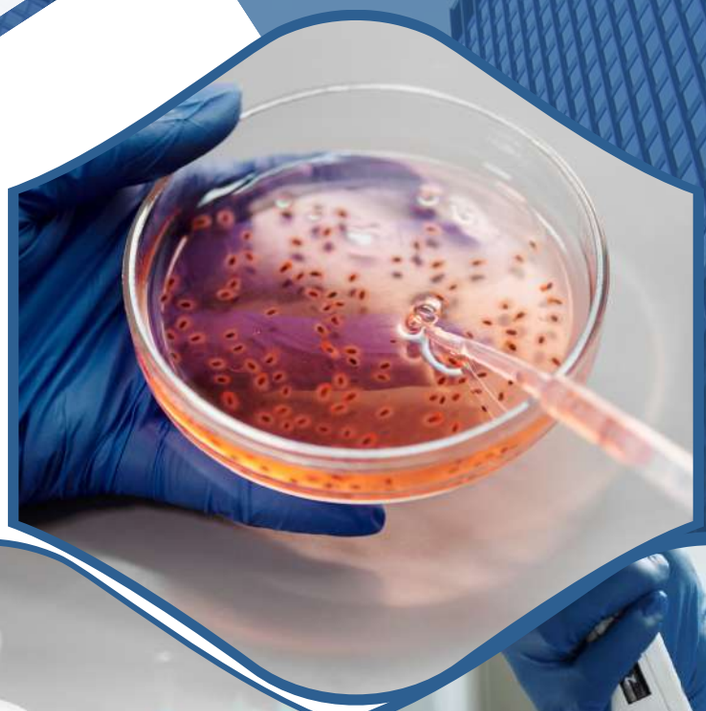
RPHL
Regional Public Health Laboratory Network



SITUATIONAL ASSESSMENT REPORT FOR RPHL NETWORK CAPACITY BUILDING

JUNE 2023

กระทรวงสาธารณสุข
MINISTRY OF PUBLIC HEALTH

FIND
Diagnosis for all

World Health Organization

CLINTON HEALTH ACCESS INITIATIVE

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

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Preface

In advancing global health security using a regional approach, supported by USAID, the Regional Public Health Laboratory Network (RPHL Network) has been established in 2019 under the auspice of the Global Health Security Agenda [GHSA]. As of today, represented by the national public health laboratories of 14 member countries in Asia Pacific [10 of ASEAN Member States, Nepal, Timor-Leste, Papua New Guinea, and Pakistan], the Network aims to cultivate resilience and responsive health laboratory systems at both national and regional levels.

It is an honor for Thailand's Ministry of Public Health, through the Department of Medical Sciences, to support the network in hosting the RPHL Network Secretariat Office.

Moving towards the second phase of its implementation [2023-2027], knowing the Laboratory situation and country context of each member is necessary to inform more targeted and tailored interventions, as well as to identify and leverage country capacity strengths and opportunities for interventions.

This assessment considers to be one of the joint efforts of the RPHL Network with key development partners. With that, I would like to express my sincere appreciation to all of RPHL Network Contact Person, RPHL Network Secretariat Team, the Clinton Health Access Initiative (CHAI), Foundation for Innovative Diagnostics (FIND), Thailand MOPH – United States Center for Disease Control Collaboration (TUC), and World Health Organization, South East Asia Regional Office (WHO-SEARO) and UNITAID.

The result of this assessment will serve as an evidence base for the RPHL Network to develop the workplan on Capacity Building Development to serve the needs of each member.

Congratulations to RPHL Network. Thailand is committed to work hand-in-hand with all members and key development partners to operate the responsive public health laboratories network which will benefit not only the Asia Pacific Region, but also other regions.

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30 September 2023

Executive Summary

The Regional Public Health Laboratory Network (RPHL Network) aims to support resilient laboratory and diagnostic systems for improved health outcomes in the Asia-Pacific region. It plans to do so by facilitating south-to-south capacity building within member countries through:

(i) Developing a knowledge management and knowledge exchange platform;
(ii) Providing technical assistance through a pool of regionally based subject matter experts;
(iii) Promoting peer-to-peer support and south-to-south cooperation; and
(iv) Strengthening regional laboratory training hubs in members countries.

In order to identify its strategic priorities and interventions over the next few years, RPHL Network has conducted a situational assessment across its 12-member countries to identify strengths as well as opportunities for intervention across the region. Participating member countries include: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Philippines, Thailand, Singapore, Timor-Leste and Viet Nam.

This report outlines the results of the situational assessment, with a summary of capabilities and priority areas for capacity building interventions from RPHL Network including training, technical assistance, and knowledge sharing.

This report was developed using a combination of desk reviews of documents and reports shared by member countries, and questionnaires (generic and tailored per country) sent to the country focal points followed by virtual consultations focusing on the following 11 thematic areas:

- National Leadership, Governance, Policies and Coordination including National Labs Strategic Plan (NLSP)
- Regulations/Licensing/Accreditation
- Quality Management
- Supply Chain Management (SCM)
- Equipment Service and Maintenance (S&M)
- Data Management and Tools
- Laboratory Workforce
- Biosafety, Biosecurity, and Waste Management
- Lab Emergency Response Plan (Threats/Emerging Threats)
- Integrated/Optimized Network, Sample Transport and Point-of-Care Testing (POCT)
- One Health, Surveillance, Anti-Microbial Resistance (AMR) and Sequencing/Bioinformatics

Strengths and gaps were assessed and identified across each of these thematic areas, and capacity building support was requested by countries across the majority of the thematic areas above. Preliminary results from the situational assessment were shared during RPHL Network's Annual Partnership Forum held with member countries and key development partners in Bangkok, Thailand from 15 – 17 May 2023.

These results serve as a basis for the development of a Capacity Building Plan for the RPHL Network over the next 5-year period. The RPHL Network will strive to remain nimble and flexible towards the maturing regional landscape and will adapt its priorities as countries' needs and requests evolve.

Abbreviations and Acronyms

AIDS	Acquired Immune Deficiency Syndrome
AMR	Anti-Microbial Resistance
ASEAN	The Association of Southeast Asian Nations
AST	Antimicrobial Susceptibility Testing
BSCs	Biosafety Cabinets
BMLS	Bureau for Medical Laboratory Services (Cambodia)
CHAI	Clinton Health Access initiative
CHAS	Center for HIV/AIDS and STIs
CHD	Center for Health Development
CMPE	Center for Malariology Parasitology and Entomology (Lao PDR)
CPE	Continuing Professional Education
CPD	Continuing Professional Development
DHS	Department of Hospital Services
DOH	Department of Health
DTRA	US Department of Defense Threat Reduction Agency
EBS	Evidence-based Surveillance
eSPAR	Electronic State Parties Self-Assessment Annual Reporting Tool
EQA	External Quality Assessment
FDA	Food and Drug Administration (Myanmar)
FDQCC	Food and Drug Quality control Center (Lao PDR)
FETP	Field Epidemiology Training Program
FIND	Foundation for Innovative New Diagnostics
G6PD	Glucose-6-phosphate dehydrogenase
GF	Global Fund
GHSA	Global Health Security Agenda
HIV	Human Immunodeficiency Virus
HR	Human Resources
IATA	International Air Transport Association
IBS	Indicator-based Surveillance
IHR	International Health Regulations
IPC	Infection, Prevention and Control
ISO	International Standard Organization
IQC	Internal Quality Control
JEE	Joint External Evaluation
LIMS	Laboratory Information Management System
LMIS	Logistics Management Information System
LQMS	Laboratory Quality Management System
LTAC	Laboratory Technical Advisory Committee (Nepal)
MERS	Middle East Respiratory Syndrome
MOH-HH	Ministry for Health – Human Health (Brunei Darussalam)
MOPH	Ministry of Public Health (Nepal)
MPRT-MOH	Ministry of Primary Resource and Tourism Ministry of Health
MRSA	Methicillin-resistant Staphylococcus aureus

NEDL	National Essential Diagnostic List
NCLE	National Center for laboratory and epidemiology (Lao PDR)
NHL	National Health Laboratory
NLSP	National Laboratory Strategic Plan
NTC	National Tuberculosis Center
ODs	Operating Districts
PCR	Polymerase Chain Reaction
PCDC	Provincial Center for Disease Control (Viet Nam)
PHD	Public Health Department
PHE	Public Health Emergency
PHL	Public Health Laboratory
POCT	Point-of-Care Testing
PPE	Personal Protective Equipment
PIDSR	Philippine Integrated Disease Surveillance and Response
QA	Quality-Assurance
QMS	Quality Management System
RDTs	Rapid diagnostic tests
RITM	Research Institute of Tropical Medicine
RMSCs	Regional Medical Sciences Centers (Thailand)
RPHL Network	Regional Public Health Laboratory Network
SCM	Supply Chain Management
S&M	Service and Maintenance
SLIPTA	Stepwise Laboratory Quality Improvement Process
SMEs	Subject Matter Experts
SMLTA	Stepwise Lab Management Towards Accreditation
SOPs	Standard Operating Procedures
STS	Sample Transport System
STDs	Sexually Transmitted Diseases
SWOT	Strengths, Weaknesses, Opportunities and Threats
TA	Technical Assistance
TB	Tuberculosis
TISTR	Thailand Institute of Scientific and Technological Researh
TOT	Training of Trainers
TWG	Technical Working Group
TUC-MOPH	Thailand MOPH- United States Center for Disease Control Collaboration
US-CDC	United States Center for Disease Control
WHO	World Health Organization

1. Background

Efficient and reliable health laboratory systems are an essential component of any resilient health system. Although countries in the Asia - Pacific region strive to make progress towards enhancing laboratory systems, considerable challenges remain, including poor management, infrastructure and

inadequately trained laboratory workforces. At the same time, the demand for laboratory services continues to increase because of emerging and re-emerging infectious diseases, the increasing magnitude of non-communicable diseases and aging populations.

The Regional Public Health Laboratory Network (RPHL Network) aims to address these issues by facilitating capacity building support to diagnostics programs and laboratories within countries in the region. Since its establishment in 2019, RPHLN has developed a network of laboratories within the Association of Southeast Asian Nations (ASEAN) region with 12-member countries including Brunei Darussalam, Cambodia, Lao PDR, Indonesia, Malaysia, Myanmar, Nepal, Singapore, Philippines, Thailand, Timor-Leste and Viet Nam. In late 2022, after initial consultations with its member countries, RPHL Network established the following objectives for the next 5-year periods from 2023 – 2027 (also outlined in Annex 6.2):

Goal: Resilient laboratory and diagnostic systems for improved health outcome in the Asia-Pacific region

Scope: Facilitating south-to-south capacity building within member countries through:

1) Development of a knowledge management and knowledge exchange platform
2) Providing technical assistance through a pool of regionally based subject matter Experts
3) Promoting peer-to-peer support and south-to-south cooperation [network to network]
4) Strengthening regional laboratory training hubs in members countries such as Thailand, Malaysia, Indonesia, etc.

To better inform the development of its strategic workplan aligned with the objectives outlined above, RPHL Network conducted a situational assessment over a 6-month period in early 2023 across its 12-member countries to identify the main strengths and gaps in laboratory systems across the region.

The findings from the assessment are expected to help identify priority areas that require capacity building interventions from RPHLN including training, technical assistance (TA) and knowledge sharing. The outcomes of this situational analysis will not only shape the key focal areas within RPHL Network's strategic workplan but will also inform longer term funding proposals that aim to directly benefit member countries through the above areas of support**.**

2. Methodology

A four-step process was conducted to assess countries' capabilities and priority needs.

Step 1: Alignment with RPHLN members

At the outset, the RPHL Network Secretariat (listed in Annex 6.3), conducted a virtual pre-consultation meeting with the country focal points (listed in Annex 6.4) to socialize the initiative, gather feedback, and ensure alignment on the assessment's objectives.

Step 2: Desk review

The desk review was undertaken by an appointed consultant based on the information collected through a systematic review of the readily available documents and reports (list in Annex 6.) shared by RPHL Network member countries. The review included the development of a data extraction tool that was used to systemically screen and extract relevant data and information from the documents. Following data extraction, preliminary analysis of the available information was conducted with the technical team members. Key missing data was summarized, and a country specific prioritized list of questions was developed. Eleven thematic areas were identified for deeper dives.

Step 3. Conducting Key Informant Interviews

A generic questionnaire, as well as a questionnaire tailored to each country context, was developed to identify countries' top priority needs and strengths (see Annex 6.5). These questionnaires were distributed and completed by the country focal points and validated through follow-up virtual consultations with each of RPHL Network members.

Step 4. Analysis

Data and information were analyzed using the Strengths, Weaknesses, Opportunities, and Threat (SWOT) matrix for a qualitative summary of aggregated as well as country-specific findings on the key thematic areas relevant to RPHL Network workplan. This then helped identify the priority areas that require capacity building interventions from RPHL Network including training, technical assistance (TA), and knowledge-sharing. The 11 core thematic areas are as follows:

- National Leadership, Governance, Policies, and Coordination including National Labs Strategic Plan (NLSP)
- Regulations/Licensing/ Accreditation
- Quality Management
- Supply Chain Management (SCM)
- Equipment Service and Maintenance (S&M)
- Data Management and Tools
- Laboratory Workforce
- Biosafety, Biosecurity and Waste Management
- Lab Emergency Response Plan (threats/emerging threats)
- Integrated/Optimized Network, Sample Transport and Point-of-Care Testing (POCT)
- One Health, Surveillance, Anti-Microbial Resistance (AMR) and Sequencing/Bioinformatics

3. Limitations

This assessment was carried out predominantly using information that was readily available publicly,
or was provided directly by country focal points, and then verified through virtual consultations with each country's focal points. The assessment did not include detailed in-country visits during which the information provided by country focal points could be independently verified by the RPHLN technical team.

The scope of this assessment therefore has a few limitations:

- In some cases, data was not made available across all the thematic areas in each country
  or may not be fully up to date.
- In some countries, the diagnostics program is managed by multiple different departments, whereas the country focal points engaged with during the assessment may only represent one of the departments.
- The assessment was focused on identifying priority areas for knowledge sharing, training and technical assistance through lab experts, and did not deep dive into country needs in terms of in-country program implementation support, which is outside of RPHL Network's current scope
- The thematic areas identified for training, knowledge sharing, and technical assistance
  have been prioritized based on direct requests from countries – country requests correspond to
  the gaps identified in the SWOT analyses across most, but not all, thematic areas.

Given the scope of the assessment, the results presented in this report should be treated as directionally correct at a high-level, and they do not preclude other areas of strengths or gaps that may not be fully covered by this assessment.

4. Findings across 12 RPHL Network member countries

4.1 JEE and eSPAR scores and findings

A Joint External Evaluation (JEE) is a collaborative and multisectoral process designed to help countries identify the most critical gaps within their health systems in order to prioritize opportunities for enhanced preparedness and response. Separately, the Electronic State Parties Self- Assessment Annual Reporting Tool (e-SPAR) is a web-based platform that supports State Parties of the International Health Regulations (IHR) to self-report annually to the World Health Assembly on capacity requirements implementation, and to encourage transparency between States Parties towards global public health security, under the World Health Organization (WHO) IHR Monitoring and Evaluation Framework (WHO, 2023).

The JEE and eSPAR score results range between 10 and 100. Lower scores equate to larger needs. Because of this, countries with JEE and eSPAR score averages that were above 80 (Thailand, Malaysia and Singapore) were excluded from the analysis. Additionally, Nepal does not have a JEE score available yet, and Brunei Darussalam did not have an eSPAR score published. Therefore, only eight- member countries were included in the JEE analyses (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Myanmar, Philippines, Timor-Leste and Viet Nam) and the eSPAR analyses (Nepal, Cambodia, Indonesia, Lao PDR, Myanmar, Philippines, Timor-Leste and Viet Nam).

Figure 2 below presents the areas with the highest needs according to the JEE assessment reports:

- Antimicrobial resistance (AMR) surveillance
- Activation and coordination of health personnel
- Biosafety and biosecurity training and practices
- Emergency risk assessment and readiness
- Whole-of-government biosafety and biosecurity
- Response to zoonotic diseases
- Laboratory quality system

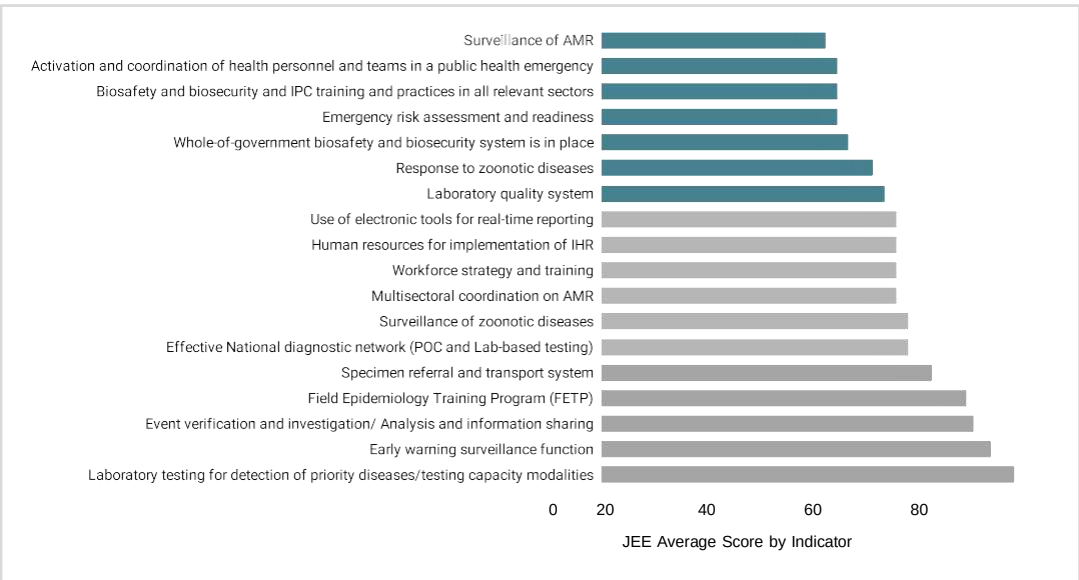


Figure 2. JEE average score by indicators (Lower scores are highlighted and equate to larger needs/gaps)

Figure 3 below presents the areas with the highest needs according to the eSPAR scores:

- Workforce surge during a public health event
- Implementation of a laboratory biosafety and biosecurity regime & infection prevention and control (IPC)
- Laboratory quality system
- Human resource (HR) implementation of IHR
- Management of health emergency response

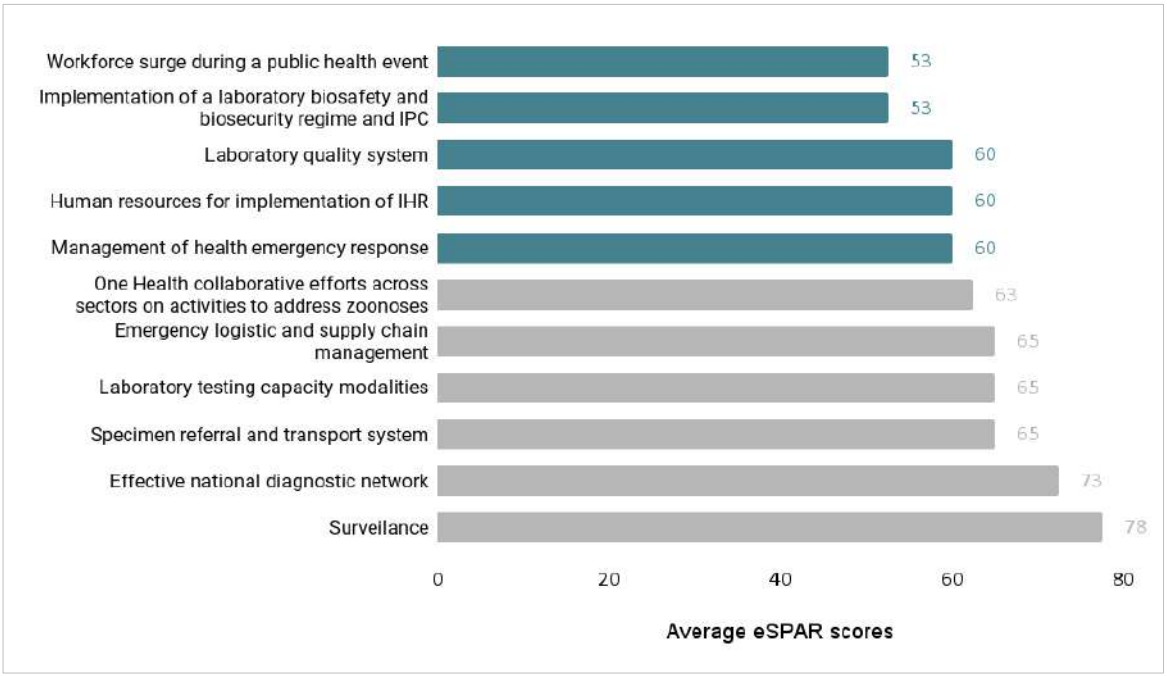


Figure 3. eSPAR average score by indicators (Lower scores are highlighted and equate to larger needs/gaps)

4.2 Summary of findings from desk review and virtual country consultations

The following capabilities, challenges and opportunities were identified and summarized by thematic areas as follows; Individual country findings summaries are found in Annex 6.1)

Thematic Area 1: National Leadership, Governance, Policies and Coordination including NLSP

Strengths and Capabilities	• All member countries have a strong commitment to improving their laboratory quality systems as a part of the country's strategic health plan. Most reported to have support from government leadership. • 67% (n=8) of member countries reported to have legal policies and frameworks for International Health Regulations (IHR)

Weaknesses and Challenges	• Only 33%(n=4) of the member countries have an updated NLSP; remaining countries' NLSPs are in draft form or are dated and need revision • Only 25% (n=3) of member countries have a national essential diagnostics list (NEDL) available; 50% (n=6) are planning to develop a NEDL with support from partners and/or WHO • 67% (n=8) of member countries have fragmented or no lab specific Technical Working Group (TWG); most countries have disease specific TWG and only 33% (n=4) have a formal working group that is lab specific - either as a standalone TWG or a sub-TWG.
Opportunities	Provide support to member countries on the following: • Revise and finalize NLSPs to be up-to-date and develop an operational plan for the NLSP • Establish a lab TWG if the existing WG does not adequately address lab services • Support the development or revision of NEDL • Establish multi-sectoral coordinating mechanisms and other fora to improve coordination

Thematic Area 2: Regulations/Licensing/Accreditation

Strengths and Capabilities	Almost all member countries (>80%) have at least one lab accredited to International Standard Organization (ISO) 15189 and/or ISO 17025
Weaknesses and Challenges	• 58% (n=7) of member countries do not have their own accreditation body and instead rely on external international bodies for accreditation • Only a limited number of labs are ISO accredited in eight countries (mostly only reference and central labs). • 42% (n=5) of member countries do not even have a licensing mechanism to regulate laboratory standards. If available, such a mechanism may only be available to the private sector or may not be enforced in the public sector
Opportunities	Provide support to member countries on the following: • Establish a national mechanism for laboratory licensing that cuts across public and private sectors • Establish an in-country accreditation body • Introduce a stepwise approach to accreditation (e.g. SLMTA)

Thematic Area 3: Quality Management

Strengths and Capabilities	Most member countries (>91%) have External Quality Assessment (EQA) schemes available for at least core tests defined by each country and at least at the national level.
Weaknesses and Challenges	• Only 42% (n=5) of the countries have well-established Quality Management Systems (QMS) • EQA participation is limited to higher level facilities and limited tests included in 58% (n=7) of the member countries 58% (n=7) of the member countries have limited to no capacity to produce local Proficiency test (PT) panels and are dependent on external or international providers for PT panels
Opportunities	Provide support to member countries on the following: • Strengthen QMS and EQA programs • Build capacity on production of local PT panels

Thematic Area 4: Supply Chain Management (SCM)

Strengths and Capabilities	• At least 67% (n=8) of member countries have a SCM system in place either at a national or subnational level, managed by DOH/MOH or by each hospital's management • 58% (n=7) of member countries have stock inventory available - managed under the hospital management. • 83% (n=10) of member countries have a procurement mechanism, managed either at the national level or by the hospital's management
Weaknesses and Challenges	• Emergency SCM is centralized and in place during the pandemic but not maintained post COVID-19 in several countries • 58% (n=7) of member countries have no national forecasting/ quantification processes available for lab commodities; ordering and procurement is mostly done by each lab under the hospital's management • 58% (n=7) of member countries have no standard tool for forecasting/quantification • Weak national standard procurement mechanisms and fragmented stock inventory management in several countries

Opportunities	Provide support to member countries on the following: • Strengthen SCM by developing national guidance and Standard Operating Procedures (SOPs) • Build capacity for forecasting/quantification • Streamline procurement and strengthen stock inventory capacity for consumption monitoring and ordering • Strengthen SCM through implementation of Logistics Management Information System (LMIS)

Thematic Area 5: Equipment Service and Maintenance (S&M)

Strengths and Capabilities	67% (n=8) of member countries have S&M in place mostly via service contracts with suppliers for major equipment • 58% (n=7) of member countries have some standard guidance for S&M as part of QMS • In 50% (n=6) of member countries, biosafety cabinets (BSCs) are maintained and certified • 75% (n=9) of member countries have trained local service engineers to maintain the BSCs
Weakness and Challenges	• Guidance on S&M often not implemented across all equipment by the laboratory due to limited trained staff and/or lack of service contracts; the contracted service supplier limits services to only major equipment under the contract. • 50% (n=6) of the member countries have no standard preventive maintenance mechanisms in place and S&M is not routinely done by several labs due to limited trained staff • 50% (n=6) of BSCs in member countries are not routinely maintained across all laboratories • Local service engineers are available but limited in 33% (n=4) of member countries; some countries still rely on overseas support
Opportunities	Provide support to member countries on the following: • Build in-country capacity for regular maintenance, certification and calibration of equipment • Strengthen S&M by establishing a standard policy as part of QMS and licensing requirements • Train staff on basic preventive maintenance and calibration of equipment, including troubleshooting

Thematic Area 6: Data Management and Tools

Strengths and Capabilities	• All member countries have some form of data management tools (either fully electronic, web-based or a mix of electronic and paper-based)
Weaknesses and Challenges	• Fragmented Laboratory Management Information Systems (LIMS) in 75% (n=9) of the member countries and some are not interoperable. • Most of the data systems in these member countries are either developed by vertical programs or by hospital management • LIMS is often limited to the central and provincial levels in 42% (n=5) of member countries • Lack of capacity to manage/maintain LIMS and to perform system upgrades in 42% (n=5) of member countries • Limited capacity and trained human resources, especially on data analyses, reconciliation of data from different sources and management in 42% (n=5) of member countries
Opportunities	Provide support to member countries on the following: • Integrate LIMS into one national data system • Strengthen capacity of staff through training on how to use and maintain LIMS • Build capacity to analyze, interpret, manage and reconcile data from different sources

Thematic Area 7: Laboratory Workforce

Strengths and Capabilities	• 75% (n=9) of member countries have in-service training programs either supported by their own government or by partners • 67% (n=8) of member countries have a national human resource (HR) development strategy or plan in place • 67% (n=8) of member countries have a Field Epidemiology Training Program (FETP) in place
Weaknesses and Challenges	• Only 42% (n=5) of member countries have national lab workforce programs specific to or relevant to labs • 25% (n=3) of member countries have limited or inconsistent in-service training, often reliant on partner support • High staff turnover and/or low retention rate in 58% (n=7) of member countries

Opportunities	Provide support to countries on the following: • Establish or enhance coordination of recruitment, training, capacity building and core capabilities • Develop plans to ensure availability of adequately skilled and competent lab workforce in different areas, including strategies for lab workforce motivation and retention • Apply Training of Trainers model for continuous training capacity

Thematic Area 8: Biosafety, Biosecurity and Waste Management

Strengths and Capabilities	• All member countries have a strong commitment to biosafety/ biosecurity that was enhanced during the COVID-19 pandemic and 83% (n=10) have policy and action plans in place • 50% (n=6) of member countries have a functional biosafety level 3 (BLS-3) laboratory • 75% (n=9) of member countries have conducted risk assessment during the early pandemic period • All member countries conducted infection, prevention and control (IPC) trainings to laboratory and non-laboratory staff • 67% (n=8) of member countries have waste management guidance in place (stand alone or integrated into the national health plan)
Weaknesses and Challenges	• Limited capacity in managing biosafety and conducting risk analysis at a sub-national level in 50% (n=6) of the member countries • Poor biosafety, IPC and waste management practices in 58% (n=7) of member countries, particularly at the subnational level due to limited capacity or resources • Poor capacity of lab staff on proper use of BSCs in 42% (n=5) of member countries
Opportunities	Provide support to member countries on the following: • Build capacity at the local level through training of trainers for continuous training to increase capacity in managing biosafety and conducting risk assessment up to the subnational level • Develop mentoring programs that include strengthening capacity at the local level to institutionalize policies and operationalize biosafety and biosecurity action plans, including improvement in biosafety practices and waste management • Conduct training for laboratory staff on proper use of BSCs • Develop laboratory specific waste management protocols or procedures understandable by all staff (e.g., garbage collectors, cleaners, administrators) with access to the laboratory and its waste products to improve compliance

Thematic Area 9: Lab Emergency Response Plan (threats/emerging threats)

Strengths and Capabilities	• All member countries have a strong commitment to have a lab emergency plan, learning from past disease outbreaks/pandemics • 58% (n=7) of member countries have an emergency plan in place that includes labs either as standalone plan or integrated in the National Health Emergency Preparedness plan
Weaknesses and Challenges	• 33% (n=4) of member countries have an emergency response plan that is only focused on either disaster/calamities or is disease-specific and does not include laboratory response • Limited capacity of laboratory personnel to handle lab emergency response for outbreaks in 58% (n=7) of member countries
Opportunities	Provide support to member countries on the following: • Develop a generic emergency response plan that includes laboratory components • Build and increase capacity of lab personnel for emergency response preparedness including public health threats/risks assessment and analysis

Thematic Area 10: Integrated/Optimized Network, Sample Transport and Point-of-Care Testing

Strengths and Capabilities	• 67% (n=8) of member countries reported to have certified specimen couriers available in their country • Integration of at least 2-4 tests on one multi-disease platform in 75% (n=9) of member countries

Weaknesses and Challenges	• 75% (n=9) of member countries have a sample transport mechanism that is fragmented and limited in geographical scope • Only 42% (n=5) of member countries reported to have national guidelines/SOP available for sample transport – guidelines are often specific to disease programs and/or are not optimally adhered to • 83% (n=10) of the member countries have limited POC screening and testing offered – when/where available, testing is mostly disease program specific • While network mapping was conducted in six-member countries, network optimization exercises are limited or only disease program specific in 67% (n-8) of member countries • Limited staff trained on International Air Transport Association (IATA) regulations /requirements in majority of countries; only 42% (n=5) • Of member countries have adequately trained staff
Opportunities	Provide support to member countries on the following: • Establish or strengthen integrated sample transport mechanisms (standard national guidelines and implementation protocols) • Strengthen and expand skilled lab workforce through a systematic training approach and TA to increase and maintain certified couriers and staff • Organize IATA trainers training and certification • Expand diagnostic network optimization exercises to include other priority diseases

Thematic Area 11: One Health, Surveillance, AMR and Sequencing/Bioinformatics

Strengths and Capabilities	• High level commitment from the government in all countries to combat AMR with action plans available in 92% (n=11) of member countries • 50% (n=6) of the member countries have One Health approach mechanisms and frameworks in place, while others are still in the process of planning /development • All member countries have surveillance systems in place but only 67% (n=8) of the member countries have surveillance mechanisms available for over five (5) notifiable diseases
Weaknesses and Challenges	• Poor AMR surveillance implementation and compliance particularly at the sub-national level in several countries • Only 33% (n=4) of the member countries have well-established genomic sequencing/ bioinformatics, available in other countries only in limited capacity and often for COVID-19 only • 67% (n=8) of member countries have a limited laboratory workforce capacity to fulfill surveillance core functions and perform genomic sequencing, particularly in data analysis and interpretation
Opportunities	Provide support to member countries on the following: • Strengthen and expand skilled laboratory workforce through a systematic training approach and TA to maintain and increase knowledge and skills needed to strengthen the implementation of One Health, AMR and surveillance • Increase and strengthen manpower capacity for genomic sequencing with an emphasis on bioinformatics analysis and interpretation

Additionally, four key threats to strong laboratory systems have emerged from the situational assessment:

- **High turnover of laboratory staff particularly at the subnational level**: This is a key risk in Brunei Darussalam, Indonesia, Philippines, Nepal and poses operational challenges at both the national and subnational level.

- **Limited lab workforce capacity**: Both Lao PDR and Myanmar have limited human resources for diagnostics and trainings. This affects Lao PDR at the subnational level, which delays national norms adoption. In Malaysia, insufficient funding for trainings affects state and district level capacity-building.

- **Reliance on external partners for funds and technical support**: Countries in the region, including Viet Nam, Cambodia, Lao PDR, Myanmar and Timor-Leste are highly dependent on external funding for their diagnostic systems, which is a significant sustainability risk. In countries such as Thailand, the flow of external funds fluctuates due to administrative delays, which can hinder emergency budget allocation. Generally, insufficient and inconsistent flow of funds poses challenges in the implementation of laboratory priorities at both the national and subnational levels.

- **Lack of strong governance**: In countries like Indonesia, Timor-Leste and Myanmar, the frequent changes in government leaders and political instability can undermine program sustainability and operationalization. The changes of local government leaders with different agendas and priorities pose a risk to the continuity of support and sustainability of laboratory programs.

4.3 Summary of country requests for capacity building support

A. Training capacity

The assessment identified four countries with the capacity to support trainings by subject matter experts (SMEs): **Thailand, Singapore, Malaysia and Indonesia.**

The top five thematic areas in which countries requested training include: Quality Management Systems, Lab regulations/Licensing and Accreditation, One Health and Surveillance including sequencing and bioinformatics, Biosafety/Biosecurity and Waste management, and laboratory emergency plan for threats/emerging threats as shown in figure 4 below.

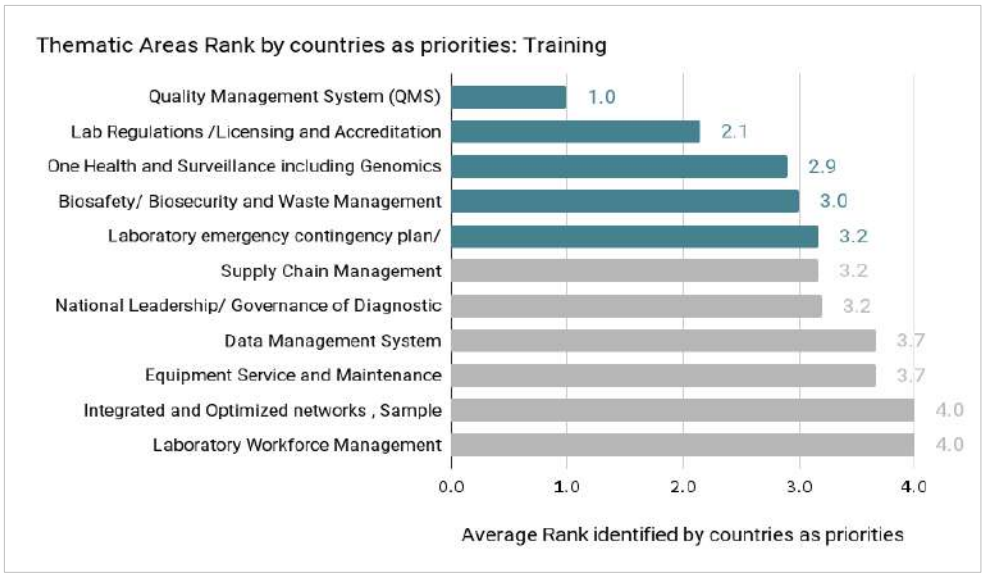


Figure 4. Thematic areas ranked by countries' self-reported priorities for training (Ranked based on the 1-5 ranking of priorities but the countries. Top 5 lower scores are highlight and equate to larger needs/gaps

Key training topics requested (not exhaustive) by thematic area include:

- **Quality management System/Lab licensing and Accreditation.**
  - Developing Internal Quality Control (IQC) and/or EQA PT panels
  - Standardizing laboratory test procedures
  - Developing certification/licensing requirements and processes
  - Strengthening lab management leading to accreditation using the Stepwise Lab Management Towards Accreditation (SLMTA) program or ISO 15189 and ISO 17025

- **One Health, Surveillance, AMR and Sequencing/Bioinformatics.**
  - Sequencing and bioinformatics trainings (analyses and interpretation)
  - Genomic surveillance for AMR and for infectious diseases

- **Biosafety/Biosecurity and Waste management**
  - Biosafety, waste Management and IPC
  - Safe handling, transportation and storage of specimens meeting international standards

- **Laboratory Emergency Contingency Plan**
  - Lab emergency response plan
  - How to conduct bio-risk assessments and analyses
  - How to plan multiple responses to biohazards and threats
  - Practicing mock emergency responses

B. Technical assistance (TA)

Six countries have been identified with SMEs as well as established mechanisms to provide technical assistance to other member countries; Thailand, Singapore, Malaysia, Brunei Darussalam, Indonesia and Cambodia. TA support can include in-country visits/mentoring or coaching, twinning program, peer to peer support, etc.

The top five thematic areas requested by countries for technical assistance include: quality management systems, biosafety/biosecurity and waste management, data management, national leadership /governance and coordination including NLSP and Lab regulations, licensing and accreditation as shown in figure 5 below.

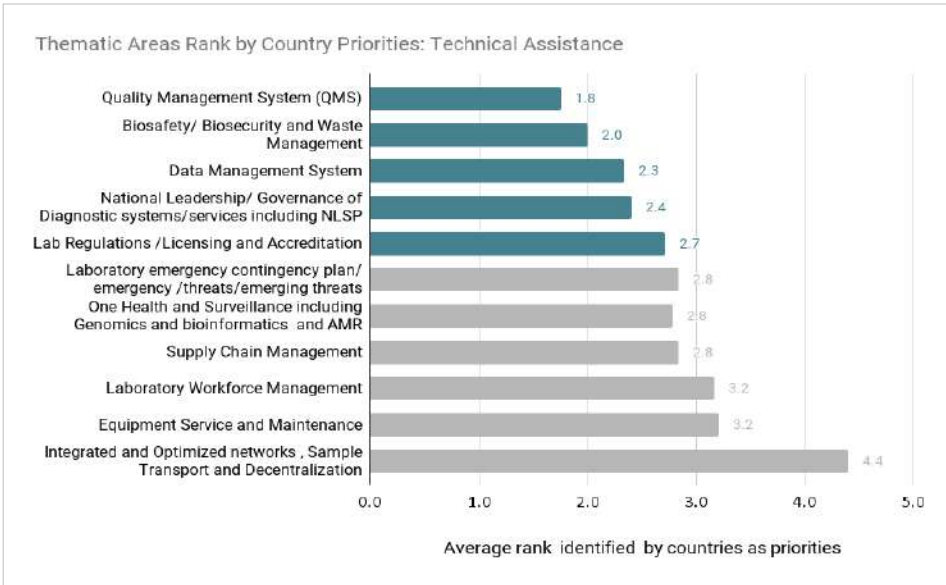


Figure 5. Thematic areas ranked by countries' self-reported priorities for technical assistance (Ranked based on the 1-5 ranking of priorities by the countries. Top 5 lower scores are highlight and equate to larger needs/gaps)

Key topics of which include:

Quality Management System/Lab licensing and Accreditation

- Development of IQC and/or EQA PT panels
- Certification/licensing requirements and processes
- ISO 15189 and 17025 accreditations
- Stepwise Lab Management Towards Accreditation (SLMTA) and Stepwise Laboratory Quality Improvement Process (SLIPTA) stepwise approach

Biosafety/Biosecurity and Waste Management

- Development of Biosafety/Biosecurity Guidelines
- Development of Laboratory Waste Management Guidelines
- Setting up of BSL-2 and BSL-3 laboratories

Data Management

- Data management implementation (use of e-tools)
- Laboratory Information Management System interface

- **National Leadership, Governance, Policies, Plans and Coordination**
  - Development of National Lab Strategic plan and operational plan
  - Development of Essential Diagnostic List and Standardization
  - Development of Policies/Guidelines
  - Resource mapping

c. Knowledge sharing

All twelve countries have indicated interest in participating in knowledge sharing efforts – to share their best practices as well as to learn from other member countries. Knowledge sharing can take place through webinars, in-person meetings, chat apps and other platforms. The top five thematic areas in which knowledge sharing has been requested by countries are as follows: quality management, lab regulatory/licensing and accreditation, equipment S&M, biosafety/biosecurity, waste management and supply chain management as shown in figure 6 below.

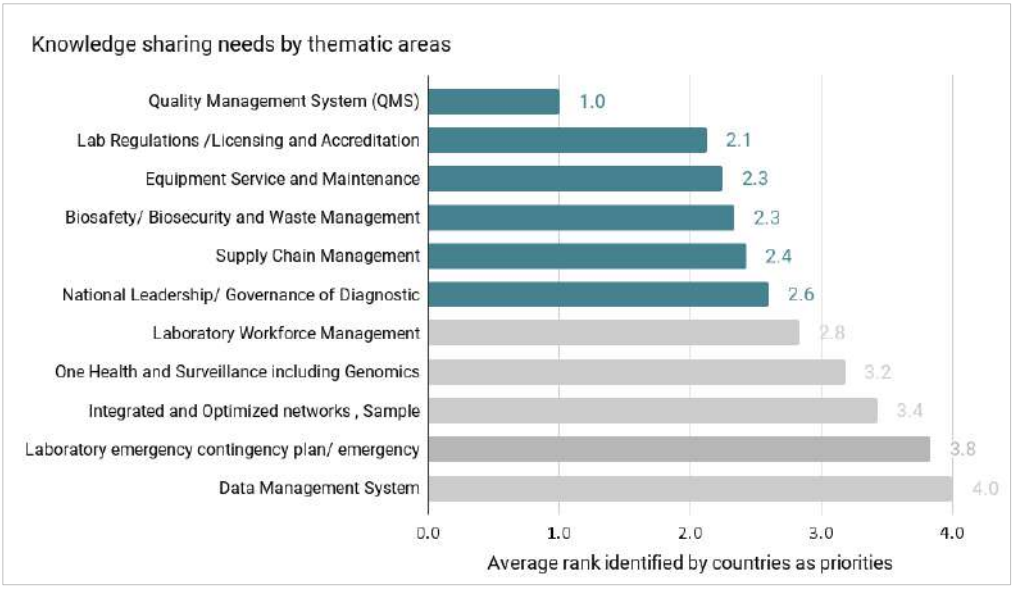


Figure 6. Thematic areas ranked by countries' self-reported priorities for knowledge sharing (Ranked based on the 1-5 ranking of priorities by the countries. Top 5 lowest scores are highlighted and equate to larger needs/gaps)

Suggested topics (not exhaustive) for the top five thematic areas are listed as follows:

- **Quality Management System/Lab licensing and Accreditation**
  - Establishment of EQA system in the country
  - Certification/licensing
  - ISO 15189 and 17025 accreditation process
  - Strengthening Laboratory Management Towards Accreditation/Stepwise Laboratory Improvement Process towards Accreditation (SLMTA/SLIPTA)

- **Equipment Maintenance**
  - Best practices and findings on maintenance and control of laboratory safety facilities and equipment

- Routine equipment maintenance and calibration contract system
- Best practices on BSCs service and maintenance

- **Biosafety/Biosecurity and Waste Management**
  - Best practices and findings on biosafety and IPC
  - Handling of infectious waste during emergency response
  - Biosafety and biosecurity (BSL-3)
  - Waste disposal management and best practice

- **Supply Chain Management**
  - Emergency logistics and supply chain management (including stockpiling)
  - Best practices on stock and inventory management
  - Logistics management information system (LMIS) and other e-tools

Countries that have capabilities and strengths as well as best practices and findings in specific thematic areas, were identified and asked to take part in sharing these practices with other member countries. The table below provided the top thematic areas in which countries are keen to share information with other RPHLN member countries:

Priority Rank	Identified thematic areas	Countries keen to share best practices and key findings
1	Biosafety/Biosecurity and Waste Management	Viet Nam, Singapore, Timor-Leste, Philippines, Nepal, Myanmar, Indonesia, Lao PDR, Cambodia, Thailand
2	One Health, AMR, Surveillance, Sequencing and bioinformatics	Nepal, Viet Nam, Brunei Darussalam, Lao PDR, Thailand
3	Integrated/Optimized network, Sample transportation and POCT	Malaysia, Lao PDR, Timor-Leste
4	Data management	Not indicated
5	Quality management system	Malaysia, Cambodia, Lao PDR, Singapore, Timor-Leste, Nepal, Thailand
6	Lab emergency plan/response	Singapore, Timor-Leste, Philippines
7	Lab regulations, Licensing and Accreditation	Singapore, Philippines, Nepal, Indonesia, Thailand
8	Lab workforce management	Singapore
	Equipment Service and Maintenance	Malaysia, Philippines, Lao PDR, Timor-Leste
10	Supply Chain Management	Singapore
11	National leadership, governance, policies and coordination including NLSP	Philippines, Nepal

Table 2. Thematic areas and relevant countries interested in sharing information with other member countries

eSPAR and JEE scores highlighted the biosafety/biosecurity and IPC, lab quality system, emergency plan response, AMR and One Health as the areas that have the highest gap. The situational assessment through SWOT analyses and country requests for capacity building have highlighted similar priorities as follows:

Thematic Areas	Trainings	TA	Knowledge Sharing
Quality Management System	✓	✓	✓
Regulation, Licensing and Accreditation	✓	✓	✓
One Health, Surveillance, AMR and Sequencing/Bioinformatics		✓	

Biosafety/Biosecurity and Waste Management	✓	✓	✓
Lab Emergency Response Plan (threats/emerging threats)	✓		
Data Management		✓	
National Leadership, Governance, Policies, Coordination + NLSP		✓	
Equipment Service and Maintenance			✓
Supply Chain Management			✓

5. Next steps

The findings of the situational assessment as well as the consolidated requests from countries for training, technical assistance and knowledge sharing will be used to inform the development of RPHLN's three-year strategic workplan. In addition to finalizing its strategic workplan, RPHLN will also prioritize the following as the next steps:

- Further identify countries that have capabilities to offer technical assistance and training to other member countries, as well as establish training hubs/facilities, and provide subject matter experts and available resources.
- Further identify and map partners' interest and support for training and technical assistance as well as for knowledge sharing.
- Disseminate and share this assessment report with potential partners and donors to mobilize resources and proposal developments for long term funding that aims to directly benefit member countries through building capacity and support in the region.

6. Annexes

6.1 Country Summaries

Brunei Darussalam

Laboratory Landscape

	Brunei Darussalam's laboratory system is governed by two ministries, namely the Ministry for Health – Human Health (MOH-HH) and the Ministry of Primary Resource and Tourism Ministry of Health (MPRT-MOH). The Department of Lab Services (DLS) and Department of Scientific Services both deliver lab services and lab testing for infectious diseases free of charge. The laboratory capacity is established in the RIPAS Hospital and covers 80-90% of the total patient population. The country also has offsite Virology and TB laboratories.

JEE country scores (eSPAR not available)

Based on the 2020 JEE report, Brunei Darussalam's main strengths are its testing of priority diseases, capacity modalities and laboratory systems with scores ranging from 80-100. Brunei Darussalam has a limited capacity for emergency response planning. The capacity has been developed but needs strengthening to maintain and improve over time on AMR, one health, biosafety, workforce strategy and use of electronic tools for reporting (40-60 scores).

RHPLN thematic areas

Thematic Areas	Strengths	Challenges
1. Governance, Policies Coordination including NLSP	○ Supportive top government management and stakeholders; ○ NLSP available and included In the MOH Strategic Plan 2019-2023	○ Weak multisectoral networking; ○ Manpower pool issue for the implementation and establishment of Brunei Darussalam health system (same pool of technical staff)
2. Regulations/ Licensing/ Accreditation	○ All labs are accredited to ISO standards (ISO15189 for Department of Lab Services and ISO17025 for Department of Scientific Services)	○ No national mechanism for lab licensing and no accreditation or certification scheme

Thematic Areas	Strengths	Challenges
3. Quality Management	○ Well-established QMS program in all labs; ○ All infectious diseases tests are covered by corresponding proficiency testing programs	○ No gaps indicated
4. Supply Chain Management	○ National lab forecasting available and effective procurement system in place according to Brunei Darussalam Financial Regulations.	○ Need to strengthen procurement in compliance to the Brunei Darussalam's Financial Regulations section of each Ministry
5. Equipment S&M	○ Major safety equipment including BSCs are properly maintained, serviced and certified	○ Cost for maintenance service is high ○ Delayed responses to work orders requested by the Biomedical engineer team
6. Data Management &Tools	○ All hospitals and health centers have LIMS in place. ○ The LIMS has been integrated with Bru-HIMS ○ Lab results from government labs are transmitted real time to clinicians through Bru-HIMS	○ Data analysis on Bru-HIMS is not yet automated with automatic triggers and alert functions for timely action ○ Private health facilities notification mechanism is not yet established
7. Lab Workforce Management	○ Ongoing education program for MoH staff ○ Workforce program in place managed by Brunei Darussalam Public Service Commission	○ Limited available HR capacity for managing events other than communicable disease outbreaks ○ Lack of long-term strategies for staff training in sub- specialist areas including outbreak planning and preparedness

Thematic Areas	Strengths	Challenges
8. Biosafety and Biosecurity and Waste Management	○ Biosafety/biosecurity program is in place at the institutional level ○ Waste management system is in place, managed within the individual health facility ○ Available trained staff and resources needed for safely shipping category B biological specimens within and outside the country	○ Limited certified lab professionals ○ Shortage of trained biosafety officers undermines oversight and enforcement of biosafety and biosecurity requirements ○ Biorisks assessment is not conducted systematically
9. Emergency lab Plan for threats and emerging threats	○ Plans exist within the individual Ministry with strong support from top government management	○ Limited available HR
10. Integrated/ Optimized Network including Sample Transport and POCT	○ Comprehensive and functional system for sample transportation is well established with 24 hours turnaround time ○ Certified couriers are available for international and authorized local transportation ○ POC testing of 9 core tests available at district level and ○ 5 core tests at health centers	○ The sample transportation system requires strengthening in terms of manpower and systems for maintaining quality of referral specimens and safe handling & transportation of Category A infectious substances ○ No network optimization exercise conducted
11. One Health, Surveillance, AMR, Genomics and Bio-informatics	○ A mechanism exists for coordinated multi-sectoral action that links the human health, animal health and environmental sectors ○ One health and AMR is implemented in the country and has the lab capacity to detect and phenotypically categorize drug resistant microorganisms ○ Laboratory and clinician notifications feed directly into the surveillance system ○ Genomics and bioinformatics are available at MOH Microbial Genomics Services	○ No harmonized lab methodologies and data reporting for phenotypic characterization of AMR organisms with relevant antimicrobial combinations in hospitals ○ Limited HR to maintain and fulfill core functions ○ Animal health and human health public labs are not integrated

Capacity building priorities and opportunities based on country consultation

Thematic Area	Training	Technical Assistance	Knowledge sharing
Governance, Policies Coordination including NLSP	2		2
Regulations/Licensing/ Accreditation	1		1
Supply Chain Management	5	2	5
Equipment S&M		1	
Emergency lab Plan for threats and emerging threats		4	
Integrated/ Optimized Network including Sample Transport and POCT	3	3	3
One Health, Surveillance, AMR, Genomics and Bioinformatics	4	5	4

Note: numbers indicate needs ranking (1 as the highest)

Brunei Darussalam has made a lot of progress in strengthening their surveillance and AMR systems over time and are willing to share the country's best practices through knowledge sharing. However, this country lacks a national licensing, accreditation mechanism, or certification scheme, making it the area with the greatest need for capacity building.

Main risks/threats: Inadequately skilled manpower pool.

Cambodia

Laboratory Landscape

	Although Cambodia's laboratory services are provided by both public and private sectors, the leading laboratory government entity in Cambodia is the Bureau of Medical Laboratory Services (BMLS) under the Department of Hospital Services (DHS) of the Ministry of Health (MOH). The BMLS has oversight on the laboratory system and the development of policies and guidelines for the public health system of Cambodia. Donor support to the lab systems is largely verticalized by disease programs such as HIV, TB and Malaria. National Public Health Laboratory (NIPH) serves as the national public health reference laboratory and provides disease surveillance and oversight for the Laboratory Quality Management System (LQMS) program in the country. There are 30 labs enrolled in the LQMS program, adapted from the SLMTA accreditation scheme. NIPH is accredited for ISO 15189, ISO 17025 and also received accreditation for blood bank services and POC. The Labs network is comprised of 62 comprehensive package of activities (CPA)-1 level health facilities, 37 CPA-2 facilities, 21 CPA-3 facilities, and 11 specialized health facilities. CPA-1 being the smallest capacity available at the health facility, and CPA-3 being the high-level facility. Cambodia has 11 national labs, 7 specialized labs, 123 referral labs in 25 Public Health Department (PHD) and 98 Operating Districts (ODs).

eSPAR and JEE country scores

In terms of eSPAR and JEE scores, key strengths include lab testing for priority diseases and disease surveillance (70-80 scores). The largest needs for labs in Cambodia include emergency logistics and supply chain management, health emergency response planning, AMR, and the national diagnostics network (20-50 scores).

RHPLN Thematic Areas

Thematic Areas	Strengths	Challenges
1. Governance, Policies Coordination including NLSP	○ Strong commitment from top government to improve laboratory services ○ Lab Policies and strategic plans are available ○ National TWG re-activated and functional ○ National quality standards available that captures SOPs for essential tests	○ Strategic plan is outdated and needs to be revised ○ Consequent lack of resources to support laboratory service activities, mostly reliant on partners ○ No national HR database for training courses or career development plans
2. Regulations/ Licensing/ Accreditation	○ Bureau of Regulations and Ethics provides regulations for private institutions including laboratories ○ National reference lab, NIPH is ISO 15189 accredited for level 2 laboratory	○ No national lab accreditation scheme in the country ○ No technical regulatory body responsible for licensing of laboratories and lab professionals
3. Quality Management	○ Established LQMS and mentorship program with 30 laboratories enrolled and over 30 mentors and national assessors trained ○ Various EQAs implemented at the national and sub national levels ○ NIPH has the capacity to locally produce PT panels for hematology, blood banks, HIV, Syphilis, hepatitis and serology	○ Limited resources to support locally produced PT panels that limits country wide coverage ○ Some SOPs are not up to date and not implemented ○ Unsteady supply of IQC materials

Thematic Areas	Strengths	Challenges
4. Supply Chain Management	○ System in place for emergency logistics and supply chain management ○ MOH procurement team available and is responsible for procurement through the central medical stores ○ The country has a good ordering system based on feedback from ISO audit	○ No SCM standard procedures in general labs and no standard inventory management system ○ Labs lack accurate forecasting of commodities ○ There are no test validation guidelines or list of recommended reagents and laboratory commodities
5. Equipment S&M	○ Standard lab equipment is largely available in most laboratories BSCs & major new equipment are under a service contract which includes spare parts, routine and curative maintenance	○ No equipment management policy or guidelines for procurement, donation and decommissioning of lab Equipment ○ Preventive maintenance capacity is limited particularly for basic cross cutting equipment
6. Data Management &Tools	○ Well-established Cambodia laboratory Information System (CamLIS) currently functional at national and provincial level laboratories	○ CamLIS has limited features for data capture and use and needs to be upgraded to also include national disease program data ○ Lack of information Technology specialist to support upgrade of CamLIS features and management
7. Lab Workforce Management	○ Well-established pre-service training by universities for lab techs	○ Limited trained workforce and low participation of lab staff in continuous training and professional development ○ Limited resources to support continuous training and professional development.

Thematic Areas	Strengths	Challenges
8. Biosafety and Biosecurity and Waste management	○ IPC guidelines in place and in use ○ 91 biosafety cabinets have been serviced and certified ○ Lab staff were trained on biosafety measures at the national and subnational levels	○ Although general medical waste management procedures are included in the Infection Prevention and Control Guidelines, there is no specific laboratory waste management policy and poor waste management practices (e.g., inconsistent sterilization and waste separation) were observed in most laboratories
9. Emergency lab Plan for threats and emerging threats	○ Completed simulation exercise for biorisk management in the laboratory	○ No lab emergency plan in place ○ Not actively participating in public health activities at the subnational level, increasing level of health risks
10. Integrated/ Optimized Network including Sample Transport and POCT	○ SOPs, training and demonstration videos developed for specimen collection and packaging for COVID-19 and other respiratory pathogens ○ SOP for Sample collection, handling, storage and transportation is available and up to date. ○ POC testing is available for HIV screening, Syphilis, Microscopy or TB and Malaria, COVID-19, Pregnancy test	○ The national referral system and specimen transportation are not standardized, and several parallel transportation systems exist (e.g., SARI/ILI, TB, HIV VL/EID/CD4) ○ Limited coordination among ministries, vertical programs, partners, and institutions regarding laboratories and surveillance systems ○ Integration of testing is not formally adopted, still in pilot phase
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ Strategic plan & policy for AMR in place ○ Strong lab capacity at national and regional reference labs for COVID-19, influenza, AMR and other priority diseases	○ Systems developed through the COVID-19 response is not integrated and needs to be systematic ○ WGS capacity still limited, particularly on bioinformatics analysis and results interpretation

Capacity building priorities and opportunities based on country consultation

Thematic Area	Training	Technical Assistance	Knowledge sharing
Regulations/Licensing/ Accreditation	3	5	5
Supply Chain Management	2	3	3
Lab Workforce Management	5	4	4
Emergency lab Plan for threats and emerging threats	4	2	2
One Health, Surveillance, AMR, Genomics and Bioinformatics	1	1	1

Note: numbers indicate needs ranking (1 as the highest)

Cambodia's top strengths include quality management focused on LQMS mentorship program, biosafety/biosecurity and Infection, Prevention and Control, and disease surveillance (COVID-19, ILI/SARI). Cambodia's greatest needs in terms of capacity-building include bioinformatics, particularly in analysis and results interpretation.

Main risks/threats: Funding and support to maintain and sustain the standards.

Indonesia

Laboratory landscape

The Indonesian health system is decentralized: at the national level, it is under the authority of the respective governmental agency; and at the subnational level,
Puskesmas are government-mandated community health clinics located across Indonesia. They are overseen by the Indonesian Ministry of Health and provide healthcare for the population on the sub-district level.

Indonesia has over a thousand laboratories that are private and publicly owned and support COVID-19 testing as well as surveillance. This network is complex with different entities sometimes working in parallel. There are 10,321 primary health care clinics (Tier 1), 321 District labs (Tier 2) and 28 Provincial Labs (Tier 4), and 2 National Labs (Tier 5). 1036 institutes have a genomic laboratory network.

The MOH is in the process of developing a public health laboratory system that consists of 5 tiers as aforesaid. Each tier has its role and function based on the WHO Guideline for public health laboratory and existing conditions in Indonesia.

eSPAR and JEE scores

Key strengths include disease surveillance, emergency logistics and emergency supply chain management with average scores between 80-100. Weaknesses include human resources for the International Health Regulations, difficulty in adequately responding to workforce surges during public health events, AMR, and zoonotic diseases and One Health (scores 40-60).

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1. Governance, Policies Coordination including NLSP	○ Strong coordination of relevant sectors at the national government level ○ Laws and regulations are established, and implementation procedures are periodically updated ○ Diagnostic testing is available for 23 diseases in peripheral reference laboratories and at a higher capacity at the central reference laboratory ○ Lab TWG in place under MOH decree No. 1256/2002	○ No NLSP, in the process of developing the document ○ No NEDL, in the process of developing the document ○ Limited training opportunities for provincial and national officials to support communication of disease cases and events between all three levels
2.Regulations/ Licensing/ Accreditation	○ Accreditation body and certification system available ○ National and some subnational labs are accredited by ISO 15189 and 17025	○ Only ~40% of the labs are accredited ○ Poor compliance to regulation for mandatory lab accreditation

Thematic Areas	Strengths	Challenges
3. Quality Management	○ A strong QMS program is in place as per MOH regulation No. 34/2022 ○ National EQA program is available and the cost of implementation has been met by the labs themselves ○ A standard checklist for laboratory supervision is available using the LMT (Laboratory Mapping Tools) instrument	○ QMS is limited to specific diseases, not in the general context. ○ Not all sites are enrolled to the EQA scheme ○ Lack of positive controls and laboratory standards SOPs for the detection of new emerging pathogens.
4. Supply Chain Management	○ SCM, Forecasting and quantification is available for specific needs that are fully supported by the government. This includes any diseases that become a national public health concern ○ National procurement system in place including distribution for the specific needs	○ No standard SCM in place and no national forecasting and qualification in routine general lab services. Each lab calculates their own supply for ordering and procurement ○ No current stock and inventory management in place but there's a plan to put together standard guidance for the labs
5. Equipment S&M	○ Equipment S&M regulations in place	○ Equipment maintenance regulations implementation has not run optimally
6. Data Management &Tools	○ A common platform called SIZE (Sistem Informasi Zoonoses dan Emerging Infectious Diseases) has been established to access animal and human health system ○ E-data system available	○ E-data system not fully in use. The electronic real time reporting system is not interoperable and interconnected between sectors. ○ Work in remote areas is hampered by poor or absent internet & telecommunication services. ○ No LIMS, still in the process of developing the LIMS.

Thematic Areas	Strengths	Challenges
7. Lab Workforce Management	○ A HR development strategy has been developed ○ Multi-disciplinary ○ workforce available at national and regional levels, and partially at local level. ○ Public health training curricula are standardized ○ HR development programs are available and conducted at central, provincial and district/city levels, including cross-program and ○ cross-sectoral training with standardized curricula & modules.	○ High public health staff turnove ○ Relevant medical specialists display a general lack of interest in public health laboratory postings ○ Limited analytical skills of subnational officers ○ Poor communication between laboratories and surveillance at the local level.
8. Biosafety and Biosecurity	○ System and supporting programme in place with a legislative foundation ○ Technical and procedural suppor is available from certified professionals ○ IPC program is available for healthcare settings, and include regulations and guidelines as we as trainings ○ A central, certified biosafety leve three (BSL3) laboratory is available both for the human	○ Local institutionalized guideline for biosafety are not yet finalized ○ High staff turnover ○ Biosafety and biosecurity are low priority subjects for some stakeholders, because a lack of knowledge of incidents
9. Emergency lab Plan for threats and emerging threats	○ Multi-hazard contingency plans in place in 300 districts/ municipalities ○ Sub-national preparedness and response plans are in place in most provinces and districts, supported by the Centre for Health Crisis (CHC) in the MOH.	○ No lab specific contingency plan ○ High turnover of staff at local level and high turnover of local government leaders cause problems, and mean policy support mist be advocated continuously.

10. Integrated/ Optimized Network including Sample Transport and POCT	○ The laboratory referral system is in place and functional ○ Algorithms and SOPs are in place for specimen collection, packaging and transport to peripheral referral laboratories for 23 diseases along with TB and HIV. ○ A tiered diagnostic testing strategy is available for specific priority diseases, with the most common ones being TB and HIV, primarily at Puskemas and second-tier peripheral referral laboratories.	○ There is a high turnover of human resources at the local government level. ○ Limited services at point of care, coupled with diverse geographical and natural conditions, pose challenges to animal disease control in the field.
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ An integrated system for laboratory-based surveillance for vaccine preventable diseases is in place (national laboratories). ○ National AMR action plan is available and adopted ○ AMR prevention and control programme guidelines for hospital is available and in four designated uses ○ TB and HIV laboratories and networks are in place and functioning ○ Strong national government commitment and ensured funding for surveillance	○ Poor coordination with local government to advocate support for AMR prevention and control ○ Lack of understanding in health workers and the public of the importance of IPC in preventing the spread of infection due to AMR ○ Lack of coordination from health facilities on surveillance data reporting ○ High turnover of staff who are rotated to province/district postings ○ Limited human resource capability and capacity to manage surveillance

Capacity building priorities and opportunities based on country consultation

Thematic Area	Training	Technical Assistance	Knowledge sharing
Governance, Policies Coordination including NLSP	1	1	
Quality Management			1
Supply Chain Management			2
Equipment S&M			3
Data Management &Tools	2	2	4
Emergency lab Plan for threats and emerging	3	3	5
Integrated/ Optimized Network including Sample Transport and POCT	4	5	
One Health, Surveillance, AMR, Genomics and Bioinformatics	5	4	

Note: numbers indicate needs ranking (1 as the highest)

In terms of capacity-building, Indonesia can support the RPHLN member countries when it comes to biosafety/biosecurity and IPC, lab regulations licensing and accreditation. For capacity gaps, Indonesia is interested in being a part of trainings in all 11 thematic areas as well as TA as needed. However, the identified greatest TA need is on developing a NLSP and EDL, as well as developing guidelines for a public health laboratory system.

Main risks/threats: High turnover of staff at the local level and high turnover of local government leaders cause problems that undermine operationalization of plan and program sustainability.

Lao PDR

Laboratory Landscape

	Lao PDR has a tiered lab structure, all of which offer laboratory diagnostic services: central, regional, provincial, district and health center levels as referred to in the Operational Guideline for Health Laboratory Networking in the country. There are 6 Central, 4 sub-national and 16 provincial hospital laboratories in 18 provinces, and 136 district laboratories. The main public health laboratory is the National Center for Laboratory and Epidemiology (NCLE). The other laboratories are Centre for Malariology, Parasitology and Entomology (CMPE), National Tuberculosis Center (NTC), Center for HIV/AIDS and STDs (CHAS). Lao PDR laboratories are a mix of private and public service providers. Molecular testing is done at both national and provincial decentralized levels. NCLE has received ISO 17025 accreditation, and several labs are in preparation for ISO 15189 accreditation. MOH- NCLE also serves as the National Surveillance System Center to detect public health threats utilizing both Indicator-based Surveillance (IBS) and Event-based Surveillance (EBS). The national laboratory system is capable of detecting 9 out of the 10 core tests identified by the International Health Regulations (IHR).

eSPAR and JEE country scores

Strengths include surveillance and lab testing of priority diseases, zoonotic diseases and One Health with an average score of 80. The scores also reveal low capacity for reporting, emergency logistics, biosafety/ biosecurity and IPC and health emergency response planning with scores ranging between 20 to 60.

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1. Governance, Policies Coordination including NLSP	○ Leadership at the highest level of government (decree on the establishment of the national communicable diseases control committee) ○ Legal framework to support and enable the implementation of country's obligations and rights for IHR implementation is available ○ Updated national policy for health laboratories, 2023 is in place ○ TWG available with subgroups- clinical biosafety and quality that meet annually ○ Has updated NLSP for health laboratories 2023-2030	○ Lack of resources in key IHR capacity areas to operationalize the national work plan ○ Weak capacities at the sub- national levels ○ NEDL still in planning process by healthcare department ○ Infrequent meeting of TWG delays decision-making
2. Regulations/ Licensing/ Accreditation	○ National Laboratory Food and Drug Quality Control Center (FDQCC) has been accredited by ISO 17025NCLE accredited for disease -specific testing by WHO for influenza, measles, rubella and Japanese encephalitis.	○ No accreditation, certification or licensing body in the country o No Medical Devices Act that regulates importation and monitors the quality and use of laboratory equipment and supplies
3. Quality Management	○ National quality standards have been developed ○ All national labs participated in EQA for 9 core tests in the health sector	○ Strong national government commitment and ensured funding for surveillance ○ QMS not functioning well, particularly at the subnational level ○ Lack of clear guidelines and training materials on QMS

Thematic Areas	Strengths	Challenges
4. Supply Chain Management	○ Electronic logistics and supply chain management tool has been developed (mSupply) and it has a dashboard which provides up to date information on the supplies and locations ○ Procurement system in place through the MOH procurement committee	○ mSupply tool not yet been fully rolled out in subnational levels ○ No system for checking the quality of lab supplies prior to distribution and no registration of lab equipment, reagents or supplies o Not up to date record of commodities and supplies
5. Equipment S&M	○ There is sufficient basic bacteriology testing equipment and supplies and capacities to carry out the testing ○ BSCs are maintained and 3 staff were trained and certified ○ Laboratories have required equipment to support performance of core laboratory tests.	○ Lack of equipment management system and standard list of lab equipment ○ Little training of lab staff in lab equipment care and maintenance and no SOPs for care and maintenance of lab equipment ○ Maintenance contract for key equipment is not in place for all
6. Data Management &Tools	○ Well- developed registers and reporting systems for diseases programs are available	○ Fragmented data system, national LIMS development still underway ○ No electronic web-based reporting system ○ No integrated lab reporting system and no data analysis at the central level

Thematic Areas	Strengths	Challenges
7. Lab Workforce Management	○ Personnel development strategy for MOH is in place FETP training program available supported by DTRA	○ Limited HR in terms of quality and quantity ○ Limited epidemiology competency at the subnational level ○ No multisectoral workforce surge strategy for communicable diseases, only emergency responses relating to disaster ○ Low staff retention ○ No incentive mechanism in place to maintain the existing public health workforce
8. Biosafety and Biosecurity	○ National IPC strategy, operational plan and SOPs are available at all major health facilities ○ Guideline for protection of healthcare workers from healthcare associated infection is available ○ Biosafety and biosecurity management programs and supporting documents are available at the national public health labs ○ Trainings on biosafety were provided to selected staff at the central and provincial levels	○ Not all healthcare workers are implementing the program in their routine work ○ Limited funds and human resources for sustainable biosafety and biosecurity ○ Insufficient national resources to ensure proper and timely maintenance of facilities and equipment ○ No National Laboratory Safety Manual addressing general laboratory safety issues ○ No Laboratory Safety Managers appointed at laboratories ○ Limited trainings on biosafety and biosecurity at the district and community levels

Thematic Areas	Strengths	Challenges
9. Emergency lab Plan for threats and emerging threats	○ All provinces and central teams have been trained on the Incident Management System and this is being implemented at the central and provincial levels. ○ It is integrated to the emergency operations centers at both the central and provincial levels ○ National stockpiles are available and emergency funds are also in place at different levels of the government. ○ Mechanism is in place for the mobilization of the surged capacity to response to emergency	○ Limited Human resource capacity to operationalize the activities
10. Integrated/ Optimized Network including Sample Transport and POCT	○ Specimen referral and transport system for infectious diseases is available (Influenza, Dengue, Diarrhoea, Fever and Rash, Japanese encephalitis and MDR-TB) ○ Standardized SOPs in place for specimen collection, packaging, and transport ○ Laboratory system can perform PCR, viral culture, bacterial culture with AST with quality assurance process	○ Specimen referral system is fragmented and disease specific with cost mostly supported by partners such as WHO CDC, globally funded and not sustainable ○ Lab network spatial analysis still underway

Thematic Areas	Strengths	Challenges
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ National labs and selected provincial labs have the capacity to test for all AMR priority pathogens in both animal and human sector ○ Laboratory networking established between animal and human health sector ○ Surveillance system is in place for the five priority pathogens including avian influenza, rabies and anthrax	○ No designated AMR lab staff and trained HR are still limited ○ Limited capacity for quality assurance of surveillance data at all levels ○ Poor coordination and limited reporting and sharing on routine surveillance data

Capacity building priorities and opportunities based on country consultation

Thematic Area	Training	Technical Assistance	Knowledge sharing
Governance, Policies Coordination including	3	4	4
Regulations/Licensing/Accreditation	2	1	1
Quality Management		3	
Equipment S&M		5	
Lab workforce Management	5		3
Emergency lab Plan for threats and emerging	4		5
One Health, Surveillance, AMR, Genomics and	1	2	2

Note: numbers indicate needs ranking (1 as the highest)

Strengths that can be shared by Lao PDR include equipment S&M, quality management, integration, surveillance and biosafety/biosecurity and waste management. A main area where Lao PDR could use support is in establishing a regulatory body for licensing and accreditation.

Main risks/threats: Stretched resources and diagnostic capacities at the subnational level delay progress to reach the national norm and standards

Malaysia

Laboratory Landscape

	Malaysia has a mix of public and private sector providers for laboratory services. However, the MoH is the major healthcare provider for the Malaysia population. There are 139 public hospital laboratories and 768 health clinic laboratories. The role of public health laboratories is to conduct surveillance, outbreak investigations and Quality-Assurance (QA) for TB and Malaria. The Public health laboratories also provide support for epidemiological investigations to the national laboratory and four regional laboratories. Malaysia has 55 laboratories accredited for medical or clinical testing. This includes 14 government laboratories, 34 private laboratories and seven public laboratories embedded in public universities for academic research purposes. The National Public Health Laboratory and all state hospital laboratories (with the exception of Perlis Hospital Laboratory because of logistics reasons) conducts testing for nine of the 10 priority diseases.

eSPAR and JEE country scores

With high average JEE and eSPAR scores (80-100), the Malaysia laboratory network builds on several strengths, including laboratory testing for priority diseases, responding to the workforce surge during public health events, surveillance and planning for public health emergencies. Laboratory quality system, biosafety/ biosecurity and IPC and electronic reporting tools were scored 60 which is slightly lower. This means that the capacity has been developed but needs strengthening to maintain itself over time

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1. Governance, Policies Coordination including NLSP	○ Adequate legislations, regulations and other government tools to support the implementation of IHR are available and reviewed/amended on a regular basis ○ National EDL is available and embedded into the national workplan ○ Functional Laboratory Technical Advisory Committee is in place	○ NSLP still in draft form and under review ○ Coordination enhancement needed with other ministries through documenting and articulating their existing processes in SOPs
2.Regulations/ Licensing/ Accreditation	○ Accreditation body is in place "Standard Malaysia" who accredits to ISO ISO15189/17025 ○ 55 laboratories accredited for medical/clinical testing	○ No licensing requirements for laboratories and laboratory accreditation is voluntary, thus not all clinical laboratories have a license to operate and are therefore not regulated
3. Quality Management	○ All public hospitals and reference ○ laboratories participate in EQA schemes and/or inter-laboratory comparisons (PT panels) and some laboratories offer EQA schemes	○ EQA for specialized tests needs to be strengthened to achieve the appropriate level of competency
4. Supply Chain Management	○ Effective procurement system in place following the Treasury Circular for Procurement Policy by the Ministry of Finance ○ Inventory and stock management are available at the hospital/subnational level management	○ Siloed procurement system ○ No national forecastingand quantification exercise and no standard tools available.

Thematic Areas	Strengths	Challenges
5. Equipment S&M	○ Medical Device Act in place that ensures the quality of devices used, including In vitro diagnostic devices and their accessories ○ All laboratories have required equipment S&M contracts ○ Preventive maintenances conducted regularly by concession companies if available ○ Maintenance and certification of laboratory equipment and biological containment facilities are locally available	○ No gaps indicated
6. Data Management &Tools	○ Electronic tools are used for laboratory test results for both human and animal health are available at all levels of government "eNotifikasi and eWabak"	○ Fragmented data system "eNotifikasi and eWabak" are not interfaced ○ Automate data sharing between the indicator-based (eNotifikasi) and event-based (eWabak) systems are not yet available
7. Lab Workforce Management	○ CPD guidelines & in-service trainings in place ○ Continuous in-service training for doctors and all health professionals exists at the national, state and district levels	○ Inadequate specialized skilled staff
8. Biosafety and Biosecurity	○ Comprehensive biosafety and biosecurity management systems at the institutional level including designated personnel for biosafety and biosecurity implementation are available ○ Biosafety and biosecurity practices are supported by legislation, regulations, policies and guidelines aligned to the international best practices.	○ Limited resources to sustain the implementation and expansion of the capacity-building at the state and district level

Thematic Areas	Strengths	Challenges
9. Emergency lab Plan for threats and emerging threats	○ Robust system for emergency response. A smart electronic disease notification system is available for all 31 notifiable diseases in the country. This prompt is for early public health intervention and control measures ○ Well-equipped emergency resources comprising of human resources, transportation, heavy machinery and specialized laboratories are located across the country	○ Coordination to ensure multisectoral implementation of preparedness and response plans need further strengthening.
10. Integrated/ Optimized Network including Sample Transport and POCT	○ Robust and standardized sample transport system for outbreak, surveillance and disaster samples is in place through postal. Countries and departmental transport have funding through the existing government budget and contracts for private laboratories ○ POC testing is available for 8 core tests at health clinic ○ Guidelines for specimen collection and transportation from the field to national or regional laboratories are available and easily accessible ○ Advanced molecular and serological testing for referred are available	○ Limited POC diagnostic tests but a plan is underway for expansion

Thematic Areas	Strengths	Challenges
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ Well-established AMR surveillance with adequate representation of hospitals participating – 144 public hospitals and 74 out of the 187 private hospitals ○ One Health approach implemented with wide range of networking across ministries and offices ○ Sequencing is available at national laboratories	○ Limited technical expertise on genome sequencing, in particular, in bioinformatics ○ Limited resources to expand AMR program and upgrade laboratory capacity for detection of AMR using genomic sequencing

Capacity building priorities and opportunities based on country consultation

Thematic Area	Training	Technical Assistance	Knowledge sharing
Leadership/Governance, coordination	5	4	2
Regulations/Licensing/Accreditation		5	
Supply Chain Management	1		1
Lab workforce Management	3	1	
Biosafety/Biosecurity & waste management	2	2	3
Integrated/Optimized Network/ST			5
One Health/Surveillance/ARM/WGS	4		5

Note: numbers indicate needs ranking (1 as the highest)

Malaysia's top strengths include quality management, S&M of equipment and laboratory workforce management. The country is keen to share findings, best practices and specific areas on QMS, Equipment Service and Maintenance System, shipping courses, testing assays, etc. through knowledge sharing. The country is also able to provide PT panels for selected tests (TB AFB stain, TB Molecular, Syphilis Serology, BFMP malaria). On the other hand, Malaysia can use the support to establish a stronger SCM as the process is currently siloed at the agency/hospital level with each having their own supply chain processes.

Main risks/threats: Insufficient financial support for trainings limit capacity building efforts at the state and district levels.

Myanmar

Laboratory Landscape

	Myanmar has a centralized and tiered lab structure (A, B, C). Sub-national specimens are referred to at the National Health Laboratory (NHL) level. NHL is the national reference laboratory and serves as the national body that provides overall oversight on any diagnostic related services. NHL is WHO accredited for Measles, Rubella, Polio and Japanese Encephalitis, while the Myanmar Food and Drug Administration (FDA) is accredited for ISO/IEC 17025.

eSPAR and JEE scores

For Myanmar, the highest scoring variable of 70 to 80 is the surveillance system for both eSPAR and JEE assessments. Specimen referral and the national diagnostics network are also considered a strength for the Myanmar laboratory system. There are huge gaps in laboratory quality system, lab workforce -in particular on workforce surge during public health events and management of health emergency response (40-60 scores).

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1. Governance, Policies Coordination including NLSP	○ NEDL developed and tested menu included by levels ○ Coordination exists within the relevant ministries and there are functional mechanisms established for inter-sectoral collaboration that include human health and animal health surveillance units and laboratories	○ NLSP was underprepared; its draft is finished ○ Lack of tools to improve and strengthen coordination and communication with relevant stakeholders ○ Lack of funding support
2. Regulations/ Licensing/ Accreditation	○ NHL is accredited for disease- specific testing by WHO ○ Laboratory certification system available for private hospitals and laboratories (estimated 200 laboratories certified) ○ 21 Molecular laboratories certified for COVID-19 testing	○ No laboratory accredited by ISO 15189 ○ No national plan for laboratory accreditation ○ Certification system is limited to private laboratories; public laboratories are not regulated
3. Quality Management	○ Has national EQA program ○ Has National QA guidelines and plan in place, assessment tool and quality manual available ○ Private sector required to participate in EQA	○ No designated national quality officer ○ Limited capacity for supervision due to limited funding

Thematic Areas	Strengths	Challenges
4. Supply Chain Management	○ Has a SCM system in place. MOH conducts yearly tender and emergency tender ○ Central Medical Supply Depot conducts national laboratory forecasting and quantification ○ Procurement system is in place through MOH tender (central tender), Global Fund for HIV program and WHO supply chain for Epidemiology ○ Distribution of commodities ○ Inventory of stocks in place by the Central Medical Supply Depot	○ Program specific SCM, not integrated ○ Limited supply chain for hepatitis program and AMR and emerging diseases
5. Equipment S&M	○ NHL BSC certified, at least one equipment w/ S&M	○ No established system for equipment maintenance ○ Equipment not routinely serviced and maintained ○ Partial SOPs or procedures on preventive maintenance ○ Lack of local service engineer or trained local expert to maintain equipment in the lab ○ Regular maintenance and calibration contract system for key equipment is not in place yet, which could jeopardize reliability ○ Limited HR capacity and funding

Thematic Areas	Strengths	Challenges
6. Data Management &Tools	○ Electronic system and LIMS are available at Type A laboratories	○ Fragmented LIMS, mostly established by vertical programs and private hospitals not interfaced, resulting in complications in data analysis and reporting ○ Limited features, need upgrade to expand use to the rest of the test menus in the laboratory
7. Lab Workforce Management	○ Health Workforce strategic plan exists and the strengthening management of human resources project has been launched ○ HR for implementing IHR core capacities are available at all levels ○ Train-the-trainer program available for biosafety and biosecurity ○ FETP program is available and has trained over 600 healthcare workers	○ A Health workforce strategic plan exists but is not regularly reviewed, updated, or implemented consistently ○ Biosafety Officers available but not trained for biosafety and biosecurity ○ Limited HR capacity ○ Lack of specialty training program for specialized areas (Epidemiologist, Bio-statisticians< scientists, information specialist, etc.)
8. Biosafety and Biosecurity and Waste management	○ Biosafety manual and biosafety guidelines available ○ Biosafety and biosecurity training program in place ○ Developed and disseminated management manual ○ Hospital infection control manual available	○ No biosafety and biosecurity legislation, regulations or frameworks in place ○ Lack of comprehensive national inventory of pathogens ○ No bio risk assessment conducted ○ No training resource capacity

Thematic Areas	Strengths	Challenges
9. Emergency lab Plan for threats and emerging threats	○ Policies exist. Action plan for Disaster Risk Reduction Is available and mass casualty ○ Set up PCR laboratories in states and regions to facilitate outbreak response	○ The current action plan largely focuses on natural disaster rather than public health emergencies ○ Lack of training program, HR capacity, technical expertise and funding ○ No national health and lab emergency preparedness and
10. Integrated/ Optimized Network including Sample Transport and POCT	○ Standardized SOPs in place for specimen collection, packaging and transportation ○ System is in place to transport specimens to NHL from at least 80% of immediate level facilities within a day ○ POC testing strategy and algorithms are available for some priority diseases (e.g. HIV, Dengue, Hepatitis, Influenzas, Covid-19, TB, Malaria, Syphilis, some bacteria disease)	○ Fragmented Sample Transport mostly done by vertical programs ○ POC testing capabilities at remote areas need to be improved

Thematic Areas	Strengths	Challenges
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ NHL, Public Health Laboratory (PHL), central hospitals, teaching hospitals, state and regional hospitals, Central Animal Health Laboratory, can detect WHO priority pathogens and AMR pathogens (25 hospital laboratories) ○ Lack of tools to improve and strengthen coordination and communication with relevant stakeholders ○ At least one lab has the capacity to perform genome capacity sequencing	○ AMR detection for both human and animal sector and national guidelines for AMR prevention and control need development ○ No proper surveillance training for clinical staff ○ Limited capacity on WGS for multi-drug resistance; in particular Genome sequencing analysis for infectious diseases ○ Limited capacity in AMR and AMR EQA programs

Capacity building priorities and opportunities

Thematic Area	Training	Technical Assistance	Knowledge sharing
Quality Management	1	1	1
Equipment Service and Maintenance	2	2	2
Biosafety/Biosecurity & Waste management	4	4	4
Integrated/Optimized network	5	5	5
One Health/Surveillance	3	3	3

Note: numbers indicate needs ranking (1 as the highest)

Myanmar's top strengths for capacity building include biosafety and biosecurity and waste management. Myanmar can benefit from capacity-building for laboratories especially in the field of lab accreditation and improving the QMS. There are currently no labs accredited for ISO15189 in Myanmar.

Nepal

Laboratory Landscape

	Nepal's health system has three main levels: federal, provincial and local. The three entities report individually to the Ministry of Public Health (MOPH) and do not work as part of a given hierarchy. The MOPH oversees the overall health service delivery structure, including laboratories. Nepal has 7 provinces with 8 laboratories, one at central and 7 in the provinces. There are 8 public health laboratories with five licensing levels: A, B, C, D and E. The National Public Health Laboratory received ISO 15189 accreditation. Four more laboratories are undergoing ISO 15189 accreditation.

eSPAR country score (JEE not available for Nepal)

Nepal has an overall low eSPAR scores (between 20-60) in most areas with main strengths being the lab quality system and the effective national disease network (scores 80). Areas for improvement include the lack of available workforce during public health emergencies, the specimen referral system, and the human resources devoted to IHR.

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1.Governance, Policies Coordination including NLSP	○ Strong commitment from government to accelerate universal health coverage to ensure equitable access to quality health services ○ Has one lab with many functions committed to improving the laboratory services in the country	○ NLSP developed but not yet finalized ○ Only program specific TWG, no dedicated Lab TWG ○ Laboratory policy currently dated, needs revision ○ No NEDL developed
2. Regulations/ Licensing/ Accreditation	○ National Public Health Laboratory under the Department of Health Services is the first ISO 15189 accredited public health laboratory ○ The country has a licensing scheme in place to provide licensing to private laboratories	○ No government accreditation body ○ Licensing scheme only for private laboratories, not mandatory to public laboratories

Thematic Areas	Strengths	Challenges
3. Quality Management	○ QMS in place and SOPs available following the set of national standards ○ EQA scheme available for COVID-19, general PT panels for public and private laboratories (25 core tests), Bacteriology EQA for AMR ○ Surveillance sites and HIV and CD4 EQA for sentinel sites	○ Limited EQA coverage and not for all tests ○ Staff not active in providing responses not keen to work (mostly old staff)
4. Supply Chain Management	○ Forecasting and quantification exercise conducted annually ○ SCM in place. One division from the federal government is responsible for SCM, including laboratory.	○ Limited SCM scope - not national
5. Equipment S&M	○ Annual maintenance in place from the vendor and has some mechanisms by hospital management ○ Mandatory S&M contract for the big instrument	○ No maintenance for small equipment and those procured directly or donated
6. Data Management &Tools	○ Data management system available	○ Fragmented system not available in all laboratories, only at the national level
7. Lab Workforce Management	○ In-service trainings available for biosafety and biosecurity, COVID-19 PCR testing, Genome Sequencing, PPE donning /doffing, waste management and AMR surveillance	○ Weak HR development program ○ Limited trained HR High turnover of staff
8. Biosafety and Biosecurity	○ Biosafety, IPC and waste management systems in place	○ No biosecurity measures ○ Inadequate infection control practices ○ No national infection control policy or program for healthcare facilities (human and animal) is available in Nepal

Thematic Areas	Strengths	Challenges
9. Emergency lab Plan for threats and emerging threats	○ 39% hospitals have outbreak management	○ No laboratory emergency plans for notifiable diseases ○ limited HR capacity
10. Integrated/ Optimized Network including Sample Transport and POCT	○ 96% of healthcare facilities offer services for diagnosis and/or management of chronic respiratory diseases ○ POC testing is available and tests include pregnancy test, malaria testing, HIV testing, STIs	○ Capacity for basic testing limited in most health facilities and availability of guidelines for provision of services and trained staff is consistently low
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ NPHL designated as the National Coordinating Center for AMR surveillance and as the national influenza center for respiratory disease program ○ 26 sites are included in AMR Surveillance for 10 priority organisms across 7 provinces ○ A growing political commitmentat the highest levels to establisha system with the “One Health” approach for tackling the matter systematically. ○ Genome Sequencing available for COVID-19	○ No integrated surveillance ○ Limited trained staff Inadequate training for bioinformatics

Capacity building priorities and opportunities

Thematic Area	Training	Technical Assistance	Knowledge sharing
Regulations/Licensing/Accreditation	2	1	5
Quality Management System	1		
Supply Chain Management	5	5	2
Equipment S&M	4	2	1
Data Management & Tools			5
Emergency plan/threats	1	4	5
Integrated/Optimized Network/ST			4
One Health/Surveillance/AMR/WGS	1	4	5

Note: numbers indicate needs ranking (1 as the highest)

Key laboratory strengths are in terms of capacity and areas for knowledge sharing. Nepal is keen to share best practices and findings on AMR, biosafety, accreditation, quality management, governance, policies, and coordination. Nepal could benefit from support to build a national accreditation body for laboratories and support in bioinformatics trainings and QMS.

Main risks/threats: Complexities associated with the development of health infrastructure, organizational reforms and the management of human resources at the federal level.

Philippines

Laboratory Landscape

	The Philippines laboratory system has six different levels. At the national level, the Office for Health Laboratories (OHL) and the National Reference Laboratory Services oversee the regional level entities. These include the Center for Health Development (CHD); Regional Health Laboratory Units; Sub-National Laboratories and Regional Public Health Laboratories. At the local level, there are clinical laboratories licensed by the Department of Health (DOH), and other health laboratories such as entities used for drug testing and military laboratories. The OHL was established in 2021 to support the NRLs. The national health laboratory network provides strategic planning for approximately 4000 clinical laboratories with various capabilities in a 3- tier system, with 6 NRLs. The Research Institute of Tropical Medicine (RITM) is the national reference laboratory and is an ISO 15189 accredited BSL-3 laboratory. The San Lazaro Hospital serves as a central cooperative lab for Sexually Transmitted Diseases (STDs) and Acquired Immune Deficiency Syndrome (AIDS), while the East Avenue Medical Center serves as a center for occupational health and industrial/chemical emergencies. The Lung Center of the Philippines is for clinical chemistry and POC tests and additional 2 system-based NRLs.

eSPAR and JEE country scores

The categories ranking the strongest for the Philippines includes lab testing for priority diseases and surveillance (scores between 70-80). Philippines has a relatively high eSPAR rank for emergency logistics and emergency SCM and for planning emergency responses, with scores between 70-100. There's a need to strengthen the development capacity on AMR, biosafety and biosecurity practices, lab quality system, effective national diagnostic network and lab workforce program (scores between 40-60).

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1.Governance, Policies Coordination including NLSP	○ OHL establishment to empower Philippines Health laboratories through instituting systems, providing directional guidance, ensuring adaptability and sustainability of laboratories ○ Enacted various legislations and guidelines for relevant technical areas to support implementation of IHR	○ NLSP in draft form waiting for ratification ○ Delay in policy enactment
2. Regulations/ Licensing/ Accreditation	○ National body for accreditation for laboratory services and conformity assessment ○ Licensing of laboratories is available and provided by Health Facilities and Services Regulatory Bureau (HFSRB) under the Department of Health ○ Two reference laboratories are ISO 15189 accredited (RITM and National kidney Institute) and four are ISO 107095 accredited	○ Not all labs are registered and comply with the QA and IQC standards, particularly at the subnational levels ○ Limited clinical labs w/ ISO standards accreditation
3. Quality Management	○ Capacity for developing IQC and EQA, and SOPs are available. ○ IQA & EQA participation for registered laboratories are established as part of the licensing mandatory requirements.	○ Weak QMS system as not all laboratories comply to the set standards ○ No standardized practice and implementation of QMS ○ A need to improve capacity in terms of PT panels preparation, training/re-training of personnel, provision for better facilities and equipment and provision for additional funding sources ISO 17043

Thematic Areas	Strengths	Challenges
4. Supply Chain Management	○ National laboratory forecasting, quantification and tools are available in free standing clinical laboratories and other types of laboratories. ○ Labs have their own monthly and annual forecasting and quantification system as well as the tools that are specifically formulated/unique for their own institutions	○ No effective procurement system ○ System for inventory and stock management needs to be improved
5. Equipment S&M	○ S&M available for each laboratory as per their SOP	○ No standard equipment maintenance ○ BSCs are not routinely serviced and maintained in some laboratories.
6. Data Management &Tools	○ Data recording & reporting available ○ Electronic tools available for Surveillance systems either online reporting tools or real time reporting to all administrative levels of the health sector.	○ Fragmented data system. A mix of electronic systems and paper-based systems including manual data entry ○ Integrated LIMS still in development to help collect data from all labs. It has a module on repository, assessment, administrative/support module to gather EQA and any relevant data

Thematic Areas	Strengths	Challenges
7. Lab Workforce Management	○ Strong commitment to developing an adequately skilled workforce across the country ○ Information available that collects data on the status of the health workforce ○ Continuing Professional Development is available as part of the requirements of the Professional Regulatory Commission ○ DOH e-learning platform available ○ Competency-based learning and development plans and interventions are well established ○ FETP well established and institutionalized at the DOH	○ Human Resources for Health Master Plan does not include multisectoral public health workforce roles such as epidemiologists, veterinarians, social scientists, IT specialists and community health workers ○ Human health resources are unevenly distributed throughout the country. This is due to unfavorable working conditions, lack of permanent employment opportunities, and disparities in wages and benefits across the country ○ Staff retention issues and limited funds
8. Biosafety and Biosecurity	○ Strong commitment to biosafety and biosecurity of infectious disease surveillance and detection of high- risk pathogens ○ IPC is required for licensing for hospitals. IPC manuals are validated through monitoring of the hospitals ○ Comprehensive institutional ○ manuals and training programmes for biosafety and biosecurity, including packing and transportation and risk assessment, are available and in use	○ Training program only available at national level and is limited ○ Not clearly articulating the tiered training levels in the SOPs.

Thematic Areas	Strengths	Challenges
9. Emergency lab Plan for threats and emerging threats	○ National resources for emergency response have been identified and hazards and health facilities have been mapped. ○ The public health emergency operations center (EOC) manual of operations is recognized as best practice among the international emergency management community. ○ Systems for monitoring and ○ distributing logistics are established	○ Risk assessment using the WHO Strategic tool for assessing risk should be strengthened and involve more stakeholders. ○ No generic emergency plan applicable for public health emergency diseases. The specific plan for laboratory emergency response is currently being developed in the crafting of the Philippine CDC Bill.
10. Integrated/ Optimized Network including Sample Transport and POCT	○ Sample transport is available. ○ Guidelines for specimen referral are included in the surveillance system manuals, and the Outbreak Manual of the RITM. Program specific referral guidelines exist for tuberculosis, transfusion- transmitted infections, sexually transmitted infections and antimicrobial resistance. ○ Tier-specific diagnostic testing strategies are well-documented in both human and animal health sectors with functional laboratory	○ Fragmented sample transport with challenges due to wide geographical distribution, decentralized governance and varied economic development at a subnational level. ○ Weak system for local government units

11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ High level of commitment by the government to combat AMR ○ AMR Surveillance program established with several sentinel sites in government hospitals ○ Well established Philippines Integrated Disease Surveillance and Response (PIDSR) system which monitors 19 notifiable diseases	○ AMR surveillance implementation and compliance are an issue, particularly at the sub- national level ○ Limited AMR awareness and response at the subnational level

Capacity building priorities and opportunities based on country consultation

Thematic Area	Training	Technical Assistance	Knowledge sharing
Governance, Policies Coordination		2	
Quality Management System	1	1	1
Supply Chain Management	2		2
Data Management & Tools	3	4	3
Lab Workforce Management	4	3	4
Integrated/Optimized Network/ST		5	
One Health/Surveillance/AMR/WGS	5		5

Note: numbers indicate needs ranking (1 as the highest)

Top strengths from the Philippines in terms of capacity-building include biosafety/biosecurity and waste management, lab regulations and licensing, equipment service and maintenance, national leadership/ governance of diagnostic systems/services including NLSP, and laboratory emergency planning. The Philippines expresses the need for QMS capacity building and increasing capacity for quality standards compliance.

Main risks/threats: Department of Health staff retention at local level and government levels. Prioritization resource allocation particularly for local government units

Singapore

Laboratory Landscape

	Singapore has a comprehensive lab system characterized by universal access and strong capacity for diagnostics, public health surveillance and environmental services. The Lab network comprises of the NPHL and 7 public hospital laboratories. The national reference laboratories for tuberculosis, poliovirus and HIV are in public hospital laboratories, while the NPHL hosts the national reference laboratory for influenza, malaria, measles and rubella.

eSPAR and JEE country scores

Singapore is the country with the highest overall eSPAR and JEE scores of over 80. The highest rating categories include biosafety/biosecurity practices, emergency response planning and lab testing for priority diseases. Although scores are high, there is still a need to further strengthen the laboratory workforce to be ready for emergency situations, and a need to upgrade tools for electronic reporting.

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1.Governance, Policies Coordination including NLSP	○ Robust legal and policy framework ○ Strong leadership and highly developed capacity level ○ Strong and comprehensive laboratory system characterized by universal access ○ Standard SOPs available for coordination with relevant sectors	○ Sustaining a high level of expertise in the Public Health Intelligence Branch is a challenge due to limited manpower and the time needed to build strong expertise
2. Regulations/ Licensing/ Accreditation	○ Accreditation and licensing body available. ○ Voluntary accreditation by the Singapore Accreditation Council and College of American Pathologists, adopted by many laboratories ○ Licensing is mandatory for all	○ May need the further enrichment on the knowledge of accreditation

Thematic Areas	Strengths	Challenges
3. Quality Management	○ Quality of laboratory testing is ensured through mandatory licensing programmes ○ QA system accredited to ISO17025 and participates annually in EQA ○ EQA programs are required for laboratories. ○ Domestic EQA available for HIV, TB & Malaria. EQA schemes for other tests are from commercial.	○ Shortage of suitable technical assessors for conducting audits based on the requirements of international standards.
4. Supply Chain Management	○ Robust procurement process managed by individual institutions who liaise with commercial vendors directly ○ Integrated procurement process, inventory monitoring and stockpiling arrangement during the pandemic by MOH	○ Not indicated
5. Equipment S&M	○ All laboratories have the required equipment, core laboratory tests and S&M contracts. ○ Preventive maintenance is conducted regularly based on manufacturers' and/or institutional recommendations	○ Not indicated
6. Data Management &Tools	○ Well established LIMS in all laboratories	○ Upgrade system within and between MOH and Healthcare institutions

Thematic Areas	Strengths	Challenges
7. Lab Workforce Management	○ Public health agencies have comprehensive workforce strategies that provide continuous education and promote retention of qualified national public health workforce ○ High retention rate of staff in the MOH, especially for Public Health personnel ○ Strong culture of encouraging professional growth and development in technical fields by providing opportunities for staff development ○ FETP training programs and other training programs available	○ Not indicated
8. Biosafety and Biosecurity	○ Strong coordination and constant communication between agencies and ministries enable a whole-of-government approach for national biosafety and biosecurity issues ○ Biosafety training programs are best practice ○ Strong culture of bio-risk awareness and practice ○ Training programmes in biosafety and biosecurity are heavily subsidized by the government in both the public and private sectors	○ Annual BSL-3 facility recertification process is costly and lengthy (shutdown time while preparing for recertification). ○ Lack of opportunity for regular, on-the-job experience and practice for personnel without access to high containment labs.
9. Emergency lab Plan for threats and emerging threats	○ Robust emergency plan and preparedness response for different hazards and outbreaks including chemical, radiological, disease outbreak and deliberate acts.	○ Not indicated

Thematic Areas	Strengths	Challenges
10. Integrated/ Optimized Network including Sample Transport and POCT	○ Sample transport system in place for surveillance and outbreaks via contract private courier companies ○ State-of-the- art technologies and techniques, including modern point-of- care diagnostics, are available and integrated universally to provide affordable laboratory testing with a timely reporting of results ○ Guidelines and oversight by MOH available for point-of-care tests	○ Lack of proficiency testing programs for many diseases and lack of reference materials
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ Robust AMR Surveillance in the human sector ○ Well established national system capacity for laboratory testing, detection and reporting of AMR pathogens ○ All seven public hospital laboratories can detect all WHO and national priority pathogens ○ One Health framework exists between the Ministry of Health (MOH), National Environmental Agency (NEA), and Agri- Food & Veterinary Authority (AVA) and all have dedicated teams focused on public health.	○ No country specific One Health surveillance ○ One health not well established in AMR Resources (funding, manpower) to expand surveillance to all priority AMR organisms in the animal health sector

Capacity building priorities and opportunities

Thematic Area	Training	Technical Assistance	Knowledge sharing
Data Management & Tools		1	
Lab Workforce Management			1
One Health/Surveillance/AMR/WGS		2	

Note: numbers indicate needs ranking (1 as the highest)

Singapore can contribute to capacity-building for the RPHLN countries, especially in terms of lab emergency response to threats/emerging threats, biosafety/biosecurity and Waste management,
lab regulations, accreditation and QMS, SCM and Lab workforce management. Although it has a very robust lab system overall, Singapore can benefit from RPHLN's technical assistance on developing a country specific One Health surveillance system.

Thailand

Laboratory Landscape

Thailand has decentralized testing capacity, and a mix of private and public sector laboratories. There is a four-tiered laboratory landscape in Thailand, with 12,496 health centers, 2,271 laboratories, 15 Regional Medical Sciences Centers (RMSCs), and one national reference laboratory (Department of Medical Sciences). In Thailand, there are strong referral networks with laboratories integrated into referral hospitals as well as standalone entities that provide services.

The Thailand Institute of Scientific and Technological Research (TISTR) is an agency in charge of laboratory certification by ISO 9001 standards. 774 Thai laboratories have ISO 15189 accreditation, and 257 laboratories have the ISO 15190 accreditation. 573 laboratories are accredited for COVID-19 testing.

eSPAR and JEE country scores

Thailand's scores highest in eSPAR and JEE categories (scores between 80-100) for effective national disease network, surveillance, lab testing for priority diseases and emergency responses. Areas for improvement include the lab quality system, human resources for IHR, and workforce strategy and training.

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1.Governance, Policies Coordination including NLSP	○ Multi-sectoral coordination mechanism in place ○ IHR coordination mechanism is available and embedded in legislation (A cabinet resolution from 2007), giving the Ministry of Public Health (MOPH) the mandate to coordinate IHR implementation across sectors	○ NLSP is still in the development stage ○ Communication and coordination among relevant departments working towards a common goal is limited ○ Insufficient dedicated financing and sourcing of funds ○ No NEDL available, still in the planning process ○ TWG is only disease specific
2. Regulations/ Licensing/ Accreditation	○ Lab accreditation scheme in place with 774 laboratories ISO 15189 accredited and 257 ISO 15190 accredited ○ MoPH Standard and Laboratory Accreditation are quality standards customized for the Thai Health System	○ No established policy/unified framework for licensing, including conformity to national standards to promote M&E and continuous quality improvement
3. Quality Management	○ QMS implemented nationwide ○ Robust national EQA scheme available and able to produce PT panels locally	○ Not indicated
4. Supply Chain Management	○ Effective emergency SCM system and practices ○ Centralized emergency procurement, resource and infrastructure available for logistical tasks, with many years of experience ○ Guidelines on medical supply and resource management in public health emergencies are available as well as for distribution inventory	○ In normal situations, there is a fragmented SCM that is usually managed by each hospital institution ○ Further enhancement needed on regional stockpiling system, training of surge capacity for logistical functions and transportation

Thematic Areas	Strengths	Challenges
5. Equipment S&M	○ Established at the institutional level ○ Equipment service and maintenance in place in all accredited laboratories	○ No mandatory law for standard compliance
6. Data Management &Tools	○ LIMS in place and functional for laboratories and Surveillance (e.g. Co- LAB MOPH for COVID-19)	○ Fragmented data and databases within and across sectors ○ Limited capacity and trained HR, especially on data management and analyses ○ No generic platform for interoperable data between human health and animal health ○ Big data analytics and forecasting is a challenge
7. Lab Workforce Management	○ Well established In-service trainings programs & facilities ○ National action plan available to increase quality health professionals in disease prevention and control ○ Serves as a lead country for Global Health Security Agenda (GHSA) Field Epidemiology Training Network ○ Well established FETP	○ High workload, high staff turnover rate ○ Unclear Professional accreditation for intermediate and lower-level training program ○ Limited skilled staff for professional accreditation

Thematic Areas	Strengths	Challenges
8. Biosafety and Biosecurity	○ Biosafety and Biosecurity guidelines for BSL3 available ○ A national IPC action plan in place that is up to date. ○ IPC program managers of the office of disease prevention and control in all heath regions are available ○ Biosafety and biosecurity Guidelines in place ○ BSC certification program available ○ Certification training program for biosafety and biosecurity available	○ Limited collaboration with multi-units' team ○ Harmonization of national biosafety and biosecurity curriculum is needed
9. Emergency lab Plan for threats and emerging threats	○ Guidelines on risk assessment of public health hazards, disaster and disease, as well as health hazard risk assessment, are available ○ All-hazards plan and disaster approach in the National and regional level are available ○ Public health risk assessment is conducted by every affiliated sector every year	○ Onsite rapid risk assessment capacity with involved stakeholders needs strengthening ○ Knowledge transfer and revised SOP need strengthening ○ Risk assessment in all levels and with all stakeholders is limited

Thematic Areas	Strengths	Challenges
10. Integrated/ Optimized Network including Sample Transport and POCT	○ Sample referral system is clearly defined in service plan ○ Country has the capacity to refer specimens from all district levels to reference laboratories and national laboratories ○ National laboratories have the capacity to refer the specimen to international laboratory networks ○ Effective multiple diagnostic networks in emergency response, e.g., COVID-19, AMR, TB, measles rubella, influenza, JE ○ Availability of point-of-care diagnostics at clinical sites across the country. PoCT is used where appropriate and has the capacity to produce PoCT such as leptospirosis and malaria rapid tests	○ Training programs limited at lower lab levels ○ Regularly increasing health workforce and training programs for all healthcare workers is a challenge ○ Decentralize testing capacity of priority and notifiable diseases at the lowest levels of the health care system require strengthening

Thematic Areas	Strengths	Challenges
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ Multisectoral government commitment and organizational leadership at the national, regional and provincial levels ○ National guidelines on an integrated surveillance on AMR under the One Health approach are available ○ National strategic plan for AMR is available ○ A National AMR surveillance Center is well-established with strong multisectoral strategic coordinating group ○ Well -established Whole Genome Sequencing (WGS) and bioinformatics center with sub- national reference laboratories in 4 regions ○ Strong Surveillance programs and functions at all levels of health care system ○ Well trained dedicated staff and availability of SOPs for surveillance and evaluations at all levels, including indicators for quality assurance	○ Needs strengthening and integration of animal health and human health ○ Limited capacity and number of frontline staff for surveillance ○ Increasing front-line HCW's understanding on public health/ disease surveillance and their role in detecting and reporting cases is a challenge

Capacity building priorities and opportunities based on country consultation

Thematic Area	Training	Technical Assistance	Knowledge sharing
Regulations/Licensing/Accreditation		3	3
Data Management & Tools	5		
Biosafety/Biosecurity & Waste management	3		
Emergency plans/threats	2	2	2
Integrated/Optimized Network/ST	4	4	4
One Health/Surveillance/AMR/WGS	1	1	1

Note: numbers indicate needs ranking (1 as the highest)

Thailand's core strengths are around biosafety/biosecurity, quality management, and genomic sequencing and bioinformatics. In terms of needs for capacity building, Thailand needs to strengthen the One Health capacity at the subnational level. Thailand needs to establish a One Health training program and revise the relevant One Health M&E platform to generate essential evidence to guide strategic decisions and support effective implementation of the national strategic plan

Main risks/threats: Funding fluctuation, delayed emergency budget release due to administrative procedures, thus delaying operationalization.

Timor Leste

Laboratory Landscape

	Timor Leste is the second youngest nation in the world. The Republic's health system is split across public and private service providers. The Timor-Leste laboratory network is comprised of one national health laboratory: the Public Health Laboratory (PHL), 5 regional labs at referral hospitals, one national hospital, one national public health laboratory and 67 laboratories at the community health center level. Timor-Leste public health is built on a strong foundation of primary healthcare based on a solid core of physicians and public health workers. The MOH currently establishes the National Institute of Public Health and National Directorate of Public Health to address public health issues.

eSPAR and JEE country scores

Areas of strength from Timor-Leste's JEE and eSPAR assessments include surveillance and workforce surge availability during public health emergency, human resources for IHR, and emergency response planning with scores between 60 to 100 on eSPAR. The JEE has a different rating of these indicators and an overall lower score for Timor-Leste with AMR, biosafety/ biosecurity, zoonotic disease and One Health, lab quality system, workforce surge needs during health events, and emergency response planning as the areas with the biggest needs for improvement (scores between 20-40). The variations on the scoring are likely due to when each assessment was conducted, JEE in 2019 and eSPAR in 2022 respectively. The country made a lot of improvements in between each assessment.

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1.Governance, Policies Coordination including NLSP	○ Strong commitment from the ministry to provide a comprehensive service package, including laboratory services ○ Procedures and guidelines are available for coordination between relevant national sectors for specific diseases ○ Some capacity exists at the National Health Laboratory (NHL) to conduct human AMR surveillance and test samples, with good international AMR collaboration already in place	○ NLSP is dated and in need of a revision ○ NEDL under development with support from WHO ○ No functional lab TWG

Thematic Areas	Strengths	Challenges
2. Regulations/ Licensing/ Accreditation	○ NHL WHO accredited for 3 core diseases	○ No ISO accredited laboratory yet ○ No licensing or certification scheme in place ○ No readily available standard SOP for all tests
3. Quality Management	○ NHL has a laboratory quality management system, including a general biosafety and biosecurity manual. ○ EQA is conducted for some tests in the NHL and some of the referral laboratories	○ Poor implementation of the QMS ○ Weak and limited EQA enrollment at subnational levels ○ No in-country capacity to locally produce PT panels
4. Supply Chain Management	○ mSupply installed and available for all products to streamline ordering and stock management	○ mSupply not yet functioning in all sites ○ fragmented procurement and lengthy processing ○ Chronic issues with supply management of consumables, leading to stockouts ○ Lack of management and coordination of laboratory needs ○ Non-functional inventory management of commodities and reagents

Thematic Areas	Strengths	Challenges
5. Equipment S&M	○ In-house equipment calibration program available ○ Service contract available for major equipment provided by companies who won the tender	○ Preventive maintenance and equipment servicing are very limited ○ Low adherence to basic preventive maintenance ○ BSC service heavily relies on overseas bioengineers, no local capacity ○ making it hard for the institution to predict yearly costs/budget
6. Data Management &Tools	○ LIMS available and functional at national and referral levels (national laboratory, national hospital laboratories and referral hospital laboratories)	○ Lack of standardized data collection SOPs and tools ○ Need to strengthen LIMS at the community health center level

Thematic Areas	Strengths	Challenges
7. Lab Workforce Management	○ The country has a multidisciplinary workforce that includes physicians, nurses, laboratory technicians and others at all levels of the healthcare system ○ Human resources development is available and conducted at the national level through in-service, cross-sectoral and overseas training, and continuing professional education. ○ Continuing professional education is available for all health workers. ○ In-service training is available in and out of country through government funds and donors	○ Limited skilled human resources and laboratory testing capacity ○ Insufficient human resources for electronic surveillance at the national level ○ Limited technical resources are available in-country ○ Frequent human resources rotations and changes at the national and local level, as well as a lack of human resources ○ Inadequately qualified biomedical engineering personnel ○ Despite an increase in the human resources for health, a shortage remains ○ The number of laboratory technicians and managers at the National Health laboratory is reasonable but these personnel are lacking in the capacity to fulfill their roles

Thematic Areas	Strengths	Challenges
8. Biosafety and Biosecurity	○ Both the human and animal laboratories are certified to Biosafety Level II ○ NHL has a laboratory quality ○ management system, including a general biosafety and biosecurity manual	○ No system for biosecurity (pathogen security), and no SOPs and procedures have been drafted for biosecurity. NHL has a limited laboratory quality management system, including a general biosafety and biosecurity manual. ○ Limited HR capacity ○ Safer waste management should be strengthened
9. Emergency lab Plan for threats and emerging threats	○ Lab emergency plans and guidelines exist for labs on disease notification, covering all diseases of public health importance available ○ Public health emergency preparedness and response simulation exercises are conducted at the municipal level	○ HR capacity and quantity are inadequate for emergency response. ○ The emergency coordination mechanism within the MoH and across ministries has not been clarified and formalized. ○ Simulation exercises that are conducted focus more on natural disaster preparedness
10. Integrated/ Optimized Network including Sample Transport and POCT	○ Integrated sample transport mechanism in place ○ System for specimen collection, packaging and transport to international reference laboratory networks is available and implemented according to standards ○ SOPs are in place for transporting specimens in accordance with international requirements	○ HR inadequate at the subnational level (regional and municipal levels) ○ Specimen collection capability and capacity of laboratory technicians should be improved. ○ NHL can perform limited advanced molecular and serological testing

Thematic Areas	Strengths	Challenges
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ High level of political commitment for AMR containment efforts. ○ AMR surveillance guidelines have been developed ○ Strong collaboration with international referral networks to dispatch samples for AMR testing and analysis. ○ National One Health strategic framework has been available and endorsed by MOH ○ Doctors, nurses and national laboratory technicians are trained for outbreak investigation ○ Genome sequencing recently established and available for COVID -19	○ Limited testing capabilities and facilities ○ AMR testing capacity not fully established ○ AMR quality and analyses are limited. A need for capacity building for laboratory technical staff, implementation of SOPs to international standards and use of a standardized reporting template ○ Human and animal health not integrated - both laboratories have a good collaboration but is operated by two different ministries

Capacity building priorities and opportunities

Thematic Area	Training	Technical Assistance	Knowledge sharing
Governance, Policies, Coordination	5	1	4
Regulations/Licensing/Accreditation	2	3	2
Quality management	1	2	1
Supply Chain Management			1
Equipment S&M		4	3
Lab workforce Management	3	5	
One Health/Surveillance/ARM/WGS	4		5

Note: numbers indicate needs ranking (1 as the highest)

Transferable skills and learnings from Timor-Leste include laboratory emergency response, integrated disease networks, biosafety/biosecurity and waste management and the QMS. Timor-Leste can use support from RPHLN to build capacity in terms of governance and policies coordination, steps towards accreditation and quality improvement, the lab workforce management, One Health/Surveillance and AMR, as well as to further strengthen genomic surveillance and bioinformatics.

Main risks/threats: Budget constraints, unstable political situations and changing leaders.

Viet Nam

Laboratory Landscape

	Viet Nam's public health laboratory system is distributed as follows: The provincial center for disease control (PCDC) and four regional laboratories located in northern, central, highland and southern Viet Nam. Besides the PHL system, there are a large number of laboratories, including hospitals, medical colleges, military hospitals and private clinics. Viet Nam has nearly 900 laboratories, 73 public health laboratories and 83 clinical laboratories. All four national/ regional labs are ISO 17025 and WHO accredited. There are 6 intermediate level laboratories and non- MoH research laboratories. Of the 83 clinical laboratories, 40 are at the central/regional levels. Two national/regional public health laboratories (i.e. (National Institute of Hygiene and Epidemiology and Pasteur Institute Ho Chi Minh City) are capable of performing diagnostic testing for the six core diseases required by IHR (2005) and the four priority diseases

eSPAR and JEE country scores

Viet Nam scores well in the priority disease testing, surveillance and effective diagnostics network (scores over 80 on eSPAR). Biosafety/biosecurity and IPC, zoonotic disease and laboratory quality system, workforce strategy are areas with lower scores with a need for improvement (scores between 20-60 under JEE and 40-60 under eSPAR). Disparity of scores between JEE and eSPAR is likely due to the dates when the two assessments were conducted, JEE in 2017 while eSPAR in 2022. Improvements were observed between the period, thus leading to higher eSPAR scores.

RPHLN Thematic Areas

Thematic Areas	Strengths	Challenges
1. Governance, Policies Coordination including NLSP	○ Policy in place to support coordination and communication between MOH and other agencies during public health emergencies ○ NLSP available to support strategic implementation of laboratory services ○ The country has an executive board to strengthen the infectious disease testing network of the MOH	○ No lab specific TWG ○ Coordination needs to be strengthened ○ National EDL still in the planning phase for development
2. Regulations/ Licensing/ Accreditation	○ ISO 15189 accredited for 4 regional laboratories: NIHE, Pasteur Institute Ho Chi Minh, Pasteur Institute Nhatang and Taynguyen Institute of Hygiene and Epidemiology. ○ Two BSL-3 laboratories are capable of performing diagnostic testing for the six core diseases in IHR (2006) and other priority diseases (Zika, dengue, measles viruses and Neisseria meningitides). ○ Some Provincial laboratories have ISO 17025 accreditation ○ Some laboratories are also WHO accredited for selected pathogens ○ A system of licensing of health laboratories exist on a voluntary basis	○ Only few laboratories are ISO accredited and sustained ○ Lab licensing exists but are not mandatory
3. Quality Management	○ QMS is well-established ○ National EQA programmes exist for some pathogens (such as influenza, dengue and Vibrio cholerae) ○ 42 notifiable diseases have SOPs for their laboratory diagnosis.	○ No EQA at provincial or lower levels ○ Laboratory quality management can be further improved ○ Participation in and coordination of EQA programmes depends on the availability of external funding.

Thematic Areas	Strengths	Challenges
4. Supply Chain Management	○ SCM system in place for emergencies	○ No standardized SCM system in place, no forecasting and quantification exercises conducted. Only have systems in place during emergencies but was not maintained post COVID-19 ○ There is no guideline for SCM ○ Local invitro kit is not easy to get licensed
5. Equipment S&M	○ S&M via equipment supplier contracts ○ Biosafety department maintains the BSCs	○ Company/supplier provides maintenance but not on a regular basis ○ Some trainings conducted but limited at the subnational levels. Fragmented service and maintenance schemes for equipment and hospital management. ○ Fragmented, mostly due to individual hospital management
6. Data Management & Tools	○ Data system available, mix of Excel and LIMS ○ Surveillance data system is in place and operational ○ Training is ongoing, focusing on curative health care workers involved under Circular No. 54 in the reporting of notifiable diseases. ○ An electronic surveillance system linking national to sub-regional levels has been established	○ LIMS not available across the country ○ Web-based systems are not fully harmonized with the medical record systems based in the hospitals.

Thematic Areas	Strengths	Challenges
7. Lab Workforce Management	○ National health workforce development plan available ○ All have received training for biosafety, testing quality management and real time RT-PCR testing performance ○ The preventive health workforce at the central and provincial levels has a relatively good capacity to undertake their mandate as per government request to increase the number of experts and specialists (the preventive health workforce) to be trained to work with other sectors. ○ Over 500 public health staff from central, provincial and district levels have been trained in the field of epidemiology	○ Limited trained staff at all levels ○ Public health capacity of staff at the district level (especially in remote and mountainous areas) needs strengthening. The appropriate mix of skilled public health workers needs to be addressed in these area ○ The quality of all three modalities of the field epidemiology training programme need to further improve.
8. Biosafety and Biosecurity	○ Five-year plan for strengthening laboratories is available ○ Possess hubs of expertise in biosafety, identified through four regional institutions that are responsible for conducting training of laboratory workers	○ Slow development of national biosecurity legislation, regulations and guidelines, which should enable monitoring of selected dangerous pathogens and toxins ○ No waste management program
9. Emergency lab Plan for threats and emerging threats	○ Emergency response plan in place ○ Training was conducted in how to conduct risk assessment	○ Dated national stockpile ○ Constraints on budget to sustain the program

Thematic Areas	Strengths	Challenges
10. Integrated/ Optimized Network including Sample Transport and POCT	○ Guidelines for specimen collection and transportation from the field to national/ regional laboratories are available ○ SOPs are available for specimen collection, packaging and transport. ○ PHL network has significantly reduced the time for sample processing and return of laboratory confirmed diagnoses. ○ A set of national diagnostic algorithms is in place for most priority diseases in humans, such as dengue, Ebola, HIV/AIDS, influenza and MERS. ○ National laboratories can conduct diagnoses using modern technology, serology and PCR at a decentralized level.	○ Several independent disease-specific laboratories referral networks are in place (disease specific only) ○ POC diagnostic testing capacity is still weak at provincial and district level laboratories ○ The availability of high-quality laboratory reagents is a challenge.
11. One Health, Surveillance, AMR, Genomics and Bioinformatics	○ One Health & AMR surveillance system in place ○ High level of commitment in Viet Nam to combat antimicrobial resistance across four key government ministries ○ National network for surveillance of antimicrobial resistance exists through 16 designated hospitals ○ National action plan for improving infection prevention and control has been developed and implementation is underway	○ The surveillance system and the need to strengthen internal and external quality assurance mechanisms and timely evaluating access to testing across Viet Nam. ○ Needs to strengthen the mechanism for information sharing between the human health and animal health sectors and between laboratories ○ Limited WGS and bioinformatics capacity

Capacity building priorities and opportunities

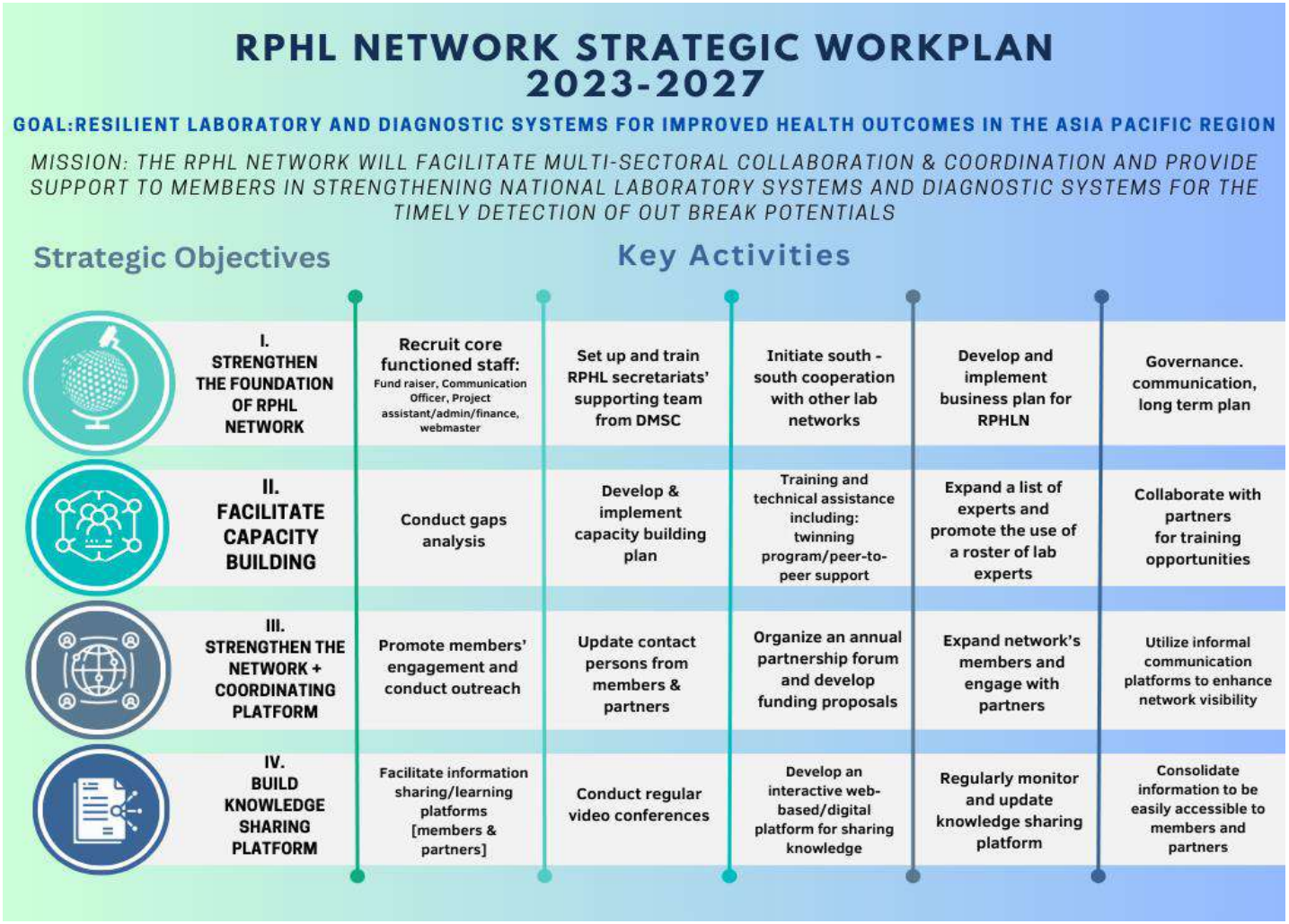
Thematic Area	Training	Technical Assistance	Knowledge sharing
Governance, Policies, Coordination			1
Regulations/Licensing/Accreditation	3		
Quality management	1	1	
Supply Chain Management	4	5	2
Equipment S&M	5	4	
Lab workforce Management		2	5
Emergency plan/threats	2	3	5
Integrated/Optimized Network/ST			3
One Health/Surveillance/ARM/WGS			4

Note: numbers indicate needs ranking (1 as the highest)

Strengths from Viet Nam include biosafety/biosecurity, One Health surveillance and bioinformatics and AMR. Viet Nam has capacity building needs especially in the areas of quality management, and governance, policies and coordination.

Main risks/threats: Dependency on external funding or technical support, which affects program sustainability.

6.2 Strategic plan of RPHL Network



6.3 Technical core group and secretariat

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Rajeev P. Nagassar	Lab Expert,	RPHL Network
Maria Rosezoil Rioja	Senior Technical Advisor	CHAI
Jessica Markby	Regional Program Manager	FIND
Kanate Temtrirath	RPHL Network Contact Person [Thailand]	RPHL Network Secretariat
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Dhamari Naidoo	Public Health Laboratory Scientist	WHO SEARO
Khanchit Limpakarnjanarat	Advisor of RPHL Network	RPHL Network
Sudarat Damrongwattanapokin	Advisor of RPHL Network	RPHL Network

6.4 List of virtual consultation and the list of participants

Date of Consultation	Country	Consultation Team	Key Respondents
April 19, 2023	Thailand	Jintana Sriwongsa Maria Rosezoil Rioja Jessica Markby Beth Skaggs Dhamari Naidoo	Dr. Athiwat Primisirikunawut and Team
April 27,2023	Brunie Darussalam	Jintana Sriwongsa	Hjh. Surita Hj Mohd Taib and Team
April 25, 2023	Cambodia (Face-to-face meeting)	Maria Rosezoil Rioja	Dr. Chau Darapheak
April 28, 2023	Lao PDR	Jintana Sriwongsa, Maria Rosezoil Rioja Athiwat Primisirikunawut	Nilandone, Dr. Boulay Norchaleun, Peck
April 21, 2023	Myanmar	Jintana Sriwongsa, Rajeev P. Nagassar Athiwat Primisirikunawut, Dhamari Naidoo Jessica Markby Maria Rosezoil Rioja	Dr. Moe Myat Aye, Dr. Swe Setk, Dr. Eh Htoo Pe, Dr. Htay HTay Tin
April 27, 2023	Nepal	Maria Rosezoil Rioja Athiwat Primisirikunawut	Dr. Jyoti Acharya, Dr. Runa Jha

April 28, 2023	Philippines	Jintana Sriwongsa Rajeev P. Nagassar Athiwat Primisirikunawut Dhamari Naidoo Beth Skaggs Jessica Markby Maria Rosezoil Rioja	Dr. Carole Zaide, Mam. Nenita Marayag Mr. Leodymar Jorduela
May 12, 2023	Indonesia	Jintana Sriwongsa, Maria Rosezoi Rioja Athiwat Primisirikunawut Sudarat Damrongwatanapokin Khanchit Limpakarnjanarat Jessica Markby	Dr. Vivi, Juzi Anindita, Dr. Mayang Sari and CDC colleagues
May 3, 2023	Malaysia	Jintana Sriwongsa, Maria Rosezoil Rioja Rajeev P. Nagassar Jessica Markby Khanchit Limpakarnjanarat	Dr. Jasmin Nik Mahir Dr. Maria Suleiman and the rest of Malaysia team
May 5, 2023	Singapore	Jintana Sriwongsa Athiwat Primisirikunawut Jessica Markby, Maria Rosezoil Rioja	Dr. Raymond Lin, Ms. Ciu Lin
April 24, 2023	Timor-Leste	Jintana Sriwongsa Rajeev P. Nagassar Athiwat Primisirikunawut, Dhamari Naidoo Beth Skaggs Jessica Markby Maria Rosezoil Rioja	Dr. Endang da Silva
April 26, 2023	Viet Nam	Jintana Sriwongsa Maria Rosezoil Rioja Athiwat Primisirikunawut	Dr. Mai Quynh Le Dr. Nguyen Le Khanh Hang

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6.6 Questionnaires used for consultations

A. Generic Questionnaire

COUNTRIES' CONSULTATION

In supplement to the preliminary results of the "Situational assessment for capacity building of the RPHL Network"

To inform more targeted and tailored interventions in the region, RPHLN is conducting a **situational assessment** across its member to identify the main public health needs in laboratory systems, with focus on country capacity strengths and opportunities for interventions.
The findings from this exercise are expected to help identify priority areas that require capacity building interventions from RPHLN including in training, technical assistance (TA), twining program, and knowledge sharing. The outcomes of this situational analysis will not only shape the key focal areas within RPHL's strategic workplan, but will also inform longer term funding proposals that aim to directly benefit member countries through the above areas of support. [Refer to the concept note attached]

Resulting from desk review, preliminary result and **individual SWOT analysis** are also attached. To deeper dive, countries' consultation will be conducted by the technical team during the period of 17-30 of April 2023 & 1-5 May 2023 using the two sets of questionnaires:

- Generic questionnaire encompasses of 3 parts including: Training Needs, Capacity Building Needs, and Best Practices /Knowledge Sharing Needs and Strengths
- Specific questionnaire for individual countries

Thank you very much for your kind attention.

Secretariat Team

1. Training Needs

In consultation with your respective national team/experts, please complete the questionnaire below based on your national laboratory/diagnostics program key knowledge gaps that would be best support through **training** activities. Based on the Situational Assessment, we have listed 11 key thematic areas for laboratory programs in the table below, place a tick in the boxes next to the areas that are key knowledge gaps in your national program that could be addressed by training. You can tick as many boxes as is relevant.

Also, in the next column "Top 5 topics", please rank your top 5 training needs by placing the numbers 1-5 next to the topics of most need. With 1 being the highest need. If there are other areas that are key training needs and knowledge gaps you can identify with your teams that are not listed in the table, please list them in the free text table below. If you need more spaces, please add additional pages.

	Training Topic	Key knowledge gaps (tick those that are a gap in your knowledge)	Top 5 topics 1
1	Leadership/ Management/Governance of Diagnostic systems/services		
2	Lab Regulations /Licensing and Accreditation		
3	Quality Management System (QMS)		
4	Supply Chain Management		
5	Equipment Service and Maintenance		
6	Data Management Systems		
7	Laboratory Workforce Management		
8	Biosafety/ Biosecurity and Waste Management		
9	Laboratory emergency contingency plan/ emergency/ threats /emerging threats		
10	Integrated and Optimized Networks (Sample Transport and Decentralization)		
11	One Health and Surveillance including Genomics and Bioinformatics and AMR		

[1] Rank by placing a number from 1 to 5 next to your top 5 topics for including in a training course

Are there any topics not listed above that you consider a high priority for your countries training needs to support the national laboratory program?

2. Capacity Building Needs

Please complete the questionnaire below based on your national laboratory/diagnostics program key **capacity building needs** that would be best support through in country technical support. We have listed 11 key thematic areas for laboratory programs in the table below, place a tick in the boxes next to the areas that are key needs for your national program. You can tick as many boxes as is relevant.

In the next column "Top 5 topics", please rank your top 5 training needs by placing the numbers 1-5 next to the topics of most need. With 1 being the highest need. If there are other areas that are key capacity building needs you can identify with your teams that are not listed in the table, please list them in the free text table below. If you need more spaces, please add additional pages.

	Capacity building areas	**Key knowledge gaps (tick those that are a gap in your knowledge)**	**Top 5 topics[2]**
1	Leadership/ Management /Governance of Diagnostic systems/services		
2	Lab Regulations /Licensing and Accreditation		
3	Quality Management System (QMS)		
4	Supply Chain Management		
5	Equipment Service and Maintenance		
6	Data Management Systems		
7	Laboratory Workforce Management		
8	Biosafety/ Biosecurity and Waste Management		
9	Laboratory emergency contingency plan/ emergency/ threats/ emerging threats		
10	Integrated and Optimized networks (Sample Transport and Decentralization)		
11	One Health and Surveillance including Genomics and bioinformatics and AMR		

[2] Rank by placing a number from 1 to 5 next to your top 5 topics for capacity building

Are there any topics not listed above that you consider a high priority for your country's capacity building to support the national laboratory program?

3. Best Practices /Knowledge Sharing Needs and Strengths

Please complete the questionnaire below based on what you would rank your biggest **needs** and your greatest **strengths** for regional laboratory program **knowledge sharing**. RPHLN plans to develop on online knowledge sharing hub for countries to share their best practices, documents, tools etc. for adaption by other RPHLN member countries.

Place numbers 1-5 in the **Needs** Column to rank your country's greatest need from other countries in the region and again a number from 1-5 in the **Strengths** Column, to rank your country's greatest strength in terms of knowledge sharing and best practices that can be shared with other countries in the region. In the comments section add details about the type of knowledge/best practices that you think could be shared with other countries; e.g. SOP on BSC maintenance, training curriculum on specimen referral procedures.

	Training Topic	Needs	Comments	Strengths	Comments
1	Leadership/Management/ Governance of Diagnostic systems/services				
2	Lab Regulations /Licensing and Accreditation				
3	Quality Management System (QMS)				
4	Supply Chain Management				
5	Equipment Service and Maintenance				
6	Data Management Systems				
7	Laboratory Workforce Management				
8	Biosafety/ Biosecurity and Waste Management				
9	Laboratory emergency contingency plan/ emergency/ threats/ emerging threats				

10	Integrated and Optimized networks (Sample Transport and Decentralization)				
11	One Health and Surveillance including Genomics and bioinformatics and AMR				

Are there any topics not listed above that you consider a high priority for your country's needs that could be supported through regional knowledge sharing?

Needs/Gaps, examples/particulars	Strengths, examples/particulars

B. Country specific follow up questions

Key Informants Interview: Brunei

Description: There are 11 thematic areas relevant to diagnostics and laboratory that RPHLN would like to assess to determine the strength and needs of the country with regard to capacity building. RPHLN did not receive documents and reports from your country. So, we are hoping that this interview would be able to provide RPHLN to understand the Brunei lab landscape and what are the opportunities to further collaborate and enhance engagement within Brunei as part of the RPHL network member countries. The following questions below will take approximately 45- 60 mins and will be focusing on the laboratory landscape and capacity building strengths, challenges and opportunities.

Instruction: Most questions below are answerable by Yes or No. Kindly tick the appropriate response and provide context/explanation in the comment box. On questions that start with "How", please provide a response by ticking the appropriate box or boxes that apply on the type of capacity building opportunities.

Note: *TA: Technical Assistance KS: Knowledge Sharing NA: No Assistance needed Other: if selected, ask to specify*

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP				**Comments**
1	Is there a national laboratory strategic plan (NLSP) available? If yes, ask to share an e-copy	□ Yes	□ No	

2	Is there a JEE report available? If yes, ask to share an e-copy	□ Yes	□ No			
3	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No			
4	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No			
5	Can you briefly explain the lab system structure in Brunei? (in terms of governance, disease programs, lab-tiered system, etc.)					
6	What are the lab systems' strengths, best practices and challenges (if any) in the country?					
2. Laboratory Regulations, Licensing and Accreditation						
1	Is there a lab certification or accreditation system in the country? If yes, please provide brief context and how many labs are enrolled/ accredited	□ Yes	□ No			
2	Are there any challenges? Provide key challenges, if any	□ Yes	□ No			
3	If there are challenges, how can RPHLN assist you? If none, and strong regulatory systems in place, how can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Does the country have a strong Lab Quality Management System in place in terms of lab quality framework, SOPs, EQA program including supervision and corrective actions?	□ Yes	□ No			
2	If yes, what are the key strengths? If not, what are the key gaps?					
3	How can RPHLN support? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	Does the country have a supply chain system in place?	□ Yes	□ No			
2	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
3	Is there a forecasting and quantification tool available and in use? If not, are there any plans to develop/get one?	□ Yes	□ No			
4	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
5	If not, is there a plan to improve the current system?	□ Yes	□ No			

6	Is there a system in distributing commodities to sites? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
7	Is there a system for inventory and stock management?	□ Yes	□ No			
8	If not, are there any plans to develop a tool and guidance on this?	□ Yes	□ No			
9	What are the key strengths? What are the key gaps?					
10	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
1	Does the country have an established system for equipment maintenance? Service contract agreement, preventive maintenance mechanisms, etc.?	□ Yes	□ No			
3	If yes, what are the key strengths? What are the key gaps?					
4	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	Does the country have a Lab Information Management system in place?	□ Yes	□ No			
2	If yes, what are the key strengths? What are the key gaps?					
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	Does the country have a Lab workforce program in terms of workforce development policy, training program, etc. ?	□ Yes	□ No			
2	Are there any training program gaps that are needed to improve laboratory personnel's' capacity and productivity?	□ Yes	□ No			
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
8. Biosafety/Biosecurity and Waste Management						
1	Does the country have a biosafety/biosecurity program in place?	□ Yes	□ No			
2	If yes, what are the key strengths/best practices? What are the key gaps?					
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA

	Does the country have a waste management program in place?	□ Yes	□ No			
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	Does the country has a lab system in place for emergency preparedness/response to threats/emerging threats)	□ Yes	□ No			
2	If yes, what are the key strengths? What are the key gaps?	□ Yes	□ No			
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	Is there a national integrated sample referral network in the country? If yes, how does it work? What tests are the country's priorities for specimen referral?	□ Yes	□ No			
2	Is point of care testing implemented in the country? If yes, what are the key diseases/tests available at the point of care?	□ Yes	□ No			
3	Which diagnostic tests are available at primary health care facilities?	□ Yes	□ No			
4	Has the country conducted a DNO or any other optimization exercises in the past 3-5 years? If so, what was the outcome of the exercise?	□ Yes	□ No			
5	If not, do you think the country could benefit from the DNO exercise? If yes, what would be the priority diseases/tests?	□ Yes	□ No			
6	What are the key strengths? What are the key gaps?					
7	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	Is One Health Approach implemented in the country?	□ Yes	□ No			
2	Is there an AMR program implemented in the country	□ Yes	□ No			
3	What are the top 3 strengths? What are the top 3 priority areas of needs in order to improve the capacity for one health approach and AMR programs in the country	1-				
		2-				
		3-				
4	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
5	What are Brunei's priority pathogens and how do you detect them?					
6	Are animal & human health public labs integrated? Explain	□ Yes	□ No			

7	Is whole genome sequencing and bioinformatics available in the country? If yes, how many labs have the capacity? Any challenges?	□ Yes	□ No			
7	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA

Key Informants Interview: Cambodia

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP						**Comments**
1	We recognized the strong leadership in the country. Also, I noticed that some policies including the National lab strategy plan (NLSP) are dated but there's a plan for revision. Are these underway?	□ Yes	□ No			
2	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No			
	The JEE report shared only focused on biosecurity and lab, do you have the full report? IF yes, ask for an e-copy	□ Yes	□ No			
3	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No			
3	How can RPHLN help?	□ TA	□ KS	□ Training	□ Other	□ NA
2. Laboratory Regulations, Licensing and Accreditation						
1	The country has no capacity for regulatory and accreditation but some labs are being supported by partners for accreditation. Is there a plan to extend this to all provincial level labs across the country?	□ Yes	□ No			
2	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Does the country have a strong lab quality management system program?	□ Yes	□ No			
2	Does the country have the capacity to develop QC, EQA/PT panels and SOPs are available?	□ Yes	□ No			
3	Do you think experts in QMS can assist in building the capacity in the country?	□ Yes	□ No			
4	How can RPHLN support?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	It was mentioned in the report that there is a strong system in place for emergency SCM. Is this the same for non-emergency or general lab commodities?	□ Yes	□ No			

2	Also mentioned, challenges on forecasting consumption and inventory management. Are these still an issue?	□ Yes	□ No			
3	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
4	Is there a forecasting and quantification tool available and in use? If not, are there any plans to develop/get one?	□ Yes	□ No			
5	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
6	If not, is there a plan to improve the current system?	□ Yes	□ No			
7	Is there a system in distributing commodities to sites? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
8	Is there a system for inventory and stock management?	□ Yes	□ No			
9	If not, are there any plans to develop a tool and guidance on this?	□ Yes	□ No			
10	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
1	Does the country have an established system for equipment maintenance? Service contract agreement, preventive maintenance mechanisms, etc. Provide more context	□ Yes	□ No			
2	In the report, preventive maintenance is a huge challenge. Is this still the case?	□ Yes	□ No			
3	Are there any issues on BSC equipment service and maintenance? If yes, what are these issues? (indicate in comment box)	□ Yes	□ No			
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	Cambodia has a CamLIS in place but there are some capacity gaps mentioned. Are these gaps still an issue? What are these key gaps?	□ Yes	□ No			
2	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	Are there any training program gaps that are needed to improve laboratory personnel's' capacity and productivity?	□ Yes	□ No			

2	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
8. Biosafety/Biosecurity and Waste Management						
1	In the report, weak capacity of lab staff on proper use of BSC and safety practices was identified as a huge gap. Is this still the case?	□ Yes	□ No			
2	If yes, do you think Cambodia can benefit from RPHLN IPC experts?	□ Yes	□ No			
3	How do you think RPHLN can help?	□ TA	□ KS	□ Training	□ Other	□ NA
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	Not much information from the report, so we would like to know if there's any laboratory emergency plan in response to disease outbreaks of public concern? If yes, specify what diseases	□ Yes	□ No			
2	Are there any guidelines for labs on disease notification covering all diseases of public health importance in Cambodia?	□ Yes	□ No			
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	In the report, it was indicated that there are no Integrated Sample Transport/Referral Guidelines and couriers/drivers are not formally trained on sample handling and IPC. How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
2	What tests are the country's priorities for specimen referral?					
3	Is point of care testing implemented in the country? If yes, what are the key diseases/tests available at the point of care?	□ Yes	□ No			
4	Which diagnostic tests are available at primary health care facilities?					
5	Has the country conducted a DNO or any other optimisation exercises in the past 3-5 years? If so, what was the outcome of the exercise?	□ Yes	□ No			
6	If not, do you think the country could benefit from the DNO exercise? If yes, what would be the priority diseases/tests?	□ Yes	□ No			
7	What are the key strengths? What are the key gaps?					
8	How can RPHLN assist ?	□ TA	□ KS	□ Training	□ Other	□ NA
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	It was mentioned in the report that surveillance systems were developed through COVID-19 response but still not integrated and need to be	□ TA	□ KS	□ Training	□ Other	□ NA

	systematic. How do you think RPHLN experts can help?					
2	Are there needs to improve the One Health approach and AMR surveillance in the country?	□ Yes	□ No			
3	Are there enough staff capacity for genome sequencing and bioinformatics?	□ Yes	□ No			
4	What are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?	1-				
		2-				
		3-				
5	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA

Key Informants Interview: Indonesia

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP				**Comments**		
1	Is there a national laboratory strategic plan (NLSP) available? If yes, ask to share an e-copy	□ Yes	□ No			
2	Is there a JEE report available? If yes, ask to share an e-copy	□ Yes	□ No			
3	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No			
4	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No			
5	Can you briefly explain the lab system structure in Indonesia? (in terms of governance, disease programs, lab-tiered system, etc.)					
6	What are the lab systems' strengths, best practices and challenges (if any) in the country?					
2. Laboratory Regulations, Licensing and Accreditation						
1	Is there a lab certification or accreditation system in the country? If yes, please provide brief context and how many labs are enrolled/ accredited	□ Yes	□ No			
2	Are there any challenges? Provide key challenges, if any	□ Yes	□ No			
3	If there are challenges, how can RPHLN assist you? If none, and strong regulatory systems in place, how can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Does the country have a strong Lab QMS in place? Provide context	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN support? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	Does the country have a supply chain system in place?	□ Yes	□ No			

2	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
3	Is there a forecasting and quantification tool available and in use? If not, are there any plans to develop/get one?	□ Yes	□ No			
4	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
5	If not, is there a plan to improve the current system?	□ Yes	□ No			
6	Is there a system in distributing commodities to sites? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
7	Is there a system for inventory and stock management?	□ Yes	□ No			
8	If not, are there any plans to develop a tool and guidance on this?	□ Yes	□ No			
9	What are the key strengths? What are the key gaps?					
10	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
1	Does the country have an established system for equipment maintenance? Service contract agreement, preventive maintenance mechanisms, etc. Provide more context	□ Yes	□ No			
3	What are the key strengths? What are the key gaps?					
4	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	Does the country have a Lab Information Management system in place? Provide context	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	Does the country have a Lab workforce program in terms of workforce development policy, training program, etc. ?	□ Yes	□ No			
2	Are there any training program gaps that are needed to improve laboratory personnel's capacity and productivity?	□ Yes	□ No			
8. Biosafety/Biosecurity and Waste Management						
1	Does the country have a biosafety/biosecurity program in place?	□ Yes	□ No			
2	What are the key strengths/best practices? What are the key gaps?					
	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4	Does the country have a waste management program in place?	□ Yes	□ No			
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	Does the country has a lab system in place for emergency preparedness/response to threats/emerging threats)	□ Yes	□ No			

2	What are the key strengths? What are the key gaps?					
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	Is there a national integrated sample referral network in the country? If yes, how does it work? What tests are the country's priorities for specimen referral?	□ Yes	□ No			
2	Is point of care testing implemented in the country? If yes, what are the key diseases/tests available at the point of care?	□ Yes	□ No			
3	Which diagnostic tests are available at primary health care facilities?	□ Yes	□ No			
4	Has the country conducted a DNO or any other optimization exercises in the past 3-5 years? If so, what was the outcome of the exercise?	□ Yes	□ No			
5	If not, do you think the country could benefit from the DNO exercise? If yes, what would be the priority diseases/tests?	□ Yes	□ No			
6	What are the key strengths? What are the key gaps?					
7	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	Is One Health Approach implemented in the country?	□ Yes	□ No			
2	Is there an AMR program implemented in the country?	□ Yes	□ No			
3	If yes, what are the top 3 strengths? If not, what are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?	1- 2- 3-				
4	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
5	What are Indonesia's priority pathogens and how do you detect them?					
6	Are animal & human health public labs integrated? Provide context	□ Yes	□ No			
7	Is whole genome sequencing and bioinformatics available in the country? If yes, how many labs have the capacity? Any skillset or capacity gaps? Please indicate in the comment box	□ Yes	□ No			
8	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA

Key Informants Interview: Laos

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP				**Comments**
1	We have noted that Laos has a strong leadership in the country but also noted the gap on capabilities at sub-national levels. Have these gaps been addressed recently? If No, what are these gaps?	□ Yes	□ No	

2	Is there a national laboratory strategic plan (NLSP) available?	□ Yes	□ No			
3	If yes, is the NLSP updated? Ask to share an e-copy	□ Yes	□ No			
4	If No, how can RPHLN assist ?	□ TA	□ KS	□ Training	□ Other	□ NA
5	The JEE report shared did not include scores, is there a report that included the scores? If yes, ask to share an e-copy	□ Yes	□ No			
6	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No			
7	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No			
2. Laboratory Regulations, Licensing and Accreditation						
1	It was mentioned in the report that Laos does not have a certification or accreditation system. Is there a plan to have these in place?	□ Yes	□ No			
2	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	In the report, it was indicated that there is inadequate knowledge and skills on QMS. Do you think experts in QMS can assist in building the capacity in the country?	□ Yes	□ No			
2	How can RPHLN QMS experts assist?	□ TA	□ KS	□ Training	□ Other	□ NA
3	Does the country have the capacity to develop QC, EQA/PT panels and SOPs are available?	□ Yes	□ No			
4	How can RPHLN support?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	In the report, it was mentioned that inventory management is in need of improvement. How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
2	mSupply is being used in the country. Are there any challenges in using this platform in terms of personnel's capacity. Please provide the key challenges	□ Yes	□ No			
3	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
4	Is there a forecasting and quantification tool available and in use? If yes, what type of tool ? If not, are there any plans to develop/get one?	□ Yes	□ No			
5	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
6	If not, is there a plan to improve the current system?	□ Yes	□ No			

7	Is there a system in distributing commodities to sites? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
8	How can RPHLN assist on SCM gaps?	□ TA	□ KS	□ Training	□ Other	□ NA
9	How can the RPHLN help with donor agencies and/or external support to fill the shortfall in reagents and tests? Vietnam develops their own tests for certain diseases. Can this help your country and the network?					
5. Equipment Maintenance						
1	In the report, it was mentioned that Laos lacks an equipment management system and standard list of lab equipment. Are these still an issue? Indicate in comment box	□ Yes	□ No			
2	Are service contract agreements available in key equipment in the labs? If yes, which equipment ?	□ Yes	□ No			
3	IF no, how can RPHLN help?	□ TA	□ KS	□ Training	□ Other	□ NA
4	Are there any issues on BSC equipment service and maintenance? If yes, what are these issues? Indicate in comment box	□ Yes	□ No			
5	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	In the report, it was mentioned that there are no web-based reporting systems or LIMS in the country, but there are plans to implement. Is the execution of the plan underway? Explain	□ Yes	□ No			
2	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	Are there any training program gaps that are needed to improve laboratory personnel's capacity and productivity?	□ Yes	□ No			
2	How can RPHLN assist	□ TA	□ KS	□ Training	□ Other	□ NA
3	How can RPHLN help to engage development partners to assist Laos in filling the gap in staff development strategy? Explain					
8. Biosafety/Biosecurity and Waste Management						
1	In the report, there are several issues mentioned such as no biosafety legislation, no dangerous pathogen control measures, no national biosafety manual, limited capacity, etc. Are these still an issue?	□ Yes	□ No			
2	How do you think RPHLN can help?	□ TA	□ KS	□ Training	□ Other	□ NA
3	Is there a waste management system/program in place?	□ Yes	□ No			
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						

1	We noticed in the report that there is not a generic Emergency Preparedness and Response Plan available which would address all public health risks identified in Laos. Is this still the case?	□ Yes	□ No			
2	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
3	Are animal & human health public labs integrated? If yes, kindly provide some context on strengths and gaps, if any.	□ Yes	□ No			
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	Based on the report, Laos is one of the countries that implement integrated testing. What are the country's priority diseases for an integrated network optimization?					
2	Is there a national integrated sample referral network in the country? If yes, how does it work? What tests are the country's priorities for specimen referral?					
3	Is point of care testing implemented in the country? If yes, what are the key diseases/tests available at the point of care?					
4	Which diagnostic tests are available at primary health care facilities?					
5	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	We noticed that Laos already uses One Health Concept in the lab surveillance system. Are there needs to improve the One Health approach and AMR surveillance in the country?	□ Yes	□ No			
2	What are Laos' priority pathogens and how do you detect them?					
3	What are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?					
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA

Key Informants Interview: Malaysia

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP				
Comments				
1	Is there a NLSP available? Ask for e-copy	□ Yes	□ No	

2	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No			
3	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No			
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
2. Laboratory Regulations, Licensing and Accreditation						
1	There are no licensing requirements in Malaysia but is there a plan to introduce mandatory licensing? Is the plan underway to make it mandatory? Does this include both public and private sectors?	□ Yes	□ No			
2	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Malaysia has QMS in place and implemented nationwide. Would Malaysia be interested to support other countries in the region?	□ Yes	□ No			
2	Does the country have the capacity to develop QC, EQA/PT panels and SOPs are available?	□ Yes	□ No			
3	How can Malaysia support other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	There's no information provided on SCM. Does Malaysia have a SCM in place?	□ Yes	□ No			
2	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
3	Is there a forecasting and quantification tool available and in use? If not, are there any plans to develop/get one?	□ Yes	□ No			
4	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
5	If not, is there a plan to improve the current system?	□ Yes	□ No			
6	Is there a system in distributing commodities to sites? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
7	Is there a system for inventory and stock management?	□ Yes	□ No			
8	If not, are there any plans to develop a tool and guidance on this?	□ Yes	□ No			
9	What are the key gaps, if any.					

10	How can RPHLN assist? How can other countries leverage Malaysia's capabilities ?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
1	Looks like Malaysia has a well-established policy to ensure equipment are in service contracts and preventive maintenance adhered. How can other RPHLN countries learn from Malaysia's capabilities and best practices? Provide context	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	Does Malaysia have an integrated national data management system?	□ Yes	□ No			
	What are the strengths? What are the gaps?					
2	How can RPHLN support? How can Malaysia assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	We noticed that you have a strong capacity including training with collaboration of Universities and the government. Are you open to the idea of supporting other RPHLN countries?	□ Yes	□ No			
2	Public-private partnership was mentioned in the report. How is the private sector Involved? Based on experience, how do you think they can assist member states?					
3	How can Malaysia assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4	What are the gaps you think needed in the country that can be assisted by other experts from countries ?					
8. Biosafety/Biosecurity and Waste Management						
1	There is strong commitment in Malaysia to biosafety/biosecurity measures. Any gaps identified?					
2	How do you think RPHLN can help?	□ TA	□ KS	□ Training	□ Other	□ NA
3	How can Malaysia assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4	Is there a waste management system in place? Provide context	□ Yes	□ No			
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	In the report , it was mentioned that there is limited POC testing and there's opportunity for expansion. Has the country conducted a DNO or any other optimization exercises in the past 3-5 years? If so, what was the outcome of the exercise?	□ Yes		□ No		

2	If not, do you think the country could benefit from the DNO exercise to support POC testing? If yes, what would be the priority diseases/tests?	□ Yes	□ No	
3	How can RPHLN assist?			
11. One Health and Surveillance including Genomics/bioinformatics and AMR				
	Is One Health Approach implemented in the country	□ Yes	□ No	
	Are there needs to improve the One Health approach and AMR surveillance in the country?	□ Yes	□ No	
	What are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?	**1-**		
		2-		
		3-		
	What surveillance measures Malaysia do to protect tourism? How can Malaysia support other countries to strengthen surveillance to protect tourism?			

Key Informants Interview: Myanmar

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP Comments				
1	Is there a national laboratory strategic plan (NLSP) available? If yes, ask to share an e-copy	□ Yes	□ No	
2	Is there a JEE report available? If yes, ask to share an e-copy	□ Yes	□ No	
3	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No	
4	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No	
5	Can you briefly explain the lab system structure in Myanmar? (in terms of governance, disease programs, lab-tiered system, etc.)			
6	What are the lab systems' strengths, best practices and challenges (if any) in the country?			
2. Laboratory Regulations, Licensing and Accreditation				
1	Is there a lab certification or accreditation system in the country? If yes, please provide brief context and how many labs are enrolled/ accredited	□ Yes	□ No	
2	Are there any challenges? Provide 3 top challenges, if any	□ Yes	□ No	

3	If there are challenges, how can RPHLN assist you?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Does the country have a strong Lab Quality Management System in place in terms of lab quality framework, SOPs, EQA program including supervision and corrective actions?	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN support?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	Does the country have a strong supply chain system in place? Explain	□ Yes	□ No			
2	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
3	Is there a forecasting and quantification tool available and in use? If not, are there any plans to develop/get one?	□ Yes	□ No			
4	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
5	If not, is there a plan to improve the current system?	□ Yes	□ No			
6	Is there a system in distributing commodities to sites? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
7	Is there a system for inventory and stock management?	□ Yes	□ No			
8	If not, are there any plans to develop a tool and guidance on this?	□ Yes	□ No			
9	What are the key strengths? What are the top 3 key gaps?					
10	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
1	Does the country have an established system for equipment maintenance? Service contract agreement, preventive maintenance mechanisms, etc. Provide more context	□ Yes	□ No			
3	What are the key strengths? What are the top 3 key gaps?					
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						

1	Does the country have a Lab Information Management system in place? Explain	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	Does the country have a Lab workforce program in terms of workforce development policy, training program, etc. ?	□ Yes	□ No			
2	Are there any training program gaps that are needed to improve laboratory personnel's' capacity and productivity?	□ Yes	□ No			
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
8. Biosafety/Biosecurity and Waste Management						
1	Does the country have a strong biosafety/biosecurity program in place? Explain	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
4	Does the country have a waste management program in place? Provide context	□ Yes	□ No			
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	Does the country has a lab system in place for emergency preparedness/response to threats/emerging threats)	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?	□ Yes	□ No			
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	Is there a national integrated sample referral network in the country? If yes, how does it work?	□ Yes	□ No			
2	Is point of care testing implemented in the country? If yes, what are the key diseases/tests available at the point of care?	□ Yes	□ No			
3	Which diagnostic tests are available at primary health care facilities?	□ Yes	□ No			
4	Has the country conducted a DNO or any other optimization exercises in the past 3-5 years? If so, what was the outcome of the exercise?	□ Yes	□ No			
5	If not, do you think the country could benefit from the DNO exercise? If yes, what would be the priority diseases/tests?	□ Yes	□ No			
6	What are the key strengths? What are the key gaps?					

7	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	Is One Health Approach implemented in the country?	□ Yes	□ No			
2	Is there an AMR program implemented in the country	□ Yes	□ No			
3	What are the top 3 strengths? What are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?	1-				
		2-				
		3-				
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
5	What are Myanmar's priority pathogens and how do you detect them?					
6	Are animal & human health public labs integrated? Provide context	□ Yes	□ No			
7	Is whole genome sequencing and bioinformatics available in the country? If yes, how many labs have the capacity? Any skillset or capacity gaps? Please indicate in the comment box	□ Yes	□ No			
8	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA

Key Informants Interview: Nepal

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP Comments				
1	Is there a national laboratory strategic plan (NLSP) available? If yes, ask to share an e-copy	□ Yes	□ No	
2	Is there a JEE report available? If yes, ask to share an e-copy	□ Yes	□ No	
3	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No	
4	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No	
5	Can you briefly explain the lab system structure in Nepal? (in terms of governance, disease programs, lab- tiered system, etc.)			
6	What are the lab systems' strengths, best practices and challenges (if any) in the country?			
2. Laboratory Regulations, Licensing and Accreditation				

1	Is there a lab certification or accreditation system in the country? If yes, please provide brief context and how many labs are enrolled/ accredited	□ Yes	□ No			
2	Are there any challenges? Provide key challenges, if any	□ Yes	□ No			
3	If there are challenges, how can RPHLN assist you?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Does the country have a strong Lab QMS in place? Explain	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN support?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	Does the country have a strong supply chain system in place? Explain	□ Yes	□ No			
2	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
3	Is there a forecasting and quantification tool available and in use? If not, are there any plans to develop/get one?	□ Yes	□ No			
4	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
5	If not, is there a plan to improve the current system?	□ Yes	□ No			
6	Is there a system in distributing commodities to sites? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
7	Is there a system for inventory and stock management?	□ Yes	□ No			
8	If not, are there any plans to develop a tool and guidance on this?	□ Yes	□ No			
9	What are the key strengths? What are the key gaps?					
10	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
1	Does the country have an established system for equipment maintenance? Service contract agreement, preventive maintenance mechanisms, etc. Provide more context	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					

3	For gaps identified, how can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	Does the country have a Lab Information Management system in place? Provide more context	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	Does the country have a Lab workforce program in terms of workforce development policy, training program, etc. ?	□ Yes	□ No			
2	Are there any training program gaps that are needed to improve laboratory personnel's' capacity and productivity?	□ Yes	□ No			
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
8. Biosafety/Biosecurity and Waste Management						
1	In the report, it was mentioned that there are challenges on IPC and there is no national infection control policy available. Is this still the case?	□ Yes	□ No			
2	If yes, do you think that experts from RPHLN can help with IPC?	□ Yes	□ No			
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
4	Does the country have a waste management program in place?	□ Yes	□ No			
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	In the report, it was mentioned that there is limited lab capacity to address outbreaks/emerging threats. Is this still the case?	□ Yes	□ No			
2.	Is there a lab emergency plan/preparedness response in place?	□ Yes	□ No			
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	Is there a national integrated sample referral network in the country? If yes, how does it work?	□ Yes	□ No			
2	It seems that point of care testing is implemented in the country but very limited. Mostly disease program specific. Aside from limited access, what are the key gaps identified?					

3	Has the country conducted a DNO or any other optimization exercises in the past 3-5 years? If so, what was the outcome of the exercise?	□ Yes	□ No			
4	If not, do you think conducting a DNO exercise would be beneficial to the country? If yes, what would be the priority diseases/tests?	□ Yes	□ No			
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	In the report, it was mentioned that there's growing political commitment at the highest levels to establish a system with the "One Health" approach for tackling the matter systematically. Is the establishment of the system underway? If not, what are the main issues?	□ Yes	□ No			
2	There is a national coordinating center for AMR surveillance and 22 hospitals/labs are included. What are Nepal's priority pathogens/organisms and how do you detect them?					
3	What are the top 3 strengths? What are the top 3 priority areas of needs in order to improve the capacity for one health approach and AMR programs in the country?	1- 2- 3-				
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
5	Are animal & human health public labs integrated? Explain	□ Yes	□ No			
6	Is whole genome sequencing and bioinformatics available in the country? If yes, how many labs have the capacity? Any skillset or capacity gaps? Please indicate in the comment box	□ Yes	□ No			
7	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA

Key Informants Interview: Philippines

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP Comments				
1	We recognized the strong policies and leadership in the country and the existence of a national association and the establishment of Office for Health Laboratories (OHL) that helped shape the lab systems	□ Yes	□ No	

	in the country. Are there any gaps in policies' enactment?					
2	We noticed that the National lab strategy plan shared is still in draft form. Is the final NLSP available? Ask for e-copy	□ Yes	□ No			
3	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No			
4	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No			
5	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
2. Laboratory Regulations, Licensing and Accreditation						
1	The country has an established national registration and licensing mechanisms required for all labs. How many labs has ISO 15189 accreditation?	□ Yes	□ No			
3. Quality Management Systems (QMS)						
1	Does the country have a strong QMS program?	□ Yes	□ No			
2	Does the country have the capacity to develop QC, EQA/PT panels and SOPs are available?	□ Yes	□ No			
3	Are there any QMS capacity gaps?	□ Yes	□ No			
4	How can RPHLN support?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
2	Is there a forecasting and quantification tool available and in use? If not, are there any plans to develop/get one?	□ Yes	□ No			
3	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
4	If not, is there a plan to improve the current system?					
5	Is there a system in distributing commodities to sites? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
6	Is there a system for inventory and stock management?	□ Yes	□ No			
7	If not, are there any plans to develop a tool/ guidance on this?	□ Yes	□ No			
8	What are the key gaps, if any.					

9	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
1	Does the country have an established system for equipment maintenance? Service contract agreement, preventive maintenance mechanisms	□ Yes	□ No			
2	Are there any issues on BSC equipment service and maintenance? If yes, what are these issues? (indicate in comment box)	□ Yes	□ No			
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	The Philippines has a fragmented data management system. A mix of e-system and paper-based including manual data entry. How can RPHLN assist in improving electronic reporting?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	We noticed that you have a strong capacity for training and the CPE program and that you can support member countries. Are you open to the idea of supporting other countries in the region?	□ Yes	□ No			
2	If yes, how do you think you can assist?	□ TA	□ KS	□ Training	□ Other	□ NA
8. Biosafety/Biosecurity and Waste Management						
1	There is strong commitment in the Philippines to biosafety/biosecurity measures. However, the training program is only available at national level. What's the hold back in expanding this to sub-national level?					
2	How do you think RPHLN can help?	□ TA	□ KS	□ Training	□ Other	□ NA
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	Is there any lab specific emergency plan in response to outbreaks/ threats/emerging bio-threats?	□ Yes	□ No			
2	Are there any guidelines for labs on disease notification covering all diseases of public health importance in the Philippines?	□ Yes	□ No			
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	There is an established sample referral. What tests are the country's priorities for specimen referral?.					
2	Has the country conducted a DNO or any other optimization exercises in the past 3-5 years? If so, what was the outcome of the exercise?	□ Yes	□ No			

3	If not, do you think the country could benefit from the DNO exercise? If yes, what would be the priority diseases/tests?	□ Yes		□ No		
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	Is One Health Approach implemented in the country	□ Yes	□ No			
2	Are there needs to improve the One Health approach and AMR surveillance in the country?	□ Yes	□ No			
3	What are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?	1-				
		2-				
		3-				
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
5	Is there adequate capacity for genome sequencing and bioinformatics?	□ Yes	□ No			
6	If not, how can RPHLN help?	□ TA	□ KS	□ Training	□ Other	□ NA

Key Informants Interview: Singapore

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP						**Comments**
1	Is there a NLSP available? Ask for e-copy	□ Yes	□ No			
2	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No			
3	Do you have a functional national lab technical working group (TWG)?	□ Yes	□ No			
2. Laboratory Regulations, Licensing and Accreditation						
1	The country has an established national registration and accreditation scheme. Are you open to the idea of supporting other countries in the region?	□ Yes	□ No			
2	How can Singapore assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Singapore has a well-established QMS. Would Singapore be interested in supporting other RPHLN countries?	□ Yes	□ No			
3	How can Singapore assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA

4. Supply Chain Management (SCM)						
1	Singapore has a strong SCM in place. Would Singapore be interested in supporting other RPHLN countries?	□ Yes	□ No			
2	How can other countries leverage Singapore's capabilities?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
3	All labs have equipment service contracts and preventive maintenance are conducted regularly. How can Singapore assist other RPHLN countries to strengthen the maintenance system?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	Singapore has a well-established national integrated DMS. Would Singapore be interested in supporting other RPHLN countries?	□ Yes	□ No			
2	How can Singapore assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	We noticed that you have a strong lab workforce program. Would Singapore be willing to share best practices on workforce management to other RPHLN member states?	□ Yes	□ No			
2	Are there any lab HR strengthening gaps in the country? If yes, what are the gaps that you think are needed in the country that can be assisted by other experts from other RPHLN countries?	□ Yes	□ No			
3	We noticed that you have a robust private sector engagement. How is the private sector Involved? How can they assist member states?					
8. Biosafety/Biosecurity and Waste Management						
1	Singapore has well-established biosafety/biosecurity measures. How do you think Singapore can help other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
2	Is there a lab waste management system in place? Provide context	□ Yes	□ No			
3	If yes, how can Singapore support other RPHLN countries to appropriately improve management of lab waste?					
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	Singapore has a well-established emergency plan and preparedness. Would Singapore be interested in supporting other RPHLN countries?	□ Yes	□ No			
2	If yes, how can Singapore assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA

10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	Singapore has robust systems in place. Would Singapore be willing to share their best practices to other RPHLN countries?	□ Yes	□ No			
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	Is One Health Approach implemented in the country?	□ Yes	□ No			
2	Are there needs to improve the One Health approach and AMR surveillance in the country?	□ Yes	□ No			
3	If yes, what are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?	1-				
		2-				
		3-				
4	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
5	How can Singapore support other countries to strengthen surveillance to protect tourism?					

Key Informants Interview: Thailand

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP						**Comments**
1	Is there a NLSP available? Ask for e-copy	□ Yes	□ No			
2	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No			
3	Do you have a functional national lab technical working group (TWG) If not, any plans to establish a LTWG?	□ Yes	□ No			
3	How can RPHLN help?	□ TA	□ KS	□ Training	□ Other	□ NA
2. Laboratory Regulations, Licensing and Accreditation						
1	The country has an established national registration and accreditation scheme. Are you open to the idea of supporting other countries in the region?	□ Yes	□ No			
2	How can Thailand assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Thailand has QMS in place and implemented nationwide. Would Thailand be interested to support other countries in the region?	□ Yes	□ No			
2	Does the country have the capacity to develop QC, EQA/PT panels and SOPs are available? What PT panels?	□ Yes	□ No			

3	How can RPHLN support?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	Thailand has a strong SCM in place. Would Thailand be interested in supporting other RPHLN countries?	□ Yes	□ No			
2	How can other countries leverage Thailand's capabilities ?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
1	Does the country have an established system for equipment maintenance? Service contract agreement, preventive maintenance mechanisms, etc. (ancillary equipment)	□ Yes	□ No			
2	If not, how can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
3	If yes, how can Thailand assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	Thailand has a well-established national integrated DMS. Would Thailand be interested in supporting other RPHLN countries?	□ Yes	□ No			
2	How can Thailand assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	We noticed that you have a strong capacity including training with collaboration of Universities and the government. Are you open to the idea of supporting other RPHLN countries?	□ Yes	□ No			
2	We noticed that you have a robust private sector. How is the private sector Involved ? How can they assist member states?					
3	How can Thailand assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4	What are the gaps that you think are needed in the country that can be assisted by other experts from other countries ?					
8. Biosafety/Biosecurity and Waste Management						
1	There is strong commitment in Thailand to biosafety/biosecurity measures. Any gaps identified?					
2	How do you think RPHLN can help?	□ TA	□ KS	□ Training	□ Other	□ NA
3	How can Thailand assist other RPHLN countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4	Is there a waste management system in place? Provide context	□ Yes	□ No			
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	Is there any lab specific emergency plan in response to outbreaks/ threats/emerging bio-threats?	□ Yes	□ No			

2	Are there any guidelines for labs on disease notification covering all diseases of public health importance in Thailand?	□ Yes	□ No			
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	Has the country conducted a DNO or any other optimization exercises in the past 3-5 years? If so, what was the outcome of the exercise?	□ Yes	□ No			
2	If not, do you think the country could benefit from the DNO exercise to support decentralization? If yes, what would be the priority diseases/tests?	□ Yes	□ No			
2	How can RPHLN assist?					
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	Is One Health Approach implemented in the country	□ Yes	□ No			
2	Are there needs to improve the One Health approach and AMR surveillance in the country?	□ Yes	□ No			
3	What are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?	1-				
		2-				
		3-				
4	What surveillance measures Thailand does to protect tourism? How can Thailand support other countries to strengthen surveillance to protect tourism?					

Key Informants Interview: Timor-Leste

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP						**Comments**
1	We recognized the strong leadership in the country but we also noticed that some of the policy documents including the National Laboratory Strategic Plan (NLSP) are outdated. Are these documents in the process of updating/revision?	□ Yes	□ No			
2	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No			
3	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No			
4	How can RPHLN help in strengthening the national diagnostic systems?	□ TA	□ KS	□ Training	□ Other	□ NA
2. Laboratory Regulations, Licensing and Accreditation						
1	It was mentioned in the report that there are gaps in licensing and accreditation as well as standard SOPs for each test. Are these gaps addressed?	□ Yes	□ No			

2	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Is there a Lab QMS in the country? If yes, what are the strengths/best practices? What are the gaps, if any?	□ Yes	□ No			
2	Does the country have the capacity to develop QC, EQA/PT panels and SOPs are available?	□ Yes	□ No			
3	Do you think experts in QMS can assist in building the capacity in the country?	□ Yes	□ No			
4	How can RPHLN support?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	It was mentioned in the report that there are several gaps in SCM In the country and SAMES is working on mSupply to be used in all products. Is the mSupply platform already functional?	□ Yes	□ No			
2	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
3	Is there a forecasting and quantification tool available and in use? If not, are there any plans to develop/get one?	□ Yes	□ No			
4	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
5	If not, is there a plan to improve the current system?	□ Yes	□ No			
6	Is there a system in distributing commodities to sites? If yes, what system is in place? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
7	It was also mentioned in the report that there are challenges in inventory management and stock outs. Are these still an issue?	□ Yes	□ No			
8	Is there a system for inventory and stock management?	□ Yes	□ No			
9	If not, are there any plans to develop a tool and guidance on this?	□ Yes	□ No			
10	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
5. Equipment Maintenance						
1	In the report, preventive maintenance is a huge challenge. Is this still the case?	□ Yes	□ No			
	Are the equipment under service level agreement? If not, how are equipment being serviced and maintained?					

2	Are there any issues on BSC equipment service and maintenance? If yes, what are these issues? (indicate in comment box)	□ Yes	□ No			
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	Based on the report, the country has no standard LIMS in place, but an integrated e-RT reporting system is underway. Can you provide more context on the system and planned coverage?					
2	In the report, challenges/gaps were identified on adhoc tools and lack of standardized data collection procedures and tools. Do you think experts in the RPHLN can help?	□ Yes	□ No			
3	How can RPHLN help?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	We noticed that there are huge gaps in HR capacity in the country? Can RPHLN assist in providing expertise given the "flight" of human resources ("brain drain") in your country?	□ Yes	□ No			
2	If yes, how can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
8. Biosafety/Biosecurity and Waste Management						
1	In the report, weak capacity of lab staff on proper use of BSC and safety practices was identified as a huge gap. Is this still the case?	□ Yes	□ No			
2	If yes, do you think Timor-Leste can benefit from RPHLN IPC experts?	□ Yes	□ No			
3	How do you think RPHLN can help?	□ TA	□ KS	□ Training	□ Other	□ NA
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	Is there a lab emergency plan for preparedness on threats/emerging threats in place?	□ Yes	□ No			
2	Are there any guidelines for labs on disease notification covering all diseases of public health importance in Timor-Leste?	□ Yes	□ No			
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
10. Integrated and Optimized networks, sample transport and Decentralization/POC						
1	Is there an integrated Sample Referral system in place?	□ Yes	□ No			
2	What tests are the country's priorities for specimen referral?					
3	Has the country conducted a DNO or any other optimization exercises in the past 3-5 years? If so, what was the outcome of the exercise	□ Yes	□ No			

4	If not, do you think the country could benefit from Diagnostic network optimization? What would be the priority diseases/tests)	□ Yes	□ No			
5	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	Are there needs to improve the One Health approach and AMR surveillance in the country?	□ Yes	□ No			
2	What are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?	1-				
		2-				
		3-				
3	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA
4	What are Timor-Leste's priority pathogens and how do you detect them?					
5	Are animal & human health public labs integrated? Provide context	□ Yes	□ No			
6	Is whole genome sequencing and bioinformatics available in the country? If yes, how many labs has the capacity? Any skillset or capacity gaps? Please indicate in the comment box	□ Yes	□ No			
7	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA

Key Informants Interview: Vietnam

Thematic Areas:

1. National Leadership/ Governance of Diagnostic systems/services including NLSP				**Comments**
1	Is there a national laboratory strategic plan (NLSP) available? If yes, ask to share an e-copy. If not, are there any plans to develop one or if dated, to revise?	□ Yes	□ No	
2	Is there a full JEE report available? If yes, ask to share an e-copy	□ Yes	□ No	
3	Do you have a national essential diagnostic list (EDL)? If yes, ask to share a copy. If not, are there any plans to develop one?	□ Yes	□ No	
4	Do you have a functional national lab technical working group (TWG)	□ Yes	□ No	
5	Can you briefly explain the lab system structure in Vietnam? (in terms of governance, disease programs, lab- tiered system, etc.)			
6	What are the lab systems' strengths, best practices and challenges (if any) in the country?			
2. Laboratory Regulations, Licensing and Accreditation				

1	Is there a lab certification or accreditation system in the country? If yes, please provide brief context and how many labs are enrolled/ accredited. If not, are there any plans?	□ Yes	□ No			
2	Are there any challenges? Provide key challenges, if any	□ Yes	□ No			
3	If there are challenges, how can RPHLN assist you? If none, and strong regulatory systems in place, how can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
3. Quality Management Systems (QMS)						
1	Does the country have a strong Lab Quality Management System in place in terms of lab quality framework, SOPs, EQA program including supervision and corrective actions?	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN support? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4. Supply Chain Management (SCM)						
1	Does the country have a supply chain management system in place?	□ Yes	□ No			
2	Is there a national lab commodities forecasting and quantification exercise annually? If not, are there any plans to conduct the quantification exercise?	□ Yes	□ No			
3	Is there a forecasting and quantification tool available and in use? If not, are there any plans to develop/get one?	□ Yes	□ No			
4	Is there an effective procurement system in place? If yes, how does the system work?	□ Yes	□ No			
5	If not, is there a plan to improve the current system?	□ Yes	□ No			
6	Is there a system in distributing commodities to sites? If yes, what system is in place? If not, how are commodities delivered/distributed to sites?	□ Yes	□ No			
7	Is there a system for inventory and stock management?	□ Yes	□ No			
8	If not, are there any plans to develop a tool and guidance on this?	□ Yes	□ No			
9	Vietnam has the domestic capacity to manufacture generic COVDI-19 test kits. What are other lab commodities Vietnam able to manufacture?					
10	Aside from domestic capacity, what are other key strengths Vietnam has? Any 3 key challenges on SCM?					
11	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA

5. Equipment Maintenance						
1	Does the country have an established system for equipment maintenance? Service contract agreement, preventive maintenance mechanisms, etc. Provide more context	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	For gaps identified, how can RPHLN assist? If a strong system is established, how can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
6. Data Management System (DMS)						
1	Does the country have a Lab Information Management system in place? Provide context	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
7. Laboratory Workforce Management						
1	Does the country have a Lab workforce program in terms of workforce development policy, training program, etc. ?	□ Yes	□ No			
2	Are there any training program gaps that are needed to improve laboratory personnel's capacity and productivity?	□ Yes	□ No			
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
8. Biosafety/Biosecurity and Waste Management						
1	In the report shared, it seems that Vietnam has a strong biosafety/biosecurity program in place? Provide more context	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
4	Does the country have a waste management program in place?	□ Yes	□ No			
9. Laboratory emergency planning, preparedness/Response on threats/emerging threats						
1	Does the country has a lab system in place for emergency preparedness/response to threats/emerging threats)	□ Yes	□ No			
2	What are the key strengths? What are the key gaps?					
3	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
10. Integrated and Optimized networks, sample transport and Decentralization/POC						

1	Is there a national integrated sample referral network in the country? If yes, how does it work? What tests are the country's priorities for specimen referral?	□ Yes	□ No			
2	Is point of care testing implemented in the country? If yes, what are the key diseases/tests available at the point of care?	□ Yes	□ No			
3	Which diagnostic tests are available at primary health care facilities?					
4	Has the country conducted a DNO or any other optimization exercises in the past 3-5 years? If so, what was the outcome of the exercise?	□ Yes	□ No			
5	If not, do you think the country could benefit from the DNO exercise? If yes, what would be the priority diseases/tests?	□ Yes	□ No			
6	What are the key strengths? What are the key gaps?					
7	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
11. One Health and Surveillance including Genomics/bioinformatics and AMR						
1	Is One Health Approach implemented in the country?	□ Yes	□ No			
2	Is there an AMR program implemented in the country?	□ Yes	□ No			
3	If yes, what are the top 3 strengths? If not, what are the top 3 priority needs in order to improve the capacity for one health approach and AMR programs in the country?	1- 2- 3-				
4	How can RPHLN assist? How can you assist member countries?	□ TA	□ KS	□ Training	□ Other	□ NA
5	What are Vietnam's priority pathogens and how do you detect them?					
6	Are animal & human health public labs integrated? Provide context	□ Yes	□ No			
7	Is whole genome sequencing and bioinformatics available in the country? If yes, how many labs have the capacity? Any skillset or capacity gaps? Please indicate in the comment box	□ Yes	□ No			
8	How can RPHLN assist?	□ TA	□ KS	□ Training	□ Other	□ NA

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