



Concise Summary of Workshop Proceedings

Event: Greater Mekong Subregion Health Security Project Workshop

Focus: *Regional Workshop on Laboratory Quality and Bio-Safety*

Date: Tuesday 14th to Wednesday 15th August 2018

Location: Angkor Paradise, Siem Reap, Cambodia

Preface

This paper details the proceedings, outputs and action plan from the ***Regional Workshop on Laboratory Quality and Bio-Safety (RWLQB)***, 2018. The workshop aimed to provide an opportunity for knowledge sharing and co-working between members of the Greater Mekong Subregion (GMS) Health Security Project (HSP). The workshop was attended by delegates and health care directors representing Cambodia, Lao PDR, and Myanmar, alongside representatives from healthcare and development bodies including ADB, WHO, IPC, USCDC, and OIE attended the event at Angkor Paradise in Siem Reap, Cambodia, from 14–15 August 2018.

Contents

Preface.....	1
Abbreviations	2
Section 1: Introduction.....	3
Workshop Objectives and Format	4
Background.....	6
Section 2: Summary of Findings.....	8
Section 3: Outputs by Session	9
Section 4: Common Gaps and Challenges	35
Section 5: Collaborative Plan of Action for Intervention and Coordination.....	37
Section 6: Conclusion and Proposed Follow-up Activities.....	38
Annex 1: Full Speech of H. E. Prof. Eng Huot.....	39

Abbreviations

ADB	Asian Development Bank
AHI	Avian and Human Influenza
AOP	Annual Operational Plan
APSED	Asia Pacific Strategy for Emerging Diseases
ASEAN	Association of South East Asian Nations
CDC	Communicable Diseases Control
CLM	Cambodia, Lao PDR, and Myanmar
CLMV	Cambodia, Lao PDR, Myanmar and Vietnam
EQA	External Quality Assessment
FAO	Food and Agriculture Organization of the United Nations
GAP	Gender Action Plan
GMS	Greater Mekong Subregion
HRD	Human Resource Development
HSP	Health Security Project
IHR	International Health Regulations
IPC	Infection Prevention and Control
ISO	International Organization for Standardization
MOF	Ministry of Finance
MOH	Ministry of Health
OIE	World Organization for Animal Health
PCR	Project Completion Report
RCU	Regional Coordination Unit
RWLQB	Regional Workshop on Laboratory Quality and Bio-Safety
SDG	Sustainable Development Goals
SOP	Standard Operating Procedure
USCDC	United States Centre for Disease Control and Prevention
WCS	Wildlife Conservation Society
WHO	World Health Organization

Section 1: Introduction

The complex interactions among humans, animals, and the environment¹ cause, and aid, the emergence and reemergence of many diseases². There are a variety of factors, including anthropogenic, genetic, ecologic, socioeconomic and climatic, that make it difficult to predict and to prevent EIDs. The emergence and re-emergence of disease has a great impact on tourism, productivity, and socio-economic development.

As part of a joint action to develop health security, the nations of Cambodia, Lao PDR, Myanmar and Vietnam are working with the support of a multi-partner network of healthcare agencies under the third stage of ADB's GMS health project: Health Security (HS). The project will complement existing projects, focusing on CDC, HIV/AIDS and malaria in one single intervention aimed at strengthening health by improving district and provincial health services capacity for diagnostic, response and treatment³.

Two primary outputs of the HSP are (1) the strengthening of health service capacity to identify and treat communicable disease, and (2) the utilization of regional knowledge gathered throughout stages one and two of the ADB GMS health project to control emerging and re-emerging diseases.

The RWLQB provided an opportunity for those in attendance to meet output one through networking and sharing information on laboratory quality, biosafety, and bio risk management in the region. By identifying and assessing the key national/regional gaps and challenges, the workshop worked towards the key strategies required to promote laboratory quality and health security measures alongside the animal and human health interface.

Laboratory services are integral to health services and require continuous upgrading and strengthening in order to provide optimum quality for diagnostic testing and the management of patient care. Reliable and timely results from lab investigations are critical elements in decision making in all aspects of health care and essential to the monitoring and control of diseases.

The GMS countries need to work together to facilitate a multi-sectoral engagement within and between each country, to prevent and control those diseases in humans, animals, plants and the environment. This workshop provides a much-needed opportunity to promote cross-border cooperation and learning.

¹ Climate changes, ecosystem services, economic channels of trade and socio-economic development.

² Such as Severe Acute Respiratory Syndrome (SARS), Avian Influenza (H5N1, H7N9), Ebola infection, Middle-East Respiratory Syndrome (Mers-CoV), recently Zika infection and yellow fever. These diseases are responsible for around 75% of the merging and re-emerging diseases in humans (WHO, 2018).

³ ADB (2018). Found at <https://www.adb.org/projects/48118-001/main>.

Workshop Objectives and Format

The Regional Workshop on Laboratory Quality and biosafety was facilitated by the Ministry of Health of the Royal Government of Cambodia's, Department of Communicable Disease Control. The overall objective of the two-day workshop was to **Improve quality and biosafety of laboratory services in the region**. Attending nation and healthcare body representatives came together to present, question, and develop a broader understanding of the regional strengths, challenges and required strategies for ensuring quality laboratory practice and biosafety.

Specific objectives:

- 1) Networking and sharing information on laboratory quality, biosafety and bio risk management in the region.
- 2) Identify and assess the priority biosafety gaps and challenges in the countries (shared assessment findings).
- 3) Promote animal and human health interface in biosafety and health security measures.
- 4) Identify key activities and strategies to promote biosafety and quality laboratory services.

Expected outputs:

- 1) Shared experience and knowledge of laboratory quality, biosafety and risk management among CLMV countries.
- 2) Established network for sharing info to improve the quality of laboratory and biosafety among CLMV nations.
- 3) List of key activities and strategies to promote biosafety and lab quality and service in the region.

Topics for Discussion:

- 1) Regional report for laboratory quality and biosafety for biorisk management.
- 2) Global health security/public health, animal health working in network.
- 3) Way forward for lab quality and biosafety to support one health among CLMV countries.

Topics for Discussion:

- 1) Networking and implementation of national oversight system for biosafety and biorisk management.
- 2) What we should know to help mitigate biorisk management and help strengthen the health system at border areas.
- 3) Biorisk capacity through result assessment under GMS HSP.

The workshop is aimed at strengthening health security in the GMS. Specifically, seeking to improve district and provincial health services capacity for diagnosis, response, and treatment of infectious diseases and other public health threats. It included two blocks of nation presentations, and two group discussion and presentation sessions. All sessions were followed by a Q&A session that facilitated the identification of recommendations, clarifications, and amendments.

Session 1: Introduction of Laboratory Quality and Biosafety in the CLMV (ADB).

Session 2: Country Presentations: Status of Laboratory Quality and Biosafety, Challenges and Future Plan.

Session 3: Global Health Security: Public Health, Animal Health Working in Network.

Session 4: Group Discussion and Presentation 1:

- 1) Discussion on issues/challenges & intervention in human health.*
- 2) Discussion on issues/challenges & intervention in animal health.*

Session 5: Group Discussion and Presentation 2:

- 1) Discussion on priority/planning & intervention in human health.*
- 2) Discussion on priority/planning & intervention in animal health.*

Session 6: Priority Planning and Recommendation

Background

“CDC and Regional Health Until Now”

Global Health Security is paramount for the prevention and mitigation of human suffering, loss of life, and economic burden (GhsAgenda.org, 2016⁴). The global requirement to implement the thirteen 2005 International Health Regulations (IHR), as well as the eight 2010 Asia Pacific Strategy for Emerging Disease (APSED) criteria, was greeted with a slow initial uptake amongst the GMS-CLV nations. Having been identified by ADB as a regional public good priority (ADB, 2008⁵) the first phase GMS-CDC project began in 2006, designed to develop the required capacity to contain emerging diseases and reduce the burden of common neglected diseases in Cambodia, Lao PDR, and Vietnam (ADB, 2005⁶).

Running across 4 years at a value of \$38.75 million, the project was rated ‘successful’ and fully aligned with development priorities (ADB, 2013). In acknowledgement of issues including an initial start-up delay, suboptimal targeting of beneficiaries, and weak implementation of gender and ethnic minority covenants (ADB, 2013), a second phase was commissioned and funded; CDC2. The second went further to enhance regional CDC systems (regional cooperation capacity and improved surveillance and response systems) and improve provincial capacity for CDC (staff training and community-based CDC at border communities). Operating initially from 2010-2014, it justified additional funding and extension across 2016-2017.

“Health Security”⁷

The project will focus on CDC, HIV/AIDS, and malaria in one single intervention aimed at strengthening health security in Cambodia, Lao PDR, Myanmar, and Vietnam by improving district and provincial health services capacity for diagnostic, response and treatment.

It seeks to strengthen health services capacity to identify and treat communicable disease, including neglected tropical diseases, HIV/AIDS, tuberculosis, and food borne diseases. This phase of the project is also looking to use the regional knowledge generated during the two previous phases of the project to control emerging and re-emerging diseases.

It particularly targets remote and underserved areas in the most need of enhanced capacity and support. Geographic targeting will be determined by linking disease incidence with mobile and migrant population data by province.

The proposed Greater Mekong Subregion (GMS) Health Security Project (the project) follows a series of subregional projects supporting control of communicable diseases, including HIV/AIDS and malaria, undertaken from

⁴ Ghsagenda.org. (2016). About | Global Health Security Agenda. [online] Available at: <https://www.ghsagenda.org/about>.

⁵ Asian Development Bank, (2008). Strategy 2020. The Long-Term Strategic Framework of the Asian Development Bank 2008-2020. Manila.

⁶ Asian Development Bank, (2005). Report and Recommendation of the President to the Board of Directors: Proposed Grants to the Kingdom of Cambodia, the Lao People’s Democratic Republic, and the Socialist Republic of Viet Nam for the Greater Mekong Subregion Regional Communicable Diseases Control Project. Manila.

⁷ This section is worked closely from the information provided by ADB (2018) at <https://www.adb.org/projects/48118-001/main>.

Cambodia, Lao People's Democratic Republic (PDR), the Union of Myanmar and Vietnam, the project will contribute to the enhancement of GMS public health security and will strengthen national and regional capacity for disease surveillance and response, risk assessment, case management and subregional collaboration.

Section 2: Summary of Findings

Health security threats are inevitable, and it is crucial that nations invest in quality laboratory and biosafety practice and facilities. The frameworks and infrastructure currently in place present a good start but they need to be strengthened. In particular where legislation and SOPs have been developed it is crucial that they are employed as standard across all levels of health care (village, district, province, nation, region).

Concerning Biosafety: The human-animal nexus is identified as a crucial battleground against emerging and re-emerging infectious disease. Nations must take care to ensure strong communication channels between the relevant stakeholders at all levels.

The table below details key summary workshop outputs covering the regions current state of opportunity/strengths, challenges, and resultant recommendations.

Key Workshop Outputs	
Key Opportunities	<ul style="list-style-type: none"> • Regional collaboration for the efficient address in a public goods arena. • Partner support for quality operational procedure. • Engaged wider stakeholder group. • Training and investment opportunities for enhanced future capacity. • Knowledge sharing for best practice, pitfalls and moving forward.
Key Challenges	<ul style="list-style-type: none"> • Human resource. quality, consistency, volume and engagement. • Infrastructure. Ill-fitted for purpose. • Quality operation at all levels of government (national, provincial, district). • Limited financial budget. • Working relationships at all levels of government towards health goal.
Regional Work Plan Recommendations	<ul style="list-style-type: none"> • Mid-term review and evaluation of regional plan, after 2 years. • Annual Budget priorities. • ADB Regional GMS should have standard indicators for biosafety. • Operational framework to be identified and implemented. • Identify the progress of LAB/IPC focal points; utilize their capacity and regional knowledge for strategic direction. Ensure that they are in good communication.

Section 3: Outputs by Session

The workshop consisted of 6 complementary sessions: 4 plenary presentation sessions and 2 group working discussions. Each session will be discussed in turn with detail on its purpose, content and key insights.

Opening

MC Ms. Uch Moniheap invites the following esteemed guests to the stage for opening remarks:

- H. E. Professor. Eng Huot. Secretary of State for Health, MOH Cambodia.
- Dr. Sok Srun. Director of DHS, MOH CAMBODIA.
- Dr. Bouakhan Phakhounthong, Deputy Director General of DHCR, MOH, Lao PDR.
- Dr. Ommar Swe Tin, National Health Laboratory, MOHS, Myanmar.
- Dr. Natacha Alexandra Korn, WHO Cambodia.

Once on stage, all attendees are asked to stand in respect to the Cambodian national anthem. After the anthem, Ms. Moniheap invites Dr. Sren to speak followed by Dr. Korn and then by H.E. Prof. Eng Huot.

Dr. Sok Srun (extract):

“Laboratory service contributes an integral part to the health service and it requires continuous upgrading and strengthening for optimum quality. Together we can work together to upgrade all aspects and capacities of public health and healthcare.

This workshop provides a useful network to share information and build support for biosafety in the region. We seek to identify the key challenges; promote animal-human health interface in security measures; and, identify key activities and strategies to support biosafety and quality laboratory service.”

Dr. Natacha Alexendra Korn (extract):

“Cambodian national work plans contain two priority areas: biosafety and laboratory quality. We are working towards national guidelines for specimen transfer and biosafety as well as a training tool curriculum to build laboratory staff skills ...

...Improvements are on the way and achievable in the GMS. The WHO is fully committed to support collaborative work plans on health security in Cambodia and the GMS.”

H.E. Professor. Eng Huot.⁸

“...I hope that all participants and speakers will share their practical experiences and expertise with the workshop for:

- 1. Connecting and info sharing*
- 2. Identify major challenges and gaps in biosafety*
- 3. Improve the relationship between human and animal health*
- 4. Identify strategic areas and directions to improve lab quality and biosafety.*

On behalf of the MOH I would like to thank all international participants for taking hard work and time so that workshop can be successful...

...I declare the workshop open.”

⁸full speech in Annex 1.

Session 1: Introduction of Laboratory Quality and Biosafety in CLMV, ADB Position.

Note: Session one, presentation one, was conducted over Skype by an ADB representative due to time scheduling issues. It was titled: **ADB Support on Laboratory Services and Biosafety in the GMS**. Originally it was scheduled to be presented by Dr. Kyi Thar, Public Health Specialist/Consultant, GMS Health Security and Health Cooperation, ADB.

Content: The presentation covered: the rationale for the workshop; ADB practice, procedure and recommendations for laboratory quality and biosafety; and an overview of the Mandalay workshop recommendations.

Key Insights: There is a tripartite rationale behind the importance of building laboratory capacity and biosafety. It encompasses the **vulnerability** to economic stability of a pandemic infectious disease; the need for improved **capacity** due to inadequate systems and infrastructures; and the **hazard** posed by antimicrobial resistance and infections.

Insight	Expansion																				
Rationale for the workshop.	<p>Three-part justification.</p> <ol style="list-style-type: none"> 1) Vulnerability: Hazard of infectious diseases pandemic threaten the economic stability in the GMS. Major economic lost in GMS during the breach of biosafety between animal human interface in the past decade. 2) Capacity: Existing capacity in GMS on the laboratory diagnostic, biosafety and infrastructures is not ready to prevent biohazards threats. Inadequate infection prevention control system and practices in the GMS. 3) Hazard: Increasing laboratory, health care associated infections and antimicrobial resistances. Limited security of microbiological agents and toxins threats to human, animal health and environment. 																				
ADB Investment for Lab and IPC in the GMS	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #d9534f; color: white;"> <th>Countries</th> <th>Lab and IPC (USD)</th> <th>% of HS project</th> </tr> </thead> <tbody> <tr> <td style="background-color: #5bc0de;">Cambodia</td> <td style="background-color: #d9ead3;">9 millions</td> <td style="background-color: #d9ead3;">39%</td> </tr> <tr> <td style="background-color: #5bc0de;">Lao PDR</td> <td style="background-color: #d9ead3;">5 millions</td> <td style="background-color: #d9ead3;">40%</td> </tr> <tr> <td style="background-color: #5bc0de;">Myanmar</td> <td style="background-color: #d9ead3;">5.2 millions</td> <td style="background-color: #d9ead3;">41%</td> </tr> <tr> <td style="background-color: #5bc0de;">Vietnam</td> <td style="background-color: #d9ead3;">54.5 millions</td> <td style="background-color: #d9ead3;">65%</td> </tr> <tr style="background-color: #d9534f; color: white;"> <td>Total</td> <td>73.7 millions</td> <td></td> </tr> </tbody> </table> <p>This tables displays the current projected expenditure of each CLVM nation on improving Lab and IPC requirements under the GMS Health Security Project. Expenditure can be seen in total terms, and as a percentage of the total budget. With no nations falling below one third</p>			Countries	Lab and IPC (USD)	% of HS project	Cambodia	9 millions	39%	Lao PDR	5 millions	40%	Myanmar	5.2 millions	41%	Vietnam	54.5 millions	65%	Total	73.7 millions	
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	of budget expenditure in this arena one can see the importance placed upon improving this area.
ADB Values/ Investments for Laboratory, Biosafety and Biosecurity	<p>The ADB identifies four laboratory values:</p> <ol style="list-style-type: none"> 1. Investments: Assess outcomes of previous or ongoing ADB Projects; invest in new projects 2. Country Ownership: Direct fund flow to government; managed by and implemented by government. 3. Capacity Building: train health professionals; provide equipment and tools; develop knowledge products. 4. Regional Public Goods: GMS Regional Working groups and networks; Regional strategies and action plans; Regional and cross-border initiatives. <p>ADB also identify four key laboratory practices and associated recommendations in the face of biosafety and biosecurity:</p> <ol style="list-style-type: none"> 1. Policy, System Formulation and Cooperation: establish a biosafety policy; develop a biosafety action plan; revised biosafety guidelines; establish lab M&E framework; establish Lab and IPC working groups; support regional technical forum/workshops; multi-sectoral meetings for AMR/ Biosafety. 2. Risk Assessment of Biohazards: Laboratory assessment and surveillance; Outbreak investigation; AMR surveillance 3. Capacity Building: Upgrade lab training institutions; Develop laboratory guidelines and protocols; Develop biosafety manual and checklists; Promote biotech training. 4. Provision of safety environment: Upgrading biosafety level; Support biosafety cabinets and equipment; Upgrading lab and isolation units; Provision of PPEs. <p>This section of recommendations can be considered as a suggestion list for best-practice implementations to ensure laboratory quality and biosafety. While it did not feature heavily in discussion its implied outputs (actions to address challenges) were discussed at every stage.</p>
ADB priority biosafety activities	<p>This section works to identify activities and practices to implement to address challenges associated with the workshop on biosafety.</p> <ul style="list-style-type: none"> - Risk assessment of biohazard. - Policy/strategy formulation. - Knowledge and capacity building. - Cooperation and collaboration. - Promotion of IPC practices. - Safety environment. - Decontamination and disinfection. - Specimens transportation/shipment.
Recommendations of the Lab and IPC workshop in Mandalay	<ul style="list-style-type: none"> - Keep momentum on collaboration, sharing information, identifying gaps by GMS Lab and IPC WGs. - Promote private sector engagement to comply the national accreditation standards/guidelines.

	<ul style="list-style-type: none"> - Link laboratory and IPC issues to the SDG and UHC to improve access and political commitment. - Encourage collaborative accreditation system by developing regional EQA standards. - Institutionalize Lab and IPC capacity by harmonizing and upgrading training program. - Promote multi-ministerial collaboration mechanism to improve IPC practice. - Continue sustainability path ways by developing strategies, action plans and streamlining into the NHPs for lab and ICP strengthening. - Establish GMS references laboratories system specimen shipment - Leverage investments on strengthening laboratory and IPC. <p>This recommendation recap section works to provoke a consideration of subsequent success in implementing the suggestions of the previous workshop.</p>
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Q&A Outputs	<p>Q: ADB identify the process of country ownership. We are interested in the point on 'direct flow to governments'. Does a government perform changes independently or do they need ADB approval first?</p> <p>A: Any changed in operational requirements need to be included in the annual operation plan. It should be submitted through the project directors and ADB will provide support.</p> <p>Note: If not already in place, the attending members agree that ADB should work to implement a standard regional evaluation form to streamline the annual operation plan procedures.</p>
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Session 2: Country Presentations. Status of Laboratory Quality and Biosafety, Challenges and Future Plan. [Plenary Session 1].

Chair: Dr. Sok Srun, Director of DHS, MOH (Cambodia)

Co-Chair: Dr. Natacha Alexandra Kornil Fonseca Milhano, WHO-Cambodia.

Order: 1) *Presentation on networking and implementation of national oversight system for biosafety and biorisk management in Cambodia.* Dr. Sau Sokunna. Cambodia.

2) *Current Laboratory System Biosafety and laboratory quality in Lao PDR.* Dr. Phonepadith Xangsayarath. Lao PDR.

3) *Status of Laboratory Quality & Biosafety, Challenges and Future Plan.* Dr. Ommar Swe Tin. Myanmar.

Content: The presentations covered the current national states of laboratory quality and biosafety procedure. They went on to document the current and emerging challenges alongside planned changes to address them in the short term. The breakdown is broken down into three categories: achievements, challenges, and proposed workplan and solutions.

Key Insights: Each of the CLM nations have made significant strides forward in recent year. Specifically, great improvements have been made in national level procedures and legislation; in identification and beginning the process of infrastructure upgrade; attendance of regional workshops and associated knowledge sharing outputs; and improved laboratory testing outputs.

While improvements are marked, there are still many common challenges. Broadly speaking they take the form of human capital, resource and infrastructure, finance, and standard process implementation.

In line with the identified challenges, general solutions capture the following proposals: improved training schemes; finding additional funding; implementing technical procedures at all laboratory levels; and upgrading infrastructure.

<u>Nation</u>	<u>Cambodia</u>
Achievements	<ul style="list-style-type: none"> ▪ Ensured participation of national reference laboratories in international EQA programs. ▪ Developed and disseminated instructions for collection of specimens for laboratory testing.

	<ul style="list-style-type: none"> ▪ Provided in-service mentorship on microbiology diagnostics to referral laboratories. ▪ Provided laboratory supplies and reagents to ensure uninterrupted access to high-quality microbiology diagnostics. ▪ Implemented Laboratory Quality Management Systems ▪ Developed Specific SOPs for communicable diseases, as well as bacteriology, Hematology, Biochemistry and Serology. ▪ Accurate laboratory diagnosis and strengthening of the quality assurance program for all the diagnostic tests. ▪ Laboratory support for surveillance and response. ▪ Coordination and laboratory networking. ▪ Biosafety and Biosecurity and Laboratory Quality Management System (LQMS) to measure progress towards IHR core capacities implementation ▪ Information and data management. ▪ Capacity building on crisis management for first responders and including biological waste management. ▪ Enhancement of Biosafety of CLMV in addressing on Biorisk management, awareness raising and legal framework and Transportation of dangerous that's requirement to ensure the safety of people, property and the environment. ▪ Improve facilities to ensure physical containment of dangerous pathogens ▪ Established the biosafety committee and Integration of the CamLIS into the PMRS. ▪ EQA program for Microbiology and main labs are implemented. Expand the existing EQA program to include all Microbiology Laboratories in private (Since 2012 until present). ▪ Laboratory quality management system (LQMS) is in place in reference and referral laboratories and Roll out implementation of existing quality management systems in priority laboratories and need sustainability 25 hospital labs. ▪ Certificate course on QMS/QA for staff qualification and competence. ▪ Biosafety procedures in laboratories meet minimum international standards. Identify biosafety officer for select higher capacity labs (CPA 3 and national labs). ▪ Development of National Biosafety Guideline and national Biosafety Committee. ▪ Development of National SOPs testing template for Bacteriology, Hematology, Biochemistry and Serology. ▪ Developed National Quality Manual template for QMS. ▪ Regular strengthening of microbiology meeting : opportunity to upgrade micro diagnostic testing AST to support disease surveillance and outbreak detection.
Challenges	<ul style="list-style-type: none"> ▪ Lack of Laboratory Biosafety Regulations. ▪ Human resource limited in biosafety sphere. ▪ Lack of preventive and curative maintenance of laboratory equipment. ▪ Lack of communication between Lab/Epi and lack of monitoring. ▪ Lack of standards SOPs at all levels.

	<ul style="list-style-type: none"> ▪ Low scoring on the average scores of the medical laboratories/addressing safety (2018). ▪ Lack of Laboratory Biosafety Regulations. ▪ Limited knowledge of biosafety officers, mentors and clinicians in the rational use of laboratory diagnostics leading to under-utilization of laboratory services. ▪ Lack of preventive and curative maintenance of laboratory equipment ▪ Lack of communication between Laboratory and Epidemiology and lack of monitoring. ▪ Lack of system transportation and properly storage and chemical safety detection. ▪ Lack of Administrative Controls (Be aware of unsafe conditions and ensure they are corrected once detected). ▪ Lack of standards SOPs for sample transpiration and chemical inventories.
Proposed Solutions and Workplan	<ul style="list-style-type: none"> ▪ Provide technical support to Laboratory Component in the adaptation and implementation of the regional laboratory quality standards. ▪ Uphold good microbiologic practices and procedures. ▪ Ensure continuous monitoring and evaluation of policy development and implementation. ▪ Combined research on understanding of underspecified transmission and related environmental issues. ▪ Combined targeted awareness raising communication and training strategies. ▪ Competence in biological risk assessment. ▪ National laboratory capacity meets diagnostic and confirmatory laboratory requirements for priority diseases <ul style="list-style-type: none"> - Develop a list of priority diseases - Update the inventory of lab capacity for diagnosis of priority diseases (Strengthening the quality microbiology diagnostics, LQMS and SOPs). - Maintain laboratory diagnostic capacity in national reference laboratories for Influenza and other priority diseases ▪ Capacity to achieve IHR minimum core capacities is available <ul style="list-style-type: none"> - Develop a directory of laboratories with public health functions, Not all public health. ▪ Strengthen biorisk management and perform annual biorisk assessments in laboratories and occupational health safety. ▪ Create biosafety and biosecurity SOPs and ensure their availability in all laboratories, and that staff knows how to use them. ▪ Provide regular training and supervision on biosafety practices to all laboratory personnel. Particular attention should be paid to appropriate use of PPE, waste management, and unsafe behaviors. ▪ Appointment of a biosafety officer in each laboratory who will be responsible for internal safety audits, ensuring safety procedures, and enforcing strict biosecurity regulations. ▪ Strengthen the national capacity for certification of Biological Safety Cabinets (BSCs) and ensure their maintenance and annual certification.

	<ul style="list-style-type: none"> ▪ Develop and keep an updated inventory of dangerous pathogens stored at facilities.
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<u>Nation</u>	<u>Lao PDR</u>
Achievements	<ul style="list-style-type: none"> ▪ Policy, Standard, Guideline and Manual developments. ▪ Designated laboratory authority/committee technical working groups. ▪ Capacity building (training through regional partners support or systems) ▪ Laboratory Quality Management implementation. ▪ National Biosafety & Biosecurity Regulatory Body. ▪ Leading national laboratory program covering biosafety/biosecurity, laboratory quality and legislation development. ▪ Establishment of a reference laboratory for AMR. ▪ National EQA programs (NEQA): Bacteriology panel (NCLE); Dengue IgM panel (NCLE); HIV panel (NCLE); Hematology panel (Mahosoth). ▪ Established policies, standards, guidelines and manuals: National Policy for Health Laboratories; National Strategic Plan for the Health Laboratories, 2013 – 2020; Operational guidelines for Health Laboratory Networking; National Laboratory Norms and Standards Guidelines; National laboratory quality standard; Laboratory interpretation guideline. ▪ Designated Laboratory Authority/Committee, technical working groups: National Laboratory Committee, National Laboratory Focal Point, National Laboratory Technical Working Group. ▪ Conducted several LQMS workshop by different organization for laboratory staff from central level, provincial level and international partner laboratories and staff from the University of Health Sciences. ▪ Conducted Laboratory quality management by using WHO Laboratory Quality Stepwise Implementation (LQSI) tool for central and provincial level laboratory staff. ▪ Conducted Laboratory accreditation workshop for central level laboratory staff. ▪ National laboratory training plan has been developed. ▪ Translated Laboratory Quality Stepwise Implementation (LQSI) tool to Lao language and use as guideline for implementation of LQMS. This tool was also use for monitoring and assessment of LQMS at each hospital. ▪ 5 provincial laboratories and selected central laboratories designated laboratory quality officer to implement LQMS by using LQSI tool with the technical support and mentoring of NCLE, WHO and ITECH. ▪ Laos National Biosafety Frameworks, National Waste Management in Healthcare Facilities, WHO biosafety manual 3rd edition-Lao version, ▪ Conducted laboratory assessment using Laboratory Assessment Tools (Biosafety is part of this assessment) and assisted laboratory to implement the biosafety and biosecurity program at selected central hospital and all provincial hospitals ▪ Renovated laboratories to strengthen Biosafety practice at selected provincial laboratories after assessment by the support of EU through WHO.

	<ul style="list-style-type: none"> ▪ Introduced Biosafety and Biosecurity management program and mentoring the implementation at 20 laboratories (14 provincial lab and 6 central lab) by the support of WHO and ADB.
Challenges	<ul style="list-style-type: none"> ▪ Lack of Laboratory Biosafety Regulations. ▪ Empowerment required to ensure actionable successes. ▪ There is no biosafety and biosecurity legislation, regulations, policy, or regulatory body in place; there is only the Biosafety Framework developed in 2004 which focuses on GMO. ▪ There is no dangerous pathogen and toxin control measures. There is no comprehensive national record of where and in which facilities dangerous pathogens and toxins are housed. There is no national plan to consolidate dangerous pathogens and toxins to a minimum number of facilities. ▪ Limited funds and human resources exist for sustainable biosafety and biosecurity. Insufficient national budget and human resources exist to ensure maintenance of facilities and equipment. ▪ Coordination between the human health sector and the animal health and other relevant sectors on biosafety and biosecurity programs and activities is lacking. ▪ No comprehensive needs assessment for biosafety and biosecurity training has been conducted. ▪ Induction and refresher training are conducted for most laboratory staff at national and some provincial level facilities, but district and community levels have limited training. ▪ Occupational/worker health services exist only for international foundation laboratories but are limited for the government-run facilities.
Proposed Solutions and Workplan	<ul style="list-style-type: none"> ▪ District Laboratory should be strengthened. ▪ Biosafety, Biosecurity and Biorisk management concepts and practice should be start in the University or Collage to foster this concept and knowledge for the student to perform the work safely and appropriate. ▪ Coordination between national biosafety authority could improve the capacity and efficiency of Biosafety and Biosecurity training and implementation. ▪ There is a need to advocate for official recognition and requirement of a designated laboratory biosafety officer as a requirement of accreditation to empower the Biosafety officer to have an authority to execute the assigned task. ▪ Biosafety and quality authority member should be accredited. ▪ Define microorganisms risk group specific for Lao PDR ▪ Conduct a national inventory of dangerous pathogens across all human and animal health labs, using a list of select agents specifically identified for Lao PDR, and update laboratory-specific risk assessments as appropriate following this inventory. ▪ QMS: Developing and implementing of a national quality standard <ul style="list-style-type: none"> - Developed national laboratory quality standards - Developing national laboratory training plan

	<ul style="list-style-type: none"> - Drafting of national laboratory quality guideline by adapted from LQSI tool to accommodate all laboratories to be able to use same guideline for both ISO15189 and national standard. - Conduct Laboratory Quality Management System workshop to laboratories (Annual workshop) - Mentoring of pilot laboratories to implement LQMS ▪ District Laboratory should be strengthened ▪ Biosafety, Biosecurity and Biorisk management concepts and practice should be start in the University or Collage to foster this concept and knowledge for the student to perform the work safely and appropriate. ▪ Coordination between national biosafety authority could improve the capacity and efficiency of Biosafety and Biosecurity training and implementation. ▪ There is a need to advocate for official recognition and requirement of a designated laboratory biosafety officer as a requirement of accreditation to empower the Biosafety officer to have an authority to execute the assigned task. ▪ Biosafety and quality authority member should be accredited.
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<u>Nation</u>	<u>Myanmar</u>
Achievements	<ul style="list-style-type: none"> • Established the fundamentals of QMS in central level laboratories. • National Policy on Health Laboratories documented by MOHS in September 2016 – lots of policies and guidelines. • Draft SOPs for sample collection, storage and transportation. • Provide training and workshop in collaboration with WHO, JICA, KOICA, NRL and other laboratory-based agencies • During the project kick-off workshop organized by EA in Naypyitaw in November 2017, four project focal persons were nominated for each project sites. • Initial laboratory assessment during March and April 2018 provided a picture of the current capacities of GMS-HS projected laboratories regarding infrastructure, human resources, equipment, quality control, SOPs and biosafety. • Program manager meeting (PMM) (10-11 May) – developed regional working group. • Township AOP training (17-18 May) – costing & planning for laboratory specimen transport by each township. • Regional workshop on improving laboratory services and IPC (4-5 June) - developed regional strategies for cooperation and improvement of lab & IPC services. • Workshop on Strengthening Surveillance of AMR. • Among 12 GMS target townships, only 4 (Loikaw, Kyaing Tone, Mawlamyaing, Dawei) perform bacteria culture & sensitivity tests • During the workshop, laboratory capacity of antibiotics sensitivity testing was enhanced.

	<ul style="list-style-type: none"> • GMS target Laboratories which do not have facilities for antibiotics sensitivity testing plan to start when equipment & reagents for antibiotics sensitivity testing supplied by GMS HS project arrive their laboratories • Draft SOPs for sample collection, storage and transportation, equipment and testing according to laboratory type. • NHL and NRL (National Serology Reference Laboratory, Australia) collaborate 'Establishment of Laboratory Quality Systems in Myanmar' from end of 2012 to 2014. • Establish the fundamentals of QMS in central level laboratories • NRL trained 3-5 Participants from (NHL, PHL, YGH, NBC, NPT 1000 bedded Hospital) for QMS. • Now, these five laboratories have already for QMS (Quality manual, Quality manager, Quality polices, Documentation system). • NRL trained 5 Quality managers from these five laboratories at 2015. • NRL trained 12 Participants from PHL and Mandalay General hospital for QMS (3 times workshop) from Feb to September 2016. • NRL trained 14 Participants from National Health Laboratory for QMS (3 times workshop) from Feb to September 2016. • Workshop on SOP Writing for State and Regional Hospitals at NHL supported by WHO (28-31 May 2018). • National Policy on Health Laboratories documented by MOHS in September 2016. • National Strategic Plan for Health Laboratories (2017-2022) • Guidelines for biosafety and biosecurity for biomedical laboratories (October 2017). • Sample collection, storage and transportation (NHL). • Hospital Infection Control Guideline (2016) based on WHO standard • National Strategic Plan for Laboratories (2017-2022) • Training of laboratory staffs from Central, State and Regional Hospitals for preparedness of outbreak and cascade training on Biosafety (two trainings, 29th – 30th Sept 2017 and 19th – 20th Oct 2017) supported by MoHS and WHO.
Challenges	<ul style="list-style-type: none"> ▪ At present there is no dedicated unit in the MoHS for biosafety and biosecurity. ▪ Limitation of human resource. ▪ Limitation of funding. ▪ No regular external audits not regularly scheduled except WHO accredited labs. ▪ No regular contract system for equipment maintenance and calibration. ▪ Limited verification and calibration of some equipment. ▪ All internal auditors are very busy & so can't arrange specific audit schedule. ▪ Poor coordination and co-operation with staffs of the audited area. ▪ The total score of the laboratories ranges from 62% (type A lab) to 17% (type C lab) due to wide variation in: organization and management structure, infrastructure, equipment, available tests.

	<ul style="list-style-type: none"> ▪ At present there is no dedicated unit in the MoHS for biosafety and biosecurity. ▪ International biosafety guidelines are followed and instructions for laboratory aspect of infection prevention and control and medical laboratory waste management are documented. ▪ Transportation of infectious samples by local or foreign carriers is not streamlined. ▪ No regular external audits. ▪ No regular contract system for equipment maintenance and calibration. ▪ Limited verification and calibration of some equipment. ▪ Adequate numbers of qualified personnel are needed to implement the national laboratory plan. ▪ Laboratory staff at central, regional and peripheral levels needs to be provided training on bio-safety and biosecurity and risk assessment by the trained personnel. ▪ Training tools: need for more capacity and volume. ▪ Requires Biosafety level 3 for handling of highly infectious pathogens ▪ Limited budget for proper waste management. ▪ No Biomedical engineer for Biosafety cabinet certification. ▪ Limited Eyewash station/ bottle, emergency shower, Spill kit.
Proposed Solutions and Workplan	<ul style="list-style-type: none"> ▪ Implementation of GMS Health Security Project accelerating in 2018 through dedicated support from MOHS/EA, ADB and PMU. ▪ Develop assessment tools that reflect optimum standard of laboratory performance rather than minimally accepted performance. Aiming for continuous improvement. ▪ Project's sustained provision of resources, technical support, monitoring and evaluation of Lab Quality and Biosafety. ▪ Development of Biosafety Manual for Cross Border. ▪ Communicating timeline among member countries for Biosafety manual development. ▪ Workshop training on development of SOPs for sample collection, storage and transport (21-22 August). ▪ Prepare procurement list for equipment & reagent according to need based on assessment finding. ▪ Year 2 Township AOP (17-18 August). ▪ Regular management review of the organization. ▪ Communication and feedback system from customers. ▪ Develop risk management - assessment of potential pitfalls. ▪ Documented action to reduce or eliminate pitfalls. ▪ Identify non-conformities. ▪ Root cause Analysis. ▪ Develop Communication Policy on delay in service. ▪ Establish a technical working group for biorisk/ biosafety management. ▪ Develop national standards and guidelines for biosafety and biorisk. ▪ Conduct national biosafety/ biorisk assessment based on national biosafety standards (Audits). ▪ Develop national plan for strengthening biosafety and biorisk management.

	<ul style="list-style-type: none"> ▪ Develop/ disseminate national standards and guidelines for biosafety/ biosecurity, including food safety/security
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Q&A Outputs	<p>The Q&A session for plenary session 1 ran more like an extended conversation on the procedure of implementing national biosafety standards. It is considered to be a long process requiring stakeholder engagement and support. It was postulated by the group that based on each nations experience in developing various SOPs, that they could liaise with the ADB to develop a basic 'standards' form to base procedure on. A form that would include international bench marks that can be augmented for national use based on specific needs.</p>
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Session 3: Global Health Security: Public Health, Animal Health Working in Network.
[Plenary Session2]

Chair: Dr. Bouakhan Phakhounthong, Lao PDR

Co-Chair: Dr. Ommar Swe Tin, Myanmar

Order: 1) *Disease Outbreak Detection, Investigation, and Response, Cambodia Experiences.* Dr. Tek Bunchhoeung.

2) *Animal Health Network and Laboratory Quality and Biosafety.* Dr. Ren Theary.

3) *Biosafety – National Animal Health Laboratory.* Dr. Phouvong Phommachanh.

4) *Global Health Security / One Health Networking.* Dr. Zin Ko Ko Chit.

Content: The presentations covered the current national states of the human-animal interface under the one health network approach.

Key Insights: Global Health Security is “a multilateral and multi-sectoral approach to strengthen both global and national capacities to prevent, detect, and respond to human and animal infectious diseases threats whether naturally occurring, or accidentally or deliberately spread.” During the session it became apparent that the successful outcome is predicated on the mechanisms and competencies to Prevent, Detect, and Respond to infectious disease threats.

Accordingly, this summary considers the different possibilities under each label, using national examples. Thereafter we can assess the challenges to global health security that came out of this session.

Nation	Prevention (Surveillance)	Detection (Investigation)	Response
Cambodia	Multiple surveillance modes including the Event based CDC Hotline; Indicator-based surveillance (IBS); Lab-based surveillance (CamLIS); Antimicrobial Resistance Surveillance; Influenza Surveillance (ILI, SARI, FSS, AISS).	Investigation Process: - Verification - Risk Assessment (Severity, Likelihood, Capacity of Intervention) - Level of investigation depends on level of risk (Low, Moderate, High, Very High) - The team comprises of:	- Level of response depends on level of risk. - Appropriate control measures. - Risk communication. - Health Education. - Case management. - Trace back / Recall.

	<p>NAHPRI; live bird market check for highly pathogenic avian influenza.</p>	<ul style="list-style-type: none"> ○ CDC department ○ Local RRT/AET (province, district, hospital, health center) ○ Other governments partner: NIPH, IPC, MIH, MOC, MAFF. ○ WHO/US-CDC/FAO 	<p>Procedure and steps to get ADB budget for outbreak investigation and response:</p> <ul style="list-style-type: none"> - Outbreak occurred. - Receive official letter from province. - Request to ADB-PMU by CDC. - MOU (signed by CDC director and Director of ADB project). - Mission order (signed by DG for Financial and Admin) - Field Work
Lao PDR	<p>Facilities upgrade (diagnostic lab, and national animal health lab) to ensure quality infrastructure that facilitates the base for prevention.</p> <ul style="list-style-type: none"> - capacity for the detection of Highly pathogenic Avian Influenza laboratory was established in 2005 under support of the FAO. - National Animal Health Laboratory. - 	<p>Enhanced NAHL capacity for conducting disease diagnosis and research activities related to HPAI and other priority diseases. This includes a process of:</p> <ul style="list-style-type: none"> - Planning: <ul style="list-style-type: none"> ○ Biosafety risk assessment ○ Developed logistical plan for the equipment relocation. ○ Consultation and recommendations. - Pre-moving: <ul style="list-style-type: none"> ○ Equipment decontamination and packing. ○ Training on routine equipment maintenance. ○ Biosafety cabinet assessment and decontamination. - Moving and beyond: <ul style="list-style-type: none"> ○ Equipment relocation and maintenance work. 	<p>Consult the quality laboratory management system at NAHL and liaise with external partners and stakeholders.</p> <ul style="list-style-type: none"> - Quality laboratory management system established and implemented at NAHL. - Established infrastructure, human resources, inventory, and documents required for a sustainable quality laboratory service. - Enhanced NAHL's capacity on conducting disease diagnosis and research activities related to HPAI and other priority diseases.

		<ul style="list-style-type: none"> ○ Equipment and BSC calibration and re-certification. ○ Provision of fixtures and fittings for the AI-related laboratory units (completed in 2012). ○ Laboratory Assessments. ○ 2013: the MORU-NAHL partnership program. 	
Myanmar	<p>Identification of six priority diseases: Rabies, Food Borne Diseases; Zoonotic Influenza; Anthrax; TB; Japanese Encephalitis.</p> <p>Development of a 5-year plan for 11 action packages in line with IHR requirements.</p> <p>Engaging in workshops to ensure quality identification process through capacity developing: One health strategy workshop (Nay Pyi Taw on 9th/10th March 2016).</p>	<p>DoPH and LBVD are working together for laboratory network, border trade control, and port health for human and animals (departmental communication channels).</p> <p>One Health – System Mapping and Analysis Resources Toolkit Training (OH-SMART), attended by concerned stakeholders from DoMS, DOPH, FDA, LBVD and Natural Resources and Wildlife Reservation Center, conducted on May 1-2, 2018, under the Lower Mekong Initiative Program</p> <p>Collaborating among DoPH and LBVD for implementing activities to achieve the goal of Rabies Elimination in 2030</p>	<p>Implementation of national plans:</p> <ul style="list-style-type: none"> - National strategy for pandemic influenza and its implementation plan. <p>Through IHR (2005) and Cross border collaboration, DoPH and LBVD are working together for Laboratory network, Border trade control (Ground Crossing Check Point), Port Health (Surveillance, Quarantine, and Prevention and control activities) for human and animals.</p>

Challenges to Global Health Security

- Human resources: limited competence workforce; no vaccination provided for front line staff (RRT).

- Finance: ADB budget is used to support only national team (only per-diem and travel); need time to get approval and may delay during the weekend or holiday.
- Laboratory capacity: limited.
- Communication networks between human and animal health branches.
- Systematic joint response mechanisms.
- Coverage restricted by capacity at district level.
- Cross-border communication and response practice.
- Lack of PPE at some provinces.
- Political commitment to ensure sufficient human and financial resources, and to develop the national strategies related to animal health/disease surveillance and control
- Financial resources for maintaining the existing established programs (QA, PT, Biosafety) without external assistance
- Limited human resources and absorbing capacity (in some laboratories)
- Need more training on
- Biosafety and Biosecurity, Quality Management System
- Writing SOPs for all documents of Quality Assurance
- Lack of budget to certify or calibration of equipment (Biosafety Cabinet Class II, ELISA reader machine...).

Recommendations

- Electronic Based Data sharing system strengthening (to develop a platform).
- Capacity-building (for both human and animal side stakeholders to implementation level).
- Needs more Evidence-based research.
- Strong Legislation and Policy Development (Communicable Disease Law and Notifiable Animal Disease).
- To develop Monitoring and evaluation framework and action plan.
- Available and useable contingency budget.
- Training Epidemiology to RRT.
- Availability and usable Lab kit for samples collection.
- Availability and usable PPE and other necessary material for outbreak investigation and response.
- Enhance the collaboration with internal and external institutions involving the disease diagnosis and livestock products quality testing products
- To set up Quality Management System for achievement ISO 17025
- Need more support from all organizations to implement of Quality Management System

Q&A Outputs

1. Lack of communication can be a big issue at the border. GMS nations need to work together to help each other more at the borders.
2. Bring in external bodies like the police to help coordinate and include them in the SOPs design and implementation. Communicable disease requires people to work together across multiple sectors and levels.

3. Genetically modified animal produce is an enticing economic prospect. It appears to be safe for consumption, but there is a need to keep close attention to ensure there are no risks to human, animal and environmental health.
4. There is a need to review the communication procedures in place and make sure that we have pen working networks on CDC and Global Health. Without a strong communications system many aspects do not work to address issues quickly enough.

Session 4: Group Discussion and Presentation 1:

- 1) Discussion on issues/challenges & intervention in human health.
- 2) Discussion on issues/challenges & intervention in animal health.

Chair: Dr. Sok Srun, Director of DHS, MOH (Cambodia).

Co-Chair: Dr. Sar Borann Sar, USCDC.

Content: The discussions and subsequent presentations cover the key issues and challenges faced in the human and animal health settings: specifically, as they pertain to the laboratory and biosafety sphere.

Key Insights: The GMS nations all experience a variety of national contextual issues, however they can be separated into four common categories. Human Resource; Infrastructure and Facilities; Technical Capacity and procedures; and Finance.

Group	Issues	Recommendations
1 – Human	<ul style="list-style-type: none"> - Equipment and supply. Not enough in quality or quantity. - Training. money needed to fund supplies, personnel and design. - Transport: cost of getting biological samples couriered safely is very high. - SOP require lots of technical assistance. - Infrastructure issues. Broadband, electricity cuts, poor lab design etc. - Human Resource: quality and quantity are an issue. 	<ul style="list-style-type: none"> - Budget in yearly expense plans for new equipment. Source new suppliers and leverage existing stakeholder network for support. - Training design for high quality outputs and balanced workload. - Share SOP practice between GMS nations. - Design a paradigm laboratory model for consultation in new design or refurb.
2 – Human	<ul style="list-style-type: none"> - Issue in biosafety/security requirements and lab guidelines. - Waste systems management. - Infrastructure. - Insufficient supply PPE. - Limited budget therefore everything is limited. - Discrepancy between response and request. - Staff motivation issues. 	<ul style="list-style-type: none"> - Design national and regional biosafety guidelines. - Ensure staff are properly trained with the waste system. Map out the process from waste to disposal and have it well displayed. - Plan for requirements and see if some materials can be acquired without the need for finance.

3 – Human	<ul style="list-style-type: none"> - Incompetency of laboratory staff/inadequate staff. - Lab accommodation inappropriate. - Lab testing (pre-analytical, analytical, post-analytical). - SOPs lacking/hiding away. They need to be actionable! - Laboratory safety procedures. 	<ul style="list-style-type: none"> - M&E, training, quality assurance and provide supplies. - Retain staff and effective human resource management. - Procurement of facilities; rebuild/redesign; minor repair of labs to be undertaken. - Utilize actionable SOPs. - Procurement of safety equipment and supplies. National biosafety training curriculum. Biosafety training workshop.
4 – Human	<ul style="list-style-type: none"> - Limited technical capacity and competency in the lab. - Limited staffing numbers. - Limited financial support. - Limitations of equipment (provision, maintenance and calibration). - Inadequate facilities. - Inadequate quality systems. - Difficulty in measuring staff performance. 	<ul style="list-style-type: none"> - Introduce well tested training quality programs to improve capacity and competencies – use WHO and external programs (ISO etc) and customise for local setting. - Incentivization (moving allowances, higher pay etc.) to work towards equity cross country. - Answer to most issues is money. However, <ul style="list-style-type: none"> o Money is only the means of transaction. o Identify requirements first. Requirements should dictate budget, not vice versa. o Strongly recommend practices such as ensuring an equipment acquisition and replacement plan. - Use the expertise at the national level in a mentoring process to help develop guidelines and protocol.
5 – Animal	<ol style="list-style-type: none"> 1. Human resource is limited and/or underqualified. 2. Inadequate budget for training, equipment, practice etc. 3. Poor doctor information sharing. 4. Lack of legislation. 	<ol style="list-style-type: none"> 1. Increase salary or incentive as motivation. 2. International support network. 3. Develop and implement an appropriate knowledge facilitation tool/procedure to

	5. Lack of stakeholder participation	<p>allow for necessary information sharing.</p> <p>4. Recruit international consultant to review and revise or develop legislation.</p> <p>5. Establish media communication to raise awareness and engagement.</p>
6 – Animal	<p>SOP writing as it is not easy it includes SOP for management, analysis, whole process in the lab: Infrastructure. Reporting from the private sector is limited and counterproductive. Cross-border challenge (illegal import at the border).</p>	<p>Plan to improve capacity more through training and investment. Engage high level commitment at the ministry level to sort this problem of poor infrastructure. Stronger communication channels between private and public sector. Help from government for registration to prevent illegal trafficking.</p>

Q&A Session Outputs

1. There is a need to find a regular and suitable PPE supplier for the region and within nations nationally. It is a top priority to have safety equipment and there appears to be a regional shortage.
2. The three nations share some similar problems in their health sector: PPE shortage, SOPs at all levels, funding constraints, and human resource (quantity and quality). It was discussed that there could be high benefit to sharing expertise and bolstering the GMS knowledge management strategy to share our expertise to address these issues together.
3. The medical waste disposal process requires more infrastructure development in all countries. There are not enough incinerators or suitable contractors to deal with the disposal process.
4. It was proposed that someone should develop a model working laboratory or nations to base their redesign or new builds on. This would allow for maximum flow and quality output.
5. Finance is always going to be an issue. It is suggested that nations start identifying their needs; classifying the timescales for requirement; and then plan to budget accordingly. In this way, it is a known quantity of resource requirement that may be able to get support beyond straight fiscal transaction (i.e. donation).
6. Nations should develop an in-service curriculum testing procedure to ensure that staff are maintaining the highest standards as required.
7. Accreditation is hard to get for accreditors. The process is long and costly. Cambodia identified how their biomedical cabinets can only be accredited by one individual who must be tested every two years. There is a need to establish a process of either internal accreditation or external accreditors from funding partners.

Session 5/6: Group Discussion and Presentation 2:

- 1) Discussion on priority/planning & intervention in human health.
- 2) Discussion on priority/planning & intervention in animal health.

Priority, Planning and Recommendation

Chair: Dr. Sau Sokunna, Cambodia.

Co-Chair: Dr. Bouakhan Phakhounthong, Lao PDR.

Content: The discussions and subsequent presentations cover the key priority and planning points in the human and animal health settings: specifically, as they pertain to the laboratory and biosafety sphere.

Key Insights: This session built upon session 4 by allowing the groups to identify specific priorities borne out of the earlier discussions identification of challenges. From here one can broadly divide the insights into four categories: Assessment: (Biological checklist, risk assessment); Audit; M&E development; and Communication techniques.

Group	Priority	Planning
1	<ul style="list-style-type: none">- Capacity development of the human resources- Equipment procurement.- Facilities upgrading.	<ul style="list-style-type: none">- Pre-service training (revise curriculum and increase training cost); end-of-service training, M&E.- ADB and development partners to help, investment plans for facilities.- Adapt to WHO standard guidelines.
2	<ul style="list-style-type: none">- Human Resource.- Finance.- Equipment and maintenance.- Facility.- Waste management.	<ul style="list-style-type: none">- Increase the number of staff; request to MOH or get contract staff; training and quality assurance.- Request the budget: put in AOP and define partner funder.- Biomedical engineer identification and training.- Renovation for existing labs; in the future we should have standard lab designs.- Focus on equipment required; follow the guidelines (biosafety guideline etc.); and train the staff.
3	<ul style="list-style-type: none">- Human resource- Financial support: lack of financial resources for hospital, lab and equipment.	<ul style="list-style-type: none">- Hire staff and request additional staff to government.- Develop in-service training, hire external consultants to identify areas of improvement.

	<ul style="list-style-type: none"> - Staff: short of staff and quality isn't always available. - Policy development guidelines. 	<ul style="list-style-type: none"> - Work with available guidelines on lab quality and biosafety and adapt for local use.
4	<ul style="list-style-type: none"> - Refocus at central level first: for Lao and Cambodia we have only one central active laboratory - Move on to establish a national lab network. - Human and physical resource. - Legislation and guideline quality/use. 	<ul style="list-style-type: none"> - Would like to be accredited by ISO17025 in the next 5 years. - Focus on the improvement of capacity in terms of the laboratory management, biosafety and QAQC. - Hire an external/internal expert to help revise/review the legislations/manuals/guidelines and to help us to develop a QAQC by understanding the key requirements. Need international support.

Having established the priority and planning items by group, the workshop body opened the floor to a discussion (session 6) on the priority items. As such the outputs of the Q&A format of this block are listed below as the identified priorities. They take three forms:

- 1) **The regional priority items.** These are the priority identifications of the workshop based upon its objectives to improve laboratory quality and biosafety in the promotion of a one health approach that engages the human-animal nexus.
- 2) **Planning needs.** These are the four classifications of requirement to make the regional priority needs actionable.
- 3) **Recommendations.** These five points are the agreed actions that could be agreed upon in the workshop to work towards the identified priority items. The recommendations of the collaborative plan of action. It is important to understand the process of post-workshop action in a concise manner. This presumes unnecessary duplication to be an inhibitor to this.

Regional Priority Items
<ol style="list-style-type: none"> 1. Human Resource: training capacity for BS/BP, SOPs, BSC, Occupational health, Waste Management, Clinical Lab. 2. Facilities: inappropriate lab design limits flow. Designing a model lab to describe optimal flow, functionality – used for renovation and basis for new laboratories. 3. Accreditation: designated resources for an accreditation officer.

4. **Preventive Maintenance and Calibration:** correct facilities and equipment, including the biomedical engineering development (BSC certification).
5. **EQA program:** subscribe to receive panel and work to develop in-country the EQA panel.
6. **High pathogenic storage and referral system** in Biosecurity concept (ADB fund allowance should be available), facility for storage, guideline and SOPs.
7. **Health Care Waste Management:** infectious waste, chemical waste.
8. **Information System** (Lab Management Information System).

Planning Needs

- | | |
|------------------------------|--|
| 1. Assessment. | Carry out assessment of current laboratory and biosafety practice to identify and classify strengths, weaknesses, opportunities and threats. |
| 2. Audit. | Undertake a procedural audit to understand the current scope and quality of coverage of best-practice in each nation. This seeks to mitigate against replication of procedural documents and will work to identify necessary steps to improving laboratory quality and biosafety. |
| 3. M&E development. | In order to ensure that regional priority items can be suitably actioned under the workshop recommendations, there must be an appropriate monitoring and evaluation framework in place. It is crucial on two main fronts: (1) to measure success, identify progress and enact change; (2) to facilitate the knowledge sharing practice between nations and internally between sectors. |
| 4. Communication techniques. | The success of the health security project is contingent on the ability for national actors to communicate successfully. It is crucial that working groups and communication modes are utilized for ongoing detection, action and prevention activities. |

Closing Remarks

Workshop MC Ms. Monipheap invites Dr. Bouakhan Phakhounthong from Lao PDR and Dr. Sok Srun from Cambodia to make their closing remarks.

Dr. Bouakhan Phakhounthong:

“On behalf of the Lao team I would like to extend my thanks to Cambodia and the project team for hosting this important workshop. It has helped us address crucial areas of laboratory service, human health, animal health. It had engaged proposals for the continued improvement in quality, and to raise work in the GMS countries through lessons learned for moving forward.

There have been some excellent suggestions for continuing to improve quality and laboratory practice, and we can take them back to our countries to help us move forward and ensure quality improvement projects.

Thank you again to our friends and colleagues in Cambodia for organizing this very successful event. I look forward to future events to learn more from our family in the GMS.

Safe trip to everyone as they return to their home and family.”

Dr. Sok Srun:

“I would like to say thank you so much to everybody on this last day of the workshop. It is now finished completely and has brought about very fruitful group discussion on the issues and challenges and interventions on the topic, as they pertain to Cambodia, Lao and Myanmar.

We are very hopeful that the group presentations can maintain the momentum of this workshop and grab at the national and regional level. There are a lot of good and excellent comments to be developed.

I take this opportunity on behalf of the ministry of health and myself to thank you for your working hard and creating excellent discussion during this workshop.

Good health and success to all. Especially I wish you to have a safe trip back home. Enjoy your families.

I now close the workshop.”

Section 4: Common Gaps, Challenges

The workshop sessions provided excellent opportunities to identify a range of common gaps and challenges. These were identified regionally, nationally, organizationally, and globally. The table below details the key common gaps and challenges that were identified across the workshop.

Common Gaps, Key Challenges	
Human Resources	<p>The human resource challenge is twofold:</p> <ol style="list-style-type: none">1) Quality. There is a gap in the required expertise and competency across a range of laboratory, biosafety, and healthcare employments. Staff often lack the tools required for self-improvement (training schemes, on-job support), and occasionally lack the motivation entirely.2) Quantity. To compound the issue of staff quality issues, there are also not enough people for the required positions. Vets in particular have been identified as elusive to the ministry of health programs.
Infrastructure	<p>Infrastructure challenges cover a number of forms.</p> <ol style="list-style-type: none">1) Laboratory Facilities. Often old, ill-equipped and not fit for purpose. There is a need to upgrade current facilities as well as a demand for new development.2) Waste Management. The infrastructure for dealing with the waste process is a common issue. There is often not the capacity to undertake systematically: a shortage of incinerators is identified as a particular issue.3) Road and Rail. The transportation of specimen samples is difficult in the region. An unsuitable rail and road network contribute to the difficulty.
Laboratory Design	<p>The design of the laboratory floor and equipment plan is unsuitable for practice. Current facilities often challenge workers for space, equipment and harmony.</p>
Collaboration	<p>The health security project requires collaboration at multiple levels (village, district, province, nation, region) and across numerous stakeholders (animal health, human health, environmental</p>

protection, economic trade channels, tourism etc.). Currently there is a need to enhance the collaboration across two key areas:

- 1) **Inter-nation.** Collective working needs promoted at all levels of a nation. It is currently improving at national level and across borders; but is severely lacking down at the district and provincial level.
- 2) **Health Stakeholder.** Improvements need to be made in collaboration between the mentioned multiple health stakeholders to ensure effective identification, verification and action.

Finance

Finance is identified to be a major inhibitor to timely and successful healthcare approaches. It is difficult to fund the identified improvements.

Process Quality

There are a number of excellent SOPs, legislation and process documents available within each nation. However, there is a feeling that they are not filtering down below national level and can lack practical recommendations that can ensure quality in the national context.

Empowerment

Despite improvements, there is a feeling that agents working in healthcare need empowered to carry out necessary actions in the face of a potential health crisis.

Communication

There aren't suitable or utilized communication channels between numerous healthcare stakeholders. This makes it difficult to respond in the desired timeframe to an outbreak, or to leverage a more appropriate identification network.

Capacity

The capacity of the healthcare network is stretched. There are too few people doing too much work with poor infrastructure, resource and equipment.

Equipment

There isn't enough laboratory equipment to go around. PPE in particular is severely lacking.

Section 5: Collaborative Plan of Action for Intervention and Coordination

A key objective of this workshop was to consider a plan of action moving forward. Below are the key considerations to be operationalized within a regional collaborative plan of action. The process is threefold and takes the same form as described in the last section. Identified issues are agreed upon; mechanisms by which they can be enacted are identified; and finally, actionable recommendations are made.

There are five recommendations in total to come out of the workshop.

Recommendations

1. Conduct a mid-term review and evaluation of regional plan.
2. Identify annual budget priorities. Once identified, prioritise and plan for them.
3. Ensure that the ADB Regional GMS has standard indicators for biosafety. If not, they need established. If so they need disseminated.
4. Identify and implement an operational framework for laboratory quality and biosafety.
5. Identify the progress of LAB/IPC focal points; utilise their capacity and regional knowledge for strategic direction. Ensure that they are in good communication.

Section 6: Conclusion and Proposed Follow up Activities

Lab services are integral to health services and require continuous upgrading and strengthening in order to provide optimum quality for diagnostic testing and the management of patient care. Reliable and timely results from lab investigations are critical elements in decision making in all aspects of health care and essential to the monitoring and control of diseases.

The GMS countries need to work together to facilitate a multi-sectoral engagement within and between each country, to prevent and control those diseases in humans, animals, plants and the environment. This workshop provides a much-needed opportunity to promote cross-border cooperation and learning.

The RWLQB provided an opportunity for those in attendance to meet output one through networking and sharing information on laboratory quality, biosafety and bio risk management in the region. By identifying and assessing the key national/regional gaps and challenges, the workshop worked towards the key strategies required to promote laboratory quality and health security measures alongside the animal and human health interface.

The Objectives were as follows:

- 1) Networking and sharing information on laboratory quality, biosafety and bio risk management in the region.
- 2) Identify and assess the priority biosafety gaps and challenges in the countries (shared assessment findings).
- 3) Promote animal and human health interface in biosafety and health security measures.
- 4) Identify key activities and strategies to promote biosafety and quality laboratory services.

The workshop successfully met its objectives and provided a rich insight upon the common achievements and challenges within the nations and across the region. Through group collaboration sessions, these insights were worked into actionable recommendations. The specific challenges and recommendations are listed in the previous two sections of the report. They constitute a collaborative commitment to improving national standards for the furtherance of health security within the region.

In addition to these concluding outcomes there is a need to highlight four further actionable points to ensure the successful implementation of the workshop outputs. These are:

- 1) Dissemination of the workshop report for review, request and submission.
- 2) Operationalization of a working group to facilitate the implementation of the action points.
- 3) Organization of a follow-up workshop to discuss the successes, pitfalls and subsequent stages of development.

- 4) Review of operational procedures to ensure each nation is aware of their total healthcare legislation and mechanisms. This would help identify overlaps or gaps for future discussions and practice.

In concluding remark: the regional workshop on laboratory practice and biosafety facilitated a necessary and insightful working platform to address the emerging issues both nationally and regionally. In particular, the commonality of many concerns engaged a deeper working ethos throughout the workshop and engendered useful and necessary action points.

It is however important to note that there needs to be continued action in the area of laboratory practice, biosafety and biosecurity. This is only the starting point from which meaningful improvements can be made. Without commitment and engagement moving forward they are certain to fall into the pile of workshop actions unutilized.

Annex 1 – H.E Professor Eng. Huot Full Speech

“Today is a great honor for me to precede over the opening of the regional workshop on laboratory quality and biosafety for the CDC GMS HSP. The main purpose of this workshop is to improve the quality of biosafety and laboratory service.

On behalf of the MOH it is a great pride that Cambodia is hosting this important regional event. My most profound thanks to the ADB for its support and to the laboratory service, Lao, Myanmar and Vietnam. I would like to thank development partners WHO, USDAC OIE, and the Institut Pasteur du Cambodge for providing technical support for this workshop.

Over the past decade of globalization there has been a rapid growth of economy, social cultural development and changing health. Recently Malaria has declined dramatically but it is still a major concern that requires monitoring and control. To fight these communicable diseases, we need lab techniques and biosafety techniques at all levels in hospitals and labs. Regional forums on laboratories in the past (Lao 2013 and Myanmar 2018) have shown the effort for developing national action plans, alongside the capacity building of labs in each country as we move toward accreditation in line with international standards of ISO15189.

Based on the assessment by the WHO in 2016, the capacity of labs quality management system and biosafety/security management security remained low. Biosafety and biosecurity are national and subnational concerns. Some district level labs need to have national standard checks and have not upgraded their standards and cannot issue correct testing results.

To improve the control of communicable disease there is a need to follow various existing guidelines announcing the capacity of the biosafety committee for health collaboration cross border. The MOHs of the CLMV need to work together to adhere to quality standards as stated in the national health regulations on and related to biosafety and biosecurity and develop list of high-risk pathogens.

Cambodian national biosafety committee guidelines 2016 and national biosafety curriculum for labs 2018 have been developed; however, we will be developing a national balance on laboratory safety in the future for the nation.

Thanks ADB who seek to help build the capacity of laboratories and biosafety in the GMS through the ADB GMS HS.

I hope that all participants and speakers will share their practical experiences and expertise with the workshop for.

- 1. Connecting and info sharing,*
- 2. Identify major challenges and gaps in biosafety, and*
- 3. Improve the relationship between human and animal health*

4. *Identify strategic areas and directions to improve lab quality and biosafety.*

On behalf of the MOH I would like to thank all international participants for taking hard work and time so that workshop can be successful. I strongly hope that the attention and effort of all participants within the framework of cooperation regional communication metric, that with all technologies that provide long term benefits in the region (work together closely with available tech)

I wish you all nobility, health, and

strength. I declare the workshop open.”