fever virus	0.758	0.687
13	Glanders	*Burkholderia mallei*	0.750	0.681
14	Cysticercosis	*Taenia solium*	0.741	0.673
15	Anthrax	*Bacillus anthracis*	0.737	0.668
16	Zoonotic tuberculosis	*Mycobacterium bovis* and *M. tuberculosis*	0.717	0.650
17	Leptospirosis	Leptospira species	0.709	0.644
18	Salmonellosis	*Salmonella enterica* (multiple subspecies)	0.709	0.644
19	West Nile virus infection	West Nile virus	0.705	0.640
20	Zoonotic swine influenza	Influenza A virus	0.624	0.566
21	*Escherichia coli* infection	*Escherichia coli* 0157:H7	0.596	0.541
22	Streptococcosis	*Streptococcus suis*	0.569	0.516
23	Zoonotic malaria	*Plasmodium knowlesi*	0.566	0.513
24	Zika virus disease	Zika virus	0.566	0.513
25	Scrub typhus	*Orientia tsutsugamushi*	0.566	0.513
26	Japanese encephalitis	Japanese encephalitis virus	0.566	0.513
27	Brucellosis	*Brucella* spp.	0.555	0.504
28	Melioidosis	*Burkholderia pseudomallei*	0.547	0.496
29	Hepatitis E	Hepatitis E virus	0.524	0.476
30	Leishmaniasis	*Leishmania* spp.	0.524	0.476
31	Botulism	*Clostridium botulinum*	0.517	0.469
32	Campylobacteriosis	*Campylobacter jejuni*	0.514	0.466
33	Cryptosporidiosis	*Cryptosporidium* spp.	0.506	0.459
34	Trichinellosis/Trichinosis	*Trichinella spiralis*	0.456	0.414

APPENDIX D: Criteria, questions and numerical weights for the criteria selected for ranking zoonotic diseases in Thailand

1. Severity of Disease (criteria weight = 0.3058)

Question: What is the fatality rate in humans and animals?

Assumptions: In animals to score, use worst case scenario (if high in any, consider it high fatality rate)

Answer:

☐ High fatality rate in both humans and animals (4)

☐ High fatality rate in humans, low in animals (3)

☐ Low fatality rate in humans, high in animals (2)

☐ Low fatality rate in both humans and animals (1)

2. Transmissibility and Spread (Criterion weight = 0.214)

Question: How is the disease transmitted and spread?

Assumptions: Use Centers for Disease Control and Prevention (CDC) definitions of vector borne and World Health Organization (WHO) definition of airborne

- Human-to-Human (Yes = 1, No = 0)
- Airborne (Yes = 1, No = 0)
- Vector Borne (Yes =1, No = 0)
- Transmission between Livestock and Wildlife (Yes = 1, No = 0)

Answer:

☐ All of the above (5)

☐ At least 3 (4)

☐ At least 2 (3)

☐ At least 1 (2)

☐ None of the above (1)

3. Economic, Social and Environmental Impact (Criterion weight = 0.149)

Question: Has the disease impacted economy, society, and the environment?

Assumptions: None

Answer:

☐ Impact to all 3sectors (4)

☐ Impact to 2 out of 3 sectors (3)

☐ Impact to 1 out of 3 sectors (2)

☐ No impacts (1)

4. Preventive Measures, Treatment and Diagnosis (Criterion weight = 0.148)

Question: Does the zoonotic disease have measures for surveillance, prevention, treatment and diagnosis?

Assumptions:

Surveillance—For each zoonotic diseases, there should be a National Surveillance Plan, either an official plan or a surveillance system exists in the country

Prevention—Either vaccine or chemoprophylaxis is available; prevention measures or guidelines exist for the zoonotic disease

No Specific Treatment—There is no drug, medicine specific to treat that disease

No Diagnostic Capacity—No laboratory capacity to test for and identify the pathogen in Thailand

Category	Surveillance	Prevention	No Specific Treatment	No Diagnostic Capacity in Country
Humans				
Livestock				
Wildlife				

Answer:

☐ Number of checkmarks in table— 10–12 (4)

☐ Number of checkmarks in table— 7–9 (3)

☐ Number of checkmarks in table— 4–6 (2)

☐ Number of checkmarks in table— <3 (1)

5. Incidence and Prevalence (Criterion weight = 0.124))

Question: Have there been cases reported in humans, livestock, or wildlife in the past 5 years in Thailand?

Assumptions: Include pets and companion animals under livestock

Answer:

☐ Reported in all 3 of humans, livestock and wildlife (4)

☐ Reported in 2 of humans, livestock or wildlife (3)

☐ Reported in 1 of humans, livestock or wildlife (2)

☐ Not reported in humans, livestock and wildlife (1)

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Photo 9. Aerial view of Maya bay, the crown jewel of Phi Phi Islands in the Hat Noppharat Thara-Mu Ko Phi Phi National Park in southern Thailand.