Table of Contents

Acknowledgement ........................................................................................................... 1
Abbreviation and acronyms .............................................................................................. 1
Executive Summary ........................................................................................................... 3
Introduction ....................................................................................................................... 5
Welcome and opening remarks ......................................................................................... 7
Session 1: Multi-sectoral Collaboration for Zoonoses Prevention and Control: Five Years in Retrospect ....................................................................................................................... 11
Session 2: Situation Update on Zoonoses ......................................................................... 12
Session 3: Multi-sectoral Collaboration, Public Health Events and Emergency Response ................................. 20
Session 4: Managing AMR at the Human-Animal Interface ............................................. 24
Partner’s forum .................................................................................................................... 29
Annex 1. Final Programme ................................................................................................ 30
Annex 2. List of participants ............................................................................................. 33
Annex 3. Summary of survey result of zoonoses situation & One Health National Coordination mechanism ......................................................................................................................... 46
Annex 4. Summary of survey result of AMR ................................................................... 52
Acknowledgement

The Tripartite would like to express gratitude to the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan for the financial support to this workshop and Hokkaido University for hosting the workshop.

Dr Hirofumi Kugita
Regional Representative, OIE Regional Representation for Asia and the Pacific

Nov 2015
Abbreviation and acronyms

AAHL     Australian Animal Health Laboratory
AEGCD    ASEAN Expert Group on Communicable Diseases
AG       Advisory Group
AHIP     Animal-Human Interface Program
AMR      Antimicrobial Resistance
APSED    Asia-Pacific Strategy for Emerging Diseases
ARES     ASEAN Rabies Elimination Strategy
ASEAN    Association of Southeast Asian Nations
ASWGL    ASEAN Sectoral Working Group on Livestock
BSE      Bovine Spongiform Encephalopathy
CCHF     Crimean Congo Haemorrhagic Fever
CDC      Centers for Disease Control and Prevention
CFE      Contingency Fund for Emergency
CIRAD    French Agricultural Research and International Cooperation Organization
CSIRO    Commonwealth Scientific and Industrial Research Organisation
DIVA     Differentiate Infection from Vaccinated Animals
DRR      Disaster Risk Reduction
DTRA/CBEP Defence Threat Reduction Agency/Cooperative Biological Engagement Program
ECTAD    Emergency Center for Transboundary Animal Diseases
EMPRES   Emergency Prevention System
ERM      Emergency Risk Management
EVD      Ebola Virus Disease
FAO      Food and Agriculture Organization of the United Nations
FAO RAP  FAO Regional Office for Asia and the Pacific
FETP     Field Epidemiology Training Programme
GAP      Global Action Plan
GARC     Global Alliance for Rabies Control
GF-TADs  Global Framework for Progressive Control of Transboundary Animal Diseases
GHSA     Global Health Security Agenda
HPAI     Highly Pathogenic Avian Influenza
HPED     Highly Pathogenic and Emerging and Re-emerging Diseases Programme
HSI      Humane Society International
IEIP     International Emerging Infections Program
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>IHR</td>
<td>International Health Regulations (2005)</td>
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<td>JICA</td>
<td>Japan International Cooperation Agency</td>
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<td>JRA</td>
<td>Joint Risk Assessment</td>
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<td>JTF</td>
<td>Japan Trust Fund</td>
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<tr>
<td>KSA</td>
<td>Kingdom of Saudi Arabia</td>
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<td>LPB</td>
<td>Low Pathogenic Avian Influenza</td>
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<td>MAF</td>
<td>Ministry of Agriculture, Forestry and Fisheries</td>
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<tr>
<td>MBDS</td>
<td>Mekong Basin Disease Surveillance</td>
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<td>MERS-Cov</td>
<td>Middle East respiratory syndrome coronavirus</td>
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<td>MHLW</td>
<td>Ministry of Health, Labour and Welfare</td>
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<td>NEOC</td>
<td>National Emergency Operation Centre</td>
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<td>NIID</td>
<td>National Institute of Infectious Diseases</td>
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<td>NVAL</td>
<td>National Veterinary Assay Laboratory</td>
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<td>OIE</td>
<td>World Organisation for Animal Health</td>
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<td>OIE RRAP</td>
<td>OIE Regional Representation for Asia and the Pacific</td>
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<td>OIE SRRSEA</td>
<td>OIE Sub-Regional Representation for Southeast Asia</td>
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<tr>
<td>PDNA</td>
<td>Post-disaster Needs Assessment</td>
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<td>PEP</td>
<td>Post-Exposure Prophylaxis</td>
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<td>PHS</td>
<td>Public Health Service</td>
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<td>PVS</td>
<td>Performance of Veterinary Services</td>
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<td>SAARC</td>
<td>South Asian Association for Regional Cooperation</td>
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<tr>
<td>SATREPS</td>
<td>Science and Technology Research Partnership for Sustainable Development</td>
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<td>SLCP</td>
<td>Strengthening Laboratory Capacity Program</td>
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<tr>
<td>SOM-AMAF</td>
<td>Senior Officials Meeting-ASEAN Ministers of Agriculture and Forestry</td>
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<tr>
<td>SOMHD</td>
<td>Senior Officials Meeting on Health Development</td>
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<tr>
<td>SPC</td>
<td>Secretariat of the Pacific Community</td>
</tr>
<tr>
<td>SPEED</td>
<td>Surveillance in Post Extreme Emergencies and Disasters</td>
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<tr>
<td>TWG</td>
<td>Technical Working Group</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>USDA-APHIS</td>
<td>United States Department of Agriculture, Animal and Plant Health Inspection Service</td>
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<tr>
<td>VS</td>
<td>Veterinary Services</td>
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<td>WAP</td>
<td>World Animal Protection</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<td>WHO SEARO</td>
<td>WHO Regional Office for Southeast Asia</td>
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<td>WHO WPRO</td>
<td>WHO Regional Office for Western Pacific</td>
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Executive Summary

The Tripartite, the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) and the World Health Organization (WHO) have institutionalised a Tripartite coordination mechanism to support countries for surveillance, prevention and control of zoonoses and emerging diseases at the human, animal and ecosystem interfaces.

As a part of the Tripartite coordination mechanism in the Asia-Pacific Region, the annual regional workshops have been organised to review progress in prevention and control of zoonoses and to define the way forward to further strengthen multi-sectoral coordination and collaboration since 2010. This workshop was the 6th meeting to reflect on achievements made to date. In addition, the meeting addressed lessons learnt to progress multi-sectoral collaboration on zoonoses prevention and control at country and regional levels and other relevant public health threats, such as antimicrobial resistance (AMR).

The progress and recommendations of the previous workshop as well as updates on zoonoses and AMR were reviewed. Prior to the workshop, questionnaires (concerning zoonoses and AMR), and country slide templates (concerning either rabies or zoonotic influenza) were sent to the country participants for completion. These questionnaires and templates formed the foundation of the activities and presentations during the workshop. The results of the zoonoses and AMR questionnaires were analysed and summarised by the OIE RRAP and OIE SRRSEA respectively. The country slides were utilised in the wall chart session chaired by FAO RAP.

The workshop on Multi-Sectoral Collaboration for the Prevention and Control of Zoonoses was held from 28 to 30 October 2015 in Research Center for Zoonoses Control at Hokkaido University in Sapporo, Japan. The workshop was attended by total 89 participants, including 22 countries from both Animal Health and Public Health Sectors, 2 Sub-Regional Representatives (ASEAN and SAARC Secretariat), 10 Development Partners (CDC, CIRAD, CSIRO, DTRA/CBEP, JICA, MBDS, NIID, NVAL, USDA-APHIS and WAP) and Tripartite (FAO, OIE and WHO). The proportion of female participants at this workshop (39%) was more than the 2014 workshop (33%).
The meeting recommends that:

1. While progress has been made over the past 5 years since the first meeting in Hokkaido 2010, countries and the Tripartite partners continue to strengthen multi-sectoral collaboration at global, regional, and in particular national and sub-national levels;

2. Whether in the presence or absence of a priority zoonotic disease such as avian influenza or rabies, countries and the Tripartite partners continue implementing and promoting the elements of a functional coordination mechanism and activities, including joint risk assessment where appropriate, as key components of good emergency preparedness and management practices;

3. Countries and the Tripartite partners need to improve understanding and knowledge of the disease characteristics of newly emerging zoonoses, such as Middle East Respiratory Syndrome Coronavirus (MERS-CoV), through multi-sectoral collaborations to inform policy decisions and accordingly convene appropriate platforms for consultative procedures;

4. Countries, with support of WHO/OIE, engage in joint national IHR/PVS workshops in order to enhance coordination and collaboration of human health and animal health sectors and to advocate for high level political commitment;

5. The Tripartite partners support capacity building to better integrate disaster risk management at the human/animal/environmental interface with adequate resource allocations;

6. Countries develop and/or implement national strategies and action plans in alignment with the Global Action Plan on Antimicrobial Resistance and countries shall ensure that such strategies are in consultation with the sub-national, local as well as the industry players/stakeholders;

7. The Tripartite partners support the implementation of the Global Action Plan on Antimicrobial Resistance at regional and country levels;

8. The Tripartite partners document lessons learnt on multi-sectoral collaboration for the prevention & control of zoonoses from the last 6 tripartite workshops;

9. The Tripartite partners analyse and disseminate the Regional zoonoses and AMR 2015 survey results;

10. The Tripartite partners will continue to engage ASEAN, SAARC, SPC & other International partners to enhance regional collaborations on One Health and zoonoses control and share their experiences in improving the system;

11. The next Asia-Pacific Workshop on Multi-Sectoral Collaboration for the Prevention and Control of Zoonoses be organised in two years to allow time to report meaningful progress, for appropriate coordination and preparation of the workshop, and for efficient use of limited financial resources.
Introduction

Background

The global human population reached 7 billion in 2014, and will continue to increase at a steady pace to an estimated 9 billion or more by 2050 and more, than 70% of the world human population live in the Asia-Pacific Region. The demand growth and intense urbanisation, leading to intensification of farming systems, greater interaction between humans and wildlife, climate change, and globalisation of trade, are some of the main underlying drivers for zoonotic diseases.

A multi-disciplinary, multi-sectoral approach is increasingly being adopted as a way to address common concerns on zoonotic diseases. There have been various platforms, regulations, guidelines, strategies and tools at global and regional levels developed. Examples include the International Health Regulations (IHR 2005), the Global Framework for Transboundary Animal Diseases (GF-TADs), the OIE Performance of Veterinary Services (PVS) Pathway and Tools, the FAO Emergency Prevention System (EMPRES) for Animal Health and the Asia-Pacific Strategy for Emerging Diseases (APSED). More recently, the Global Health Security Agenda (GHSA) brings countries, international organisations and public and private stakeholders together to seek and accelerate progress towards a world safe and secure from infectious disease threats, including zoonoses, and to promote global health security as an international security priority. These platforms, regulations, guidelines, and tools aim to facilitate a functional coordination mechanism to support the member countries to effectively implement zoonosis prevention and control.

FAO, OIE and WHO have institutionalised a Tripartite coordination mechanism to support countries for surveillance, prevention and control of zoonoses and emerging diseases at the human, animal and ecosystem interfaces. As a part of the Tripartite coordination mechanism in Asia-Pacific Region, annual regional workshops have been organised to review progress in prevention and control of zoonoses and to define the way forward to further strengthen multi-sectoral coordination and collaboration.

Since 2010, five regional workshops have been organised to advance zoonosis control and prevention. The workshops provided opportunity for member countries in the region to update each other on the progress made in establishing a functional multi-sectoral coordination mechanism, in implementing prevention and control of zoonoses at country level, and in sharing their experiences including problems and constraints encountered.

The 6th Asia-Pacific Workshop on Multi-Sectoral Collaboration for the Prevention and Control of Zoonoses provided the opportunity to reflect on achievements made, as well as lessons learnt.
to progress multi-sectoral collaboration on zoonosis prevention and control at country and regional levels since the inception of the regional workshop in 2010. The workshop looked at how such multi-sectoral collaboration could also be utilised to address other relevant public health threats, such as AMR.

**Objectives**

The objectives of the workshop were:

i) to provide an update on the situation and scientific information of emerging and re-emerging zoonotic diseases, as well as other public health threats, at global, regional and country levels;

ii) to review achievements made and challenges encountered over the recent years, including the period since the inception of the regional zoonoses workshops in 2010, regarding multi-sectoral coordination at regional and country levels to inform the way forward;

iii) to discuss how multi-sectoral collaboration can contribute to response to public health emergencies; and

iv) to make recommendations on how to further improve coordination and collaboration between the human health, animal health and other relevant sectors related to zoonoses prevention and control.

The three-day workshop included four sessions applying various modalities, such as presentations, questionnaire surveys, and wall chart/panel/plenary/group discussions.
Welcome and opening remarks

Master of ceremonies: Dr Yooni Oh, OIE RRAP

Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan

Dr Kazuo Ito, Director of International Animal Health Affairs Office, Animal Health Division, Ministry of Agriculture, Forestry and Fisheries, Japan welcomed the participants to Sapporo. He commenced the session as the representative of animal health sector of host country, on behalf of the OIE Delegate to Japan, Dr Toshiro Kawashima.

Dr Ito mentioned that the first workshop on Multi-sectoral Collaboration for the Prevention and Control of Zoonoses in the Asian Pacific Region was held in Hokkaido University in 2010. He introduced the One Health approach implemented in Japan, which has long been in place in the country. For instance, under the Act on Rabies Prevention and Control, the public health measures against rabies are implemented jointly by the Ministry of Health, Labour and Welfare (MHLW), while the border control measures are under MAFF jurisdiction. In addition, AMR control has been implemented in a well-coordinated manner by close collaboration between MAFF and MHLW. Such coordination has been enhanced since the first detection of Bovine Spongiform Encephalopathy (BSE) case in Japan in 2001. In 2002, the amended Act on Domestic Animal Infectious Disease Control stipulated that when addressing zoonotic diseases, MAFF and MHLW would exchange information and expertise. In 2011, the abovementioned act was further amended to involve Ministry of Environment (for the wildlife sector). This tri-ministerial coordination mechanism aims to address animal and human health risks at the animal-human-ecosystems interfaces, examples being zoonotic influenzas, rabies and AMR.

In addition, Japan has been contributing to the Asia region through “OIE/JTF Project for Controlling Zoonoses in Asia under One Health Concept”. The objective of such is to prevent and control zoonoses, namely avian influenza and rabies, under the One Health approach and to strengthen the capacity of veterinary services. Dr Ito reiterated Japan’s full commitment to the OIE 6th Strategic plan for 2016-2020, emphasising One Health. Dr Ito closed his speech by expressing gratitude to the participants, members of the Tripartite as well as Hokkaido University for hosting the workshop.

Ministry of Health, Labour and Welfare (MHLW), Japan

Dr Shoji Miyagawa, Director of Infectious Disease Information Surveillance Office, Health Service Bureau, Ministry of Health, Labour and Welfare, Japan commenced his
opening remarks by addressing the public health hazards of infectious disease and noted that many of these are known to be caused by zoonotic agents. Zoonotic infectious diseases including the Ebola Virus infection in West Africa, the MERS-CoV in Saudi Arabia and Avian Influenza H7N9 in China remain threats to our modern community. In addition to the above, AMR is another current global issue in public health in both human and animal sectors. It requires promoting a multi-sectorial approach for surveillance, management and monitoring the use of antibiotics in both the human and animal sectors.

Dr Miyagawa also made the point that it is important to identify/take note of the nature of the abovementioned infectious disease agents and the mode of transmissions from animal to human and human to human. At the same time we should be mindful of the importance of preparedness for those events, as zoonotic events happen at unexpected times in our communities. In preparation for these events, collaboration is necessary between different stakeholders within both domestic and international communities. This workshop would hopefully provide the participants opportunities to have useful discussions on prevention and control of zoonotic infectious disease and AMR.

Research Center for Zoonoses Control, Hokkaido University

Prof. Hiroshi Kida, Head, Research Center for Zoonoses Control, Hokkaido University expressed his honour in welcoming the participants on behalf of Hokkaido University. He mentioned that the first Tripartite workshop for multi-sectoral collaboration for the prevention and control of zoonoses was held in Hokkaido University back in 2010. Since then, each workshop has been organised by one of the Tripartite partners and held in different venues within the Asia-Pacific Region. The 6th workshop would look at multi-sectoral collaboration on combating public health threats such as AMR.

Prof. Kida explained the main objectives of the workshop including providing update of situation and scientific information of emerging and re-emerging zoonoses; review progress and achievements regarding multi-sectoral coordination; how the contributions resulting from the collaboration have contributed to public health. It is crucial for the Tripartite to make recommendations at the last session of the workshop on how to improve collaboration between animal health, human health and other relevant sectors on zoonoses prevention and control.
**FAO**

Dr Peter Black, Deputy Regional Manager, Emergency Centre for Transboundary animal Diseases (ECTAD), FAO Regional Office for Asia and the Pacific (FAO RAP) made welcome remark on behalf of Dr Wantanee Kalpravidh who was unable to attend the meeting due to other work commitments.

Dr Black commented that the workshop would be an invaluable opportunity to be updated and hold discussions on topics that lead to important outcomes in preventing and combating zoonoses in the future. He noted that the threat of zoonoses and AMR has been increasing, which indicated that we would need to be even better prepared in terms of prevention and response. It would be important to make the best use of the time in Sapporo and work together on One Health approach in a formal and structured way, including to:

- Highlight the areas of work on zoonoses including AMR,
- Highlight global issues and the opportunities for funding from donor agencies
- Work smart and translate recommendations into actions
- Address issues and build sustainability around the One Health approach

Dr Black expressed appreciation for the OIE RRAP and Hokkaido University in hosting this workshop.

**WHO**

Dr Frank Konings, Technical Officer, WHO Regional Office for the Western Pacific (WPRO) commenced his presentation by citing how the workshop, which has been organised by Tripartite on a rotational basis, has been a unique occasion for addressing zoonoses work at the animal health and human health interface.

Dr Konings noted that Asia-Pacific Region has been a hot spot of various emerging diseases, and many of them are zoonotic in origin. With the recent events of avian influenza H7N9, MERS-CoV, Ebola in Africa and the natural disasters like typhoons, earthquakes and flooding, he commented that it was indeed right time to discuss health security issue and zoonoses. He also explained the goals which WHO would like to achieve via the programme APSED, including but not limited to dedicated areas for international collaboration; as a generic platform for alert and response as well as making progress in improving the health security of the region. As such, there is the need to strengthen the work at the animal health and human health interface.
He closed the opening speech by expressing continuous support to the Tripartite meeting on behalf of the WHO and stating how he was looking forward to more collaboration in the coming three days, as well as acknowledging that it would be WHO’s turn to organise the next workshop.

**OIE**

Dr Hirofumi Kugita, Regional Representative, OIE Regional Representation for Asia and the Pacific (RRAP) expressed sincere gratitude on behalf of the OIE to Hokkaido University for hosting the workshop. He noted the significant role of the Tripartite in promoting the coordination and collaboration of One Health. He explained this meeting has been held annually since 2010 and OIE RRAP was honoured to take the lead in organising the 6th Tripartite workshop this year.

Dr Kugita has noted that the workshop has brought together nearly 100 participants including representatives from various backgrounds, including both animal health and human health experts from 22 countries, partners as well as observers in Hokkaido University. He wished that the participants would have three productive days in generating valuable recommendations on promoting the collaboration of different sectors in prevention and control of zoonoses.

Dr Kugita then declared the official opening of the 6th Asia-Pacific Workshop on Multi-sectoral collaboration for the prevention and control of zoonoses.
Session 1: Multi-sectoral Collaboration for Zoonoses Prevention and Control: Five Years in Retrospect

Dr Carolyn Benigno, Animal Health Officer, FAO RAP explained it would be difficult to review the past five workshops by PowerPoint slides. As such, the Tripartite summarised the recommendations of the previous workshops and activities from the past 5 years by compiling a 10-minute video. Since the inception of the first Tripartite zoonoses workshop of 5 years ago, there has been much progress with multi-sectoral collaboration to address prevention and control of zoonotic diseases and AMR, in line with existing strategies such as the APSED and GF-TADs which will provide a foundation for future strengthening in this area.
Session 2: Situation Update on Zoonoses

Session Chair: Dr M.J.H. Jabe, Dr Bounlay Phommasack

Update on regional zoonotic disease status: Dr Frank Konings

Dr Konings, Technical Officer, WHO WPRO started his presentation by stating that health security threats including but not limited to SARS, H5N1, H7N9, MERS-CoV are inevitable. As such, it is crucial to invest in preparedness during peace-time which would allow a rapid response in the event of emergencies. He explained that the APSED serves as a regional tool to comply with IHR core capacities, and therefore can manage health security threats collectively.

Dr Konings explained various aspects of the APSED, including its focus area, regional effort made and evaluation performed. He then illustrated the value and importance of the APSED with commonly found health security threats including MERS, Ebola Virus Disease (EVD), Influenza, Crimean Congo Haemorrhagic Fever (CCHF), Leptospirosis and Nipah.

Dr Konings concluded the presentation by stating that Health Security threats are inevitable and do not respect national borders. The consequence of those would go beyond health impacts and a good framework is therefore absolutely necessary.

Regional updates on zoonotic diseases and survey results: Dr Yooni Oh

Dr Oh, Regional Project Coordinator, OIE RRAP commenced the presentation by explaining the OIE’s disease reporting system and OIE disease data collection and sharing. She gave a summary on disease reported via the immediate notification system in 2015 in Asia-Pacific Region including disease situation for the top 5 priority zoonotic diseases.

Prior to the workshop, a questionnaire concerning zoonoses were distributed to the participating countries for completion. A total of 23 countries responded to the questionnaire. According to the questionnaire, a total of 42 different zoonoses were reported, with rabies remaining the most commonly reported zoonosis in 2015 within the region, followed by leptospirosis, anthrax, brucellosis and avian influenza. Updates were given on the top 5 priority zoonoses of concern within the region, namely rabies, anthrax, avian influenza, leptospirosis and brucellosis.

Dr Oh also summarised the other components of the questionnaire regarding the national One Health mechanisms of the participating countries, operationalisation and key supporting elements. While 87% of the participating countries reported One Health mechanisms within their system, only 80% had legally-recognised One Health mechanisms. Ninety percent of the
countries would have One Heath meetings regularly and 91% noticed result changes in countries; joint activities, and raising awareness of One Health. Approximately 50% of the countries receive fundings for both One Health meetings and other One Health events.

The detailed summary of the questionnaires can be found in Annex 3 of this report.

**Challenges for the control of avian influenza and preparedness for future pandemics in humans: Prof. Hiroshi Kida**

Prof. Kida started the presentation by providing background and origin of highly pathogenic avian influenza (HPAI). He explained the persistence of HPAI H5N1 strains in poultry was mainly due to the misuse of vaccine. He also pointed out that for the containment and eradication of avian influenza in the poultry flocks infected, enhanced surveillance, early detection, culling of flock, movement restrictions and strengthening hygiene without misuse of vaccine should be employed. Vaccines should be carefully used in addition to, but not instead of stamping out. Vaccination was not primarily recommended but later approved as one of the options and should be applied only under DIVA based strategy. This is because vaccination could lead to the silent spread of the virus. He opined that the avian influenzas of concern HPAI and LPAI H7N9 are not the only candidates of endemic influenza and are unlikely to cause pandemic influenza as direct transmission of these avian viruses from birds has been found in specific individuals only. Regarding the candidates of future pandemic strains, avian viruses of any subtype can contribute genes for reassortants, thus none of the 16 HA subtypes can be ruled out as potential candidates for future pandemics. Prof. Kida concluded his presentation by describing both the short term and long term goals in terms of improvement of seasonal influenza vaccine and biological standard.

**MERS-CoV – where are we three years on and what are the outstanding questions: Dr Frank Konings**

Dr Konings presented latest updates on scientific issues and technical challenges surrounding MERS-CoV outbreak. The first half of the presentation concentrated on the current knowledge of virus, including the patterns of the epidemic. Epidemic pattern showed that repeated sporadic introductions into the human population was mainly due to direct or indirect contact with dromedary camels (and possibly other not-yet identified animals); resulted in limited human-to-human transmission, notably in healthcare settings; no sustained human to human infections. Camels play an important role in transmission in the region. It is important to take note of the fact that MERS-CoV is widespread in camels throughout the Middle East.
The second half of the presentation was devoted to the outstanding questions in regard to MERS-CoV including the extent of human infection with MERS-CoV; how humans are infected from contact with camels; risk factors for transmission between animals and humans, etc.

The WHO commented that nosocomial outbreaks occur due to various reasons including low level awareness; slow isolation of suspected patients; recommendations not being implemented as well as cultural differences in health seeking behaviour.

Improvements required in handling the outbreaks include case investigations; immediate notification to human and animal sector; joint investigations for all community acquired cases; tracing and testing of animals; reporting and follow up for both animal and human cases investigation.

Challenges remain in addressing community acquired infections, including: more expected nosocomial outbreaks; increasing awareness of MERS, especially with countries with close ties to KSA; and improvements in basic infection prevention and control procedures, particularly in emergency departments.

**Ebola Virus Outbreak update: Dr Ritu Singh Chauhan, WHO India**

Dr Chauhan, National Professional Officer, WHO Country Office to India started the presentation by providing an update on the current situation of Ebola virus in Guinea, Sierre Leone and Liberia and their on-going movement to become Ebola free areas. She went on to give a retrospective analysis on how the outbreak has evolved, and stated that huge population movement, huge number of mis-diagnoses and the weak healthcare/response system have fueled the event spreading. She summarised the lesson to learn by stating how new diseases and old diseases in new contexts must be treated with humility and an ability to respond quickly. In many of the countries where there are fragile health systems, health gains are too easily reversed and could collapse in the face of an outbreak of this nature. It has been pointed out that the current capacities and systems that exist for national and international for response could not cope with the outbreaks. The importance of community including engagement and empowerment of local people play an essential part in outbreak response. We share the vulnerability and thus share the responsibility.
**Iloco Norte, Philippine achieving zero rabies: Dr Loida M. Valenzuela**

Dr Valenzuela, the provincial veterinarian, Iloco Norte in the Philippines, shared the experience on how the province reached zero cases of rabies with the last case of canine and human rabies in July and May 2013 respectively.

Rabies was a priority in Iloco Norte since it is a tourist hub in Northern Philippines, the majority of the households have dogs as pets and the majority of dog bite incidents involve children. Key factors in eliminating rabies include but are not limited to support from international partner organisations such as OIE, FAO, GARC, HSI, WAP, et al.; executive and legislative support; inter-agency collaboration such as local universities, media, department of education; provision of appropriate prophylaxis; provision of appropriate and timely Post-Exposure Prophylaxis (PEP); diagnostic surveillance and monitoring (appropriate equipped lab, proficiency tests, active surveillance for highly suspect bite cases, rabies death review); education and communication (TV, radio, print interviews, border control advocacy, leaflets and information) and rabies control at municipal and barangay level. Towards the end of the presentation, Dr Valenzuela also shared the plans for future activities including collaboration with multiple parties, lessons learnt and the challenges ahead in achieving rabies-free Iloco Norte.

**Recent outbreak situations and prevention activities of HPAI in Korea: Dr Jaryong Jo**

Dr Jo, veterinary officer, Animal and Plant Quarantine Agency, Republic of Korea, provided the audience with a background of the organisational structure of the national animal health of Republic of Korea. The four different risk and warning categories in combating avian influenza were introduced. Dr Jo stated the 4 steps undertaken when HPAI is detected in domestic fowls in Korea, namely: (1) establishment of movement restriction around the place of origin; (2) stamping-out and disinfection for removing the source of infection; (3) performing surveillance on domestic fowls in the region of movement restriction; and (4) removal of movement restriction, re-stocking and compensation. He then went on to compare and contrast the various HPAI outbreaks which have occurred in the past decade in the country. He concluded the presentation by discussing the major tasks and initiatives taken in combating the recent HPAI outbreaks, which includes: (1) Preventative measures to block the circulations of residual viruses; (2) Blocking the spread link by developing systems that can monitor minor industries such as small farms and middlemen; and (3) Inflow prevention to block the introduction of new AI virus in a migratory bird inflow season.
Panel discussion to share country experiences on two topics (rabies and influenza)

Bangladesh, Bhutan, Nepal and Sri Lanka shared their own experience in rabies control in respective countries. These countries have improved the collaboration between the human and animal health sectors and worked on national rabies control programmes with support from partners, resulting in drastic decrease in the number of human deaths from rabies. Limitations and challenges they are facing include lack of animal rabies vaccines for dog mass vaccination, lack of rabies immunoglobulin for Category III dog bites at district level, need of improvement of multi-sectoral collaboration at central and local level, including organisational restructure, to tackle rabies as well as other zoonoses such as avian influenza, brucellosis, tuberculosis, leptospirosis, etc. The importance of border control and dog population management was emphasised. They requested technical support from partners to tackle these challenges.

Bangladesh, Bhutan and Nepal shared the situations of avian influenza, which suggested most cases have founded on backyard farms, and preventive and control measures taken in the countries including surveillance and vaccination programmes at district level depending on risk. They shared successful collaboration for avian influenza control between multiple sectors including the human health, animal health and environment for avian influenza infection in wild birds.

Laos shared the experience in multi-sectoral collaboration for One Health in the country and suggested that activities for rabies and avian influenza be incorporated into a national plan and a joint action plan be developed between the human and animal health sectors to work together.

Updates on flagship topics in the region

Rabies – outcome of the ASEAN/SAARC meeting:

Recent development from ASEAN on rabies prevention and control: Dr Nguyen Thi Huong

Dr Huong, Zoonotic Management Officer, Ministry of Health, Vietnam, who jointly prepared a presentation with Dr Pham Thi Thu Hien, Specialist, Ministry of Agriculture and Rural Development of Vietnam, began by describing the rabies situation in ASEAN countries, as the disease is endemic in most of the countries excluding Brunei, Malaysia and Singapore.

She then went on to introduce the development of ASEAN Rabies Elimination Strategy (ARES), with the goal of controlling and eliminating rabies in ASEAN Member States by 2020 and to maintain regional freedom from the fatal disease. Key principles of ARES include: (1) Call for Action for Rabies Elimination by 2020; (2) One Health approach; (3) Harmonisation with other
regulation, strategy and standard guidelines; (4) Vaccination and PEP; (5) Dog population management; (6) Capacity building; and (7) Stakeholder engagement. In light of ARES, an implementation timeline has been proposed to divide the work into 3 main stages. The four main pillars of ARES are: (1) Socio cultural; (2) Technical support; (3) Organisation and One Health; and (4) Policy and legislation.

In order to operationalise ARES, an action plan has been developed and was endorsed by ASEAN Expert Group on Communicable Diseases (AEGCD) and ASEAN Sectoral Working Group on Livestock (ASWGL) in early 2015 as well as by Senior Officials Meeting on Health Development (SOMHD) and Senior Officials Meeting-ASEAN Ministers of Agriculture and Forestry (SOM-AMAF) earlier in Sept 2015. The next step would be launching of the action plan which would operationalise ARES.

**SAARC initiative for rabies elimination: Dr P.A.L. Harischandra**

Dr Harischandra, Director, Ministry of Health, Sri Lanka reported the SAARC initiative for rabies elimination. Rabies in SAARC is significant as 7 out of 8 countries (other than Maldives, which is free from rabies) within SAARC contribute to 45% of the global burden of human rabies cases.

He went on to review the key achievements in last 5 years under the HPED project (2010-2014), which includes international partnership with WHO to strengthen national capacity to institutionalise a comprehensive rabies control/elimination programme, provision of dog rabies vaccines from OIE, hosting of workshops in rabies control, and raising awareness by World Rabies Day. The way forward in eliminating rabies in SARRC countries includes development of a roadmap for rabies elimination/control, considering country specific situation for each SARRC country, and regionally-coordinated rabies elimination programmes to guide SAARC countries including rational use of available resources and expertise. In addition, priority should be given to mass dog vaccination and public awareness with the involvement of major stakeholders.

**Zoonotic influenza (Joint Risk Assessment): Tripartite representative**

Dr Kachen Wongsathapornchai, Regional Coordinator from FAO RAP, on behalf of the Tripartite Joint Risk Assessment (JRA) Technical Working Group (TWG), presented the Tripartite initiative to support JRA of zoonotic influenza at animal and human health interface. Risk assessment is a process which assists countries to design their disease management
programmes, prioritise resources, and inform prevention and surveillance. Risk assessment is usually carried out uni-sectorally, serving purposes specific to either animal health or human health sectors. Processes for conducting uni-sectoral risk assessments are well documented. The animal health risk assessment process is described in the OIE Terrestrial Animal Health Code (OIE, 2015), and supplemented by Handbooks for Import Risk Analysis for Animal and Animal Products (OIE, 2014; OIE, 2010). Human health risk assessment normally follows a guideline provided in WHO’s Rapid Risk Assessment of Acute Public Health Events (WHO, 2012). Similarities and differences of approaches and processes exist between animal and human health sector according to the documents, and these have been documented. When dealing with zoonotic diseases; however, one usually is confronted with situations where the risk assessment process needs to be streamlined, noting risk of diseases in animals and subsequent infection of such disease in human. Uni-sectoral risk assessment may not be ideal to provide a comprehensive insight on risks at the interface, which is an essential element to fully understand how diseases cross species barriers. For example, uni-sectoral risk assessment may not take into consideration animal value-chains, which are actually one of the most important determinants for disease transmission, both between animals and from animals to humans.

Recognising this gap, participants attending the sub-regional technical consultation to review preparedness, surveillance and response for avian influenza A (H7N9) in Myanmar, 28-30 April 2014, including representatives of animal and human health sectors from Laos, Myanmar and Vietnam, recommended that the Tripartite support countries to conduct joint animal and human health risk assessment at the interface. The countries specifically requested that the Tripartite provide practical tools and methodologies on how JRA is conducted, and strengthening national capacities to implement such tools and methodologies.

Progress has been made to support the recommendation. From May to July 2014, a concept paper for H7N9 JRA Activity in Asia was developed, resulting in the formulation of the Tripartite JRA TWG and Advisory Group (AG). The JRA TWG held series of discussions and developed a draft Recommended Process for Conducting Joint Rapid Risk Assessment for Avian Influenza (JRA Tool) in December 2014. The national JRA Orientation Workshop was organised in Myanmar in January 2015 to introduce JRA concepts to national stakeholders, and to garner stakeholders’ engagement and ownerships. In July 2015, the Workshop on Animal Health Risk Assessment to Support Future JRA at the Animal-Human Health Interface was held in Myanmar. The workshop aimed to strengthen national capacities on JRA, as well as to pilot the JRA Tool with national-level partners. The workshop also provided an excellent opportunity to stimulate wider engagement and ownership at national level, to promote sharing of information between the sectors, and to adjust the JRA Tool and process to deliver the tool in the future.
Future plans include the finalisation of the draft JRA Tool by the end of 2015, allowing further piloting in Laos and Vietnam. Following the completion of the pilot, the JRA Tool is expected to be published and made available to the public by 2016. The Tripartite will continue to support the JRA Tool implementation at country level.

**Facilitated wall chart discussion**

A facilitated wall chart discussion was hosted by Dr Carolyn Benigno and Dr Kachen Wongsathapornchai from FAO RAP. Participating countries were given a PowerPoint template to demonstrate the elements of a functional coordination mechanism using either rabies or zoonotic influenza as an example in their countries. Thirteen of the countries that submitted answers to the questionnaire chose rabies while the rest focused on zoonotic avian influenza. Participants were divided into 5 groups, and each group was asked to come up with 5 keywords that are most important in terms of One Health collaboration and coordination.

The wall chart discussion session was then summarised by Dr Benigno the next morning. The keywords identified by the participants were grouped into different categories including socio-cultural/economic factors; technical; organisational and multi-sectoral; policy support; impacts; and challenges. Dr Benigno further commented that the “take home message” from the session would be the recognition of policy support, importance of multi-sectoral collaboration, strengthening technical capacities and respect for socio-cultural practices in combating zoonotic diseases in One Health.
Session 3: Multi-sectoral Collaboration, Public Health Events and Emergency Response

Session Chair: Dr F. Fernando, Dr B. Purevsuren

Lesson learnt from public health events and emergency response, moderated by Dr Arturo M Pesigan, WHO Sri Lanka.

Nepal earthquake 2015 – health sector response and international partnership: Dr Kedar Ceintury

Dr Ceintury, Director, Ministry of Health and Population, Nepal provided the audience with the background of the event such as the overview of the injuries and losses as well as findings from the post-disaster risk assessment conducted.

He went on and explained the health sector responses to the earthquake, including the emergency meeting organised by National Emergency Operation Centre (NEOC); co-ordination of the major hospitals and NEOC; assistance from the international organisations (e.g. UN, WHO). An example of communicable disease outbreak surveillance in terms of rumour verification of the disease outbreaks and response was raised. The presentation was concluded with strengths, weaknesses and lesson learnt regarding to preparedness, response, recovery, international participations, etc. and longer term plans in rebuilding health facilities.

Post disaster surveillance with a focus on Leptospirosis: Dr Corazon Flores

Dr Flores, Ministry of Health, Philippines, commented that the country has unfortunately been a frequent victim of earthquakes and natural disasters, and surveillance in post extreme emergencies and disasters (SPEED) has been established. SPEED was conceptualised and launched after the large leptospirosis outbreaks after the massive flooding after typhoons, with key challenges identified. The objectives of SPEED are to detect early unusual increase in communicable and non-communicable health conditions; monitor health trends to determine effectiveness of intervention; and enable identification of appropriate response to handle the emergency.

Dr Flores went on to explain how SPEED is backed up by a legal framework and the milestones achieved by the programme so far include the monitoring of 21 health conditions; standard reporting tools (paper forms, SMS format); web-based software to enable easy access to reported data anywhere anytime; health facility code; compilation of training materials, etc. The impact of SPEED was emphasised and Dr Flores concluded that the SPEED programme is an
innovator since it is the world’s first early warning disease surveillance system in terms of disaster and emergencies.

**Multi-sectoral collaboration in emergencies with public health consequences: Dr Arturo M Pesigan**

The presentation was divided into several parts. Dr Pesigan addressed the reform of WHO for enhanced emergencies and the deliverables: a unified WHO programme for outbreaks and emergencies; the development of IHR core capacities as an integral part of a resilient health system; a global health emergency workforce; improved functioning of IHR (2005); accelerated research and development in epidemics/emergencies, and a WHO Contingency Fund for Emergencies (CFE). The principles for the reform, challenges, status and milestones of the reforms were also presented to the audience.

Dr Pesigan explained the conceptual framework, critical functions during emergencies and core commitment in emergency risk management (ERM) in health. The core commitment of the programme includes offering strategic direction, encouragement of local-level appreciation of health risks, provision of high quality technical assistance, ensuring necessary technical assistance (finance, human resources and logistics), ensuring effective management of information, and measurement of performance against standardized benchmarks.

Lastly, the Health in the Sendai Framework for Disaster Risk Reduction (DRR) was introduced to the audience. The Hyogo Framework for Action has identified gaps and challenges, and the Sendai Framework for DRR aims to prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience. The seven global targets and four priority areas were presented. The presentation was concluded with the take home message that emergencies have seriously tested the capacities of agencies and Member Countries to adequately respond, and that cooperation and collaboration have been enshrined in the Sendai Framework for Action.

**Good governance on animal/human interface: IHR and PVS approach – common seminar between VS and PHS in Thailand: Dr Thanawat Tiensin**

During the presentation, Dr Tiensin, Senior Veterinary Officer, Department of Livestock Development, Thailand compared and contrasted the WHO IHR monitoring framework and
OIE PVS Pathway. The former aims to prevent, protect against, control and provide a public health response to the international spread of disease and to improve the governance of international responses to public health risks and emergencies, while the latter is a global programme for the sustainable improvement of a country’s Veterinary Services. He endorsed the bridging of the IHR and PVS tools for assessment of national capacities and highlighted the IHR-PVS joint national workshop held in Thailand as an example. Dr Tiensin introduced the idea of gaps and overlap analysis between the OIE PVS Pathway and WHO IHR monitoring tool and explained the common goal of provision of sustainable foundations for the integrated protection of human health and animal health at national, regional and international level. The aim is to achieve synergy between PVS and IHR tools via better intersectoral communication, coordination and collaboration between the animal and human health sectors.

**Group work – How human health and animal health sectors can work together before, during and after emergencies**

During the group work session, participants were split into 3 groups and were asked to prioritise elements/ components in the following situation:

1. Risk reduction, prevention, mitigation, preparedness, readiness;
2. Response-acute emergency;
3. Recovery.

The country participants were given an hour for discussion in their group. The groups identified the following elements as “must-do” in different situations.

**Group 1. Risk reduction, prevention, mitigation, preparedness, readiness**

Risk assessment; preventive/mitigation measure; surveillance/risk monitoring; coordination mechanism; readiness/preparedness activities; developments of Standard Operating Procedures; developments of technical protocols/guidelines; HR planning-surge capacity nationally; supply chain planning/ readiness/preparation (logistic)

**Group 2. Response-acute emergency**

Activity of response plan; activation of Emergency Operations Centre; activation of health (OH) cluster; deployment of teams; activation of supply chain; rapid health assessment; risk communication; training
Group 3. Recovery

Post-disaster needs assessment (PDNA); surveillance and early warning; recovery plan/standalone advice; analysis of residual risk and management; resource mobilisation; supply chain; lesson learnt exercise; coordination mechanism
Session 4: Managing AMR at the Human-Animal Interface

Session Chair: Dr R. Cresencio, Dr A.K.M. Shamsuzzaman

Introduction to the Antimicrobial Resistance Global Action Plan: Dr Gyanendra Gongal

Dr Gongal, Scientist, WHO SEARO stated that AMR is a now a global public health issue and a global action plan on AMR is therefore necessary. He presented the overall key findings of the worldwide country situation analysis: response to AMR which was published earlier in April 2015. The survey was completed by 133 counties in 2013-2014. Only 1/3 of the countries (34/133) have a comprehensive national plan to fight resistance to antibiotics and other antimicrobial medicines, and monitoring for AMR is still fairly infrequent. Sales of antibiotics and other antimicrobial medicines without prescription remain widespread and there is lack of standard treatments guidelines in many countries. In addition, the lack of programmes for the prevention and control of hospital-acquired infections remains a major problem.

In the second part of the presentation, Dr Gongal continued to present more detailed key findings of the survey by region. He then introduced the Global Action Plan (GAP) on AMR, which covers antibiotic resistance in more detail other than only ‘antimicrobials’. He explained the principles, strategic objectives and framework for actions of the GAP. Examples of activities under the AMR GAP were quoted, including development of national action plans as well as a global surveillance system for common bacteria. Dr Gongal also introduced the actions taken in WHO South-East Asia and Western Pacific regions and concluded that AMR is a complex problem at the human-animal interface that requires a multi-sectoral, "One Health" approach.

Actions contributing to the AMR Global Action Plan: Dr Peter Black

Dr Black, Deputy Regional Manager, FAO RAP commenced his presentation by explaining the FAO contribution to the AMR GAP in terms of its collaboration, and noted that the Tripartite are engaged to actively in the following: raise awareness; strengthen national capacities to address AMR; support countries to establish appropriate policies; establish institutional and regulatory frameworks/networks; and support efforts to fight against the circulation of poor quality or counterfeit products. Dr Black also emphasised that FAO considers that there is a need for a “One Health” and “food chain” approach when addressing AMR.

The future of AMR in Asia was then presented to the audience. It was estimated that by 2030, antimicrobial consumption in Asia is projected to represent 82% of the current global antimicrobial consumption in food animals in 2010. FAO holds the view that it is a serious
challenge since these countries that are currently experiencing the most rapid increase in demand for meat products are often those where the regulations on antimicrobial and surveillance information on antimicrobial consumptions are still lacking. In light of the above, a USAID funded project on AMR with an Asian focus in ASEAN and SAARC countries has been launched. The ultimate goal of the project is to promote a more prudent use of antimicrobials in the livestock production industry in Asia to contain AMR development and spread.

**Actions contributing to the AMR Global Action Plan: Dr Susan Corning**

Dr Corning, Consultant, OIE HQ reiterated the goal of the GAP and identified its five main criteria essential for success: multisectoral collaboration, international standards and good governance, technical capacity building, information collection and sharing, and support to countries.

The OIE has contributed to each of the abovementioned five areas. In terms of multisectoral collaboration, the OIE has collaborated with WHO and FAO in the Tripartite AMR effort. This includes the nomination of Technical Focal points, active participation in relevant ad hoc groups, meetings and trainings, and contributing to the formulation of the GAP. The OIE has also been a key supporting partner of the GHSA, and specifically its AMR Action Package. The OIE has established Standards and Guidelines on antimicrobial agents, and the OIE Terrestrial Animal Health Code “Chapters” includes topics such as the harmonisation of national AMR surveillance programmes, monitoring of the quantities and usage patterns, responsible and prudent use, risk assessment and the OIE List of Antimicrobial Agents of Veterinary Importance. The OIE builds veterinary capacity to address AMR issues via nomination and training of National Focal Points for Veterinary Product as well as through its Reference Laboratories and twinning programmes. Although currently 73% of OIE Member Countries do not have an official plan in collecting quantitative data about antimicrobial use, it is the intention of 65% of them to do so. As there is to date no harmonised system of surveillance on the worldwide use of antimicrobial agents, the OIE was mandated by its Member Countries to gather relevant data on the use of antimicrobial agents in food-producing animals, and to create a global database to monitor this use. This mandate is also supported by FAO and WHO within the framework of the GAP, and the database will form a solid basis for the work of FAO, WHO and OIE to combat AMR. Dr Corning concluded the presentation with the challenges ahead for both the OIE and partners and highlighted the importance of collaborative efforts.
National situation and regional initiatives on AMR in the Asia-Pacific (Survey results)

Dr Mary Joy Gordoncillo

Prior to the workshop, a questionnaire on AMR was sent to participating countries to obtain the following information:

1. Current operations (governance, legislation, political support)
2. Current capacity related to AMR surveillance and mitigation
3. Current inter-sectoral collaboration in addressing AMR in the country

Twenty one countries responded to the questionnaire on AMR, and Dr Gordoncillo, One Health Coordinator, OIE SRRSEA summarised and presented the findings at the workshop. The detailed summary of the questionnaires can be found in Annex 4 of this report. The most critical gaps identified on AMR mitigations within the region include the need to improve awareness in antibiotic use and compliance, strengthening surveillance and research; sanitation, hygiene and infection prevention; optimising antimicrobial use, as well as to advocate sustainable investments.

Panel discussion on AMR

A panel discussion modulated by the four speakers of the session was conducted with discussions and comments open to the floor.

Participating countries shared the situations of organic agricultural food including livestock products. Dr Tiensin, Thailand explained that the country has advocated organic foods. However, they have experienced complicated issues in certification and labelling, particularly for raw materials to produce animal products such as feed, and are trying to set up a certification system from raw materials to the end products through the coordination of multiple sectors. He noted that keeping the balance with food security issue is important. Dr Gongal introduced the EU regulation of organic production and reiterated the strengths of consumer education and awareness for antimicrobial residues. He also pointed out the real challenge in this region is that many countries do not have mechanisms and capacities to detect antimicrobial residues which allows antimicrobial resistant bacteria to circulate.

Dr Ekanayake, Sri Lanka also explained their organic food production, part of which is exported. He asked if it is possible to formulate a unique regulation to be adopted by countries to regulate and prevent AMR to achieve the common goals of One Health concept, involving both the human public health and animal health sectors, which currently issue export certificates separately. Dr Gongal responded by explaining that unique standards and regulations for export to specific countries exist and are followed by many countries because of its great incentive;
however, an issue is that many countries in the region do not follow international standards in their regulations for domestic consumption.

Regarding the data collection and information sharing of AMR, Dr Chanachai, Thailand explained the difficulties to finalise the information for the AMR database and asked what type of information should be shared. Dr Gordoncillo explained that types of basic information are included in the OIE Terrestrial Animal Health Code. Dr Black introduced countries with mature systems of data sharing with mentioning that currently many countries are trying to collect data for the global database. Dr Gongal mentioned the global database tracking antimicrobials’ use for farm animals by OIE. Dr Corning added that between the human and animal health sectors IHR/PVS national joint workshops could be a starting point to discuss how to share and start collecting the information on particularly antimicrobial usage and resistance.

Dr Ghosh, Bangladesh suggested including in recommendations: 1) people’s awareness, using good initiatives such as the World Antibiotic Awareness Week and 2) capacity to detect antimicrobial residue in animal products at local level.

New Zealand, Australia and Japan explained their experience in control and monitoring of usage of antimicrobials on farm or in hospital, national database, and surveillance systems of AMR. Dr Lee, New Zealand introduced their National Microbiological Database covering several animals mainly for export purpose. Dr Asgar, Australia explained a system in place to record the usage of antimicrobials on farm, which was accessed for the OIE data collection. Dr Ozawa, Japan, introduced a collaboration of existing national surveillance programmes in nosocomial infection and animal products. Dr Jo, RO Korea shared an annual reporting system for AMR.

(OIE and FAO explained their systems to review and adopt scientific findings and evidence into their international standards as science-based organisations.)

Regarding over-the-counter antimicrobial drugs, Dr Sim, Cambodia shared a concern in quality control of medicines in developing countries, explaining that low quality and less expensive drugs including antimicrobial are produced and sold locally. Dr Sharma, Bhutan explained an autonomous drug regulatory authority in Bhutan strictly regulates all medicinal stores in the country in terms of drugs for all agricultural, human and aquatic sectors. Dr Lhasheen, Bhutan, emphasised the importance of support for capacity building in laboratories and technical advice and linkage with neighbouring countries to work together. Dr Jha, Nepal shared difficulties around imported drugs for veterinary use due to absence of veterinarian in drug administration office.

As summary, the Tripartite remarked the following topics. Dr Gongal highlighted issues from the public health aspect, such as patient noncompliance with prescription of antimicrobial,
cross-border issue of counterfeit drugs, prescription of broad antimicrobial and chemical used on grassland. Dr Corning pointed that the different levels of quality control in countries discussed indicate the importance of two main points in AMR GAP, i.e. raising awareness and prudent and responsible use are important. She suggested participants taking what discussed in the session back to political higher levels in their own countries and raising awareness of politicians. Dr Gordoncillo noted that considering limited resources in the region it is important to prioritise manageable options to control AMR, such as monitoring, education and public awareness, and collaborate between human and animal health sectors to share resources to look at what exists and available. Dr Black noted that GAP can be an entry point of starting the process to transform the health systems in countries. Dr Shamsuzzaman, Vice-Chair of the session, concluded the session with comments on the current situation of antimicrobials including commercial aspect of antimicrobial use and trade, use as growth factor.
Partner’s forum

During the last day of the workshop, the partnering organizations gave short presentations regarding their One Health activities.

Dr Kurt Zuelke from Australian Animal Health Laboratory (AAHL), CSIRO provided the audience with an overview of its One Health regional activities, including but not limited to being an OIE Reference Laboratory and engagement in the laboratory twinning programme.

Dr Darunee Tuntasuvan from Animal and Plant Health Inspection Service (APHIS) of USDA reported its current One Health initiatives within the Asia Pacific Region such as organisation of various workshops and conferences, as well as training of personnel.

Dr Ferdinal M. Fernando from ASEAN first provided the overview of ASEAN governance and coordination mechanism, then went on to explain the vision of post-2015 Health Development Agenda, with One Health being one of the priorities.

Dr Dr Pawin Padungtod from U.S. CDC Southeast Asia Regional Office introduced the audience to several One Health programmes: Animal-Human Interface Program (AHIP), Strengthening Laboratory Capacity Program (SLCP), Field Epidemiology Training Program (FETP), International Emerging Infections Program (IEIP) and the GHSA.

Dr Aurelie Binot from the French Agricultural Research and International Cooperation Organization (CIRAD) illustrated the development of an integrated One Health approach operational in SEA (Thailand, Laos and Cambodia) via regional activities implementation.

Dr Motohiro Horiuchi from Hokkaido University, the host of the zoonoses workshop, introduced the new establishment of their Graduate School of Infectious Disease. The PhD programme aims to foster and nurture global leaders in veterinary science in contributing to “One Health”.

Dr Kaname Kanai from the Japan International Cooperation Agency (JICA) introduced the audience to the programme structure, objectives and on-going projects of the Science and Technology Research Partnership for Sustainable Development (SATREPS). Currently, there are research projects regarding zoonoses conducted in various Asia Pacific Sub-regions.

Dr MJH Jabed from SAARC reported the relevant activities of One Health and multi-sectoral collaboration in SAARC Region, including regional initiatives undertaken and the establishment of a road map.

Dr Jennifer Ford from the World Animal Protection (WAP) presented their work on education regarding humane dog management as part of rabies control.
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.30 – 09.00</td>
<td>Registration</td>
</tr>
<tr>
<td>09.00 – 09.30</td>
<td>Opening of the Workshop</td>
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<tr>
<td></td>
<td>- Host country, Japan:</td>
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<td></td>
<td>- Ministry of Agriculture, Forestry and Fisheries</td>
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<td></td>
<td>- Ministry of Health, Labour and Welfare</td>
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<td></td>
<td>- Hokkaido University</td>
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<td></td>
<td>Tripartite (FAO, WHO and OIE each)</td>
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<tr>
<td>09.30 – 09.50</td>
<td>Summary and recommendations of the previous workshops</td>
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<tr>
<td>09.50 – 10.00</td>
<td>Introduction of the workshop</td>
</tr>
<tr>
<td>10.00 – 10.30</td>
<td>Group photo followed by Break for refreshments</td>
</tr>
<tr>
<td>10.30 – 11.30</td>
<td>Session 2: Situation Update on Zoonoses</td>
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<tr>
<td></td>
<td>- Update on regional zoonotic disease status</td>
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<tr>
<td></td>
<td>- Findings of the zoonoses questionnaire</td>
</tr>
<tr>
<td>11.30 – 12.30</td>
<td>Scientific updates on zoonoses of significance to the region:</td>
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<tr>
<td></td>
<td>- Influenza</td>
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<td></td>
<td>- MERS-CoV</td>
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<td></td>
<td>- Ebola</td>
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<tr>
<td>12.30 – 13.30</td>
<td>Break for lunch</td>
</tr>
<tr>
<td>13.30 – 15.00</td>
<td>Panel discussion to share country experiences on One Health achievements and constraints</td>
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<td></td>
<td>- Rabies</td>
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<td>- Dr L. Valenzuela</td>
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<td>(Philippines)</td>
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<td>- Influenza</td>
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<td>- Dr J. Jo</td>
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<td>(Korea, RO)</td>
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<tr>
<td>15.00 – 15.30</td>
<td>Break for refreshments</td>
</tr>
<tr>
<td>15.30 – 16.30</td>
<td>Updates on flagship topics in the region:</td>
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<td></td>
<td>- Rabies; outcomes of the ASEAN/SAARC meeting:</td>
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<tr>
<td></td>
<td>o Viet Nam</td>
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<td>- Dr N.T. Huong</td>
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<td>o Sri Lanka</td>
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<td></td>
<td>- Dr P.A.L. Harischandra</td>
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<tr>
<td></td>
<td>- Zoonotic influenza (Joint Risk Assessment)</td>
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</tbody>
</table>
## Day 2 - 29 October 2015

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Organizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.30 – 9.00</td>
<td>Summary of wall chart discussion</td>
<td>Dr C. Benigno (FAO-RAP)</td>
</tr>
<tr>
<td><strong>Session 3</strong></td>
<td><strong>Multi-sectoral Collaboration, Public Health Events and Emergency Response</strong></td>
<td>Session Chair:</td>
</tr>
<tr>
<td>9.00 – 9.45</td>
<td>Lesson learnt from public health events and emergency response:</td>
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<td></td>
<td>- Nepal earthquake 2015: International partnership</td>
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<td>- Post-disaster surveillance with a focus on leptospirosis</td>
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<td>Moderator: Dr A. Pesigan, (WHO-Sri Lanka)</td>
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<td>- Dr K. Ceintury (Nepal)</td>
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<td>- Dr C. Flores (Philippines)</td>
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<tr>
<td>9.45 – 10.15</td>
<td>Reducing and managing health risks the Sendai Framework and its applications on the health sectors</td>
<td>Dr A. Pesigan (WHO-Sri Lanka)</td>
</tr>
<tr>
<td>10.15 – 10.30</td>
<td>Good governance on animal/human interface: IHR and PVS approach – common seminar between VS and PHS in Thailand</td>
<td>Dr T. Tiensin (Thailand)</td>
</tr>
<tr>
<td>10.30 – 11.00</td>
<td>Break for refreshments</td>
<td></td>
</tr>
<tr>
<td>11.00 – 12.30</td>
<td>Group work – How human health and animal health sectors can work together before, during and after emergencies</td>
<td>All participants</td>
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<tr>
<td>12.30 – 13.30</td>
<td>Break for lunch</td>
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</tr>
<tr>
<td><strong>Session 4</strong></td>
<td><strong>Managing AMR at the Human-Animal Interface</strong></td>
<td>Session Chair: Dr R. Cresencio, Dr A.K.M. Shamsuzzaman</td>
</tr>
<tr>
<td>13.30 – 14.00</td>
<td>Introduction to the AMR Global Action Plan and Regional Action Agenda</td>
<td>Dr G. Gongal (WHO-SEARO)</td>
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<tr>
<td>14.00 – 14.15</td>
<td>Actions contributing to the AMR Global Action Plan</td>
<td>Dr P. Black (FAO-RAP)</td>
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<tr>
<td>14.15 – 14.30</td>
<td>Actions contributing to the AMR Global Action Plan</td>
<td>Dr S. Corning (OIE-HQ)</td>
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<tr>
<td>14.30 – 15.00</td>
<td>Discussion</td>
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<tr>
<td>15.00 – 15.30</td>
<td>Break for refreshments</td>
<td></td>
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<tr>
<td>15.30 – 16.00</td>
<td>National situation and regional initiatives on AMR in the Asia-Pacific (Survey results)</td>
<td>Dr M.J. Gordoncillo (OIE-SRSEAA)</td>
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<tr>
<td>16.00 – 17.00</td>
<td>Panel discussion on AMR</td>
<td>Tripartite</td>
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<tr>
<td>Time</td>
<td>Event</td>
<td>Location</td>
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<tr>
<td>18.30 - 20.30</td>
<td><em>Hosted dinner</em></td>
<td>Hokkaido University</td>
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<tr>
<td><strong>Day 3 - 30 October 2015</strong></td>
<td></td>
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<tr>
<td><strong>Summary and Closing</strong></td>
<td>Session Chair: Prof H. Kida, Dr G. Murray</td>
<td></td>
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<tr>
<td>9.00 - 10.30</td>
<td>Partners' forum</td>
<td>Open to all partners</td>
</tr>
<tr>
<td>10.30 - 10.45</td>
<td>Introduction to the Center for Zoonoses Control</td>
<td>Dr N. Isoda (Hokkaido Univ)</td>
</tr>
<tr>
<td>10.45 - 11.10</td>
<td><em>Break for refreshments</em></td>
<td></td>
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<tr>
<td>11.10 - 12.30</td>
<td>Laboratory tour</td>
<td>Center for Zoonoses Control</td>
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<tr>
<td>12.30 - 13.30</td>
<td><em>Break for lunch</em></td>
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<tr>
<td>13.30 - 14.00</td>
<td>Workshop evaluation</td>
<td></td>
</tr>
<tr>
<td>14.00 - 14.30</td>
<td>Conclusions and Recommendations Closing</td>
<td></td>
</tr>
</tbody>
</table>
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Summary of survey result of Zoonoses situation & One Health National Coordination mechanism in the Asia-Pacific Region

Summary of the Zoonoses & National Coordination mechanism for One Health Questionnaire at the 6th Asia-Pacific Workshop on Multisectoral Collaboration for the Prevention and Control of Zoonoses held in Sapporo, Japan on 28-30 October 2015

Background

Since 2010, 5 Regional workshops on “Multisectoral Collaboration for the Prevention and Control of Zoonoses” have been organised by the Regional Tripartite (FAO/OIE/WHO) in the Asia-Pacific Region with participation of animal and human health as well as other relevant sectors (Table 1). One of the objectives of this workshop was to provide updates on the situation and scientific information of emerging and re-emerging zoonotic diseases.

Prior to the workshop, all participating countries were requested to complete a questionnaire formatted in coordination with the Animal Health sector and Public Health sector regarding the zoonosis situation in 2015. A total of 23 countries responded to this survey; Afghanistan, Australia, Bangladesh, Bhutan, Brunei, Cambodia, China PR, India, Indonesia, Japan, Korea RO, Laos, Malaysia, Maldives, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. Even though Brunei submitted the survey, due to personal reasons, their participant could not join the workshop.

The reported information from these submissions were accordingly collated and summarised to provide a comprehensive overview of the zoonoses situation in the region. However, given the varying depth of details and degree of accuracy of the information as submitted, readers are encouraged to view and conclude with due caution.

Table of contents

1 Background
2 Zoonoses situation in the Asia-Pacific Region for 2015
3 Most commonly reported zoonoses in 2015
4 Top priority zoonotic diseases in the Asia-Pacific Region
5 National Coordination mechanism for One Health
6 Key elements for One Health coordination

Table 1. List of annual workshops

<table>
<thead>
<tr>
<th>Date</th>
<th>Place</th>
<th>Leading organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 – 19 Dec 2010</td>
<td>Sapporo, Japan</td>
<td>WHO WPRO</td>
</tr>
<tr>
<td>16 – 18 Jan 2012</td>
<td>Chiang-mai, Thailand</td>
<td>FAO RAP</td>
</tr>
<tr>
<td>26 – 28 Nov 2012</td>
<td>Bali, Indonesia</td>
<td>OIE SRRSEA</td>
</tr>
<tr>
<td>27 – 29 Nov 2013</td>
<td>Kathmandu, Nepal</td>
<td>WHO SEARO</td>
</tr>
<tr>
<td>24 – 26 Nov 2014</td>
<td>Bangkok, Thailand</td>
<td>FAO RAP</td>
</tr>
<tr>
<td>28 – 30 Oct 2015</td>
<td>Sapporo, Japan</td>
<td>OIE RRAP</td>
</tr>
</tbody>
</table>
Summary of Zoonosis survey result in the Asia-Pacific Region for 2015

A total of 42 zoonoses were reported from the 22 countries which submitted the survey (Table 2). Brunei has no report of zoonoses as well as no National Coordination mechanism for One Health.

In terms of pathogenic origin, the most frequently reported zoonoses were due to bacterial infection (45%), followed by viral infection (38%) and parasitic infection (17%), as shown in Figure 1.

Table 2. List of Zoonoses event in 2015

<table>
<thead>
<tr>
<th>Zoonoses event</th>
<th>Total</th>
<th>Zoonoses event</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>10</td>
<td>Plague</td>
<td>2</td>
</tr>
<tr>
<td>Avian influenza</td>
<td>7</td>
<td>Porcine cysticerosis</td>
<td>1</td>
</tr>
<tr>
<td>Barmah forest virus infection</td>
<td>1</td>
<td>Psittacosis/ Ornithosis</td>
<td>2</td>
</tr>
<tr>
<td>Botulism</td>
<td>1</td>
<td>Q Fever</td>
<td>3</td>
</tr>
<tr>
<td>Bovine tuberculosis/tuberculosis</td>
<td>2</td>
<td>Rabies</td>
<td>15</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>9</td>
<td>Ross River virus infection</td>
<td>1</td>
</tr>
<tr>
<td>Campylobacteriosis</td>
<td>2</td>
<td>Salmonellosis</td>
<td>5</td>
</tr>
<tr>
<td>CCHF</td>
<td>2</td>
<td>Schistosomiasis</td>
<td>1</td>
</tr>
<tr>
<td>Chikungunya</td>
<td>1</td>
<td>Scrub Typhus/Tsutsugamushi</td>
<td>4</td>
</tr>
<tr>
<td>Dengue Fever</td>
<td>2</td>
<td>Severe fever with thrombocytopenia syndrome</td>
<td>1</td>
</tr>
<tr>
<td>Echinococcosis</td>
<td>4</td>
<td>STEC</td>
<td>2</td>
</tr>
<tr>
<td>Glanders</td>
<td>1</td>
<td>Streptococcus suis</td>
<td>0</td>
</tr>
<tr>
<td>Hendra virus</td>
<td>1</td>
<td>Swine erysipelas</td>
<td>1</td>
</tr>
<tr>
<td>Japanese Encephalitis</td>
<td>5</td>
<td>Swine flu</td>
<td>1</td>
</tr>
<tr>
<td>Japanese spotted disease</td>
<td>1</td>
<td>Tick borne encephalitis</td>
<td>1</td>
</tr>
<tr>
<td>Kunjin virus</td>
<td>1</td>
<td>Toxoplasmosis</td>
<td>3</td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td>1</td>
<td>Trypanosomiasis</td>
<td>1</td>
</tr>
<tr>
<td>Leptospirosis</td>
<td>11</td>
<td>Virus hepatitis A</td>
<td>1</td>
</tr>
<tr>
<td>Listeriosis</td>
<td>1</td>
<td>Virus hepatitis E</td>
<td>1</td>
</tr>
<tr>
<td>Lyme disease</td>
<td>2</td>
<td>Visceral Leishmaniasis</td>
<td>1</td>
</tr>
<tr>
<td>Nipah</td>
<td>1</td>
<td>Yersiniosis</td>
<td>1</td>
</tr>
</tbody>
</table>
Most commonly reported zoonoses in 2015

Rabies was the most commonly reported zoonosis in 2015 within the region, followed by leptospirosis, anthrax, brucellosis and avian influenza (Fig. 2).

**Rabies** was reported by 15 countries; Afghanistan, Bangladesh, Bhutan, Cambodia, China PR, Indonesia, Laos, Malaysia, Mongolia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam.

**Leptospirosis** was reported by 11 countries; Australia, Bangladesh, Bhutan, India, Japan, Myanmar, Nepal, New Zealand, Philippines, Sri Lanka and Vietnam.

**Anthrax** was reported by 10 countries; Afghanistan, Bangladesh, Bhutan, China PR, India, Indonesia, Mongolia, Myanmar, Philippines and Vietnam.

**Brucellosis** was reported by 9 countries; Afghanistan, Australia, China PR, India, Indonesia, Japan, Korea RO, Nepal and Thailand.

**Avian influenza** was reported by 7 countries; Cambodia, China, Indonesia, Korea RO, Laos, Myanmar and Philippines.

![Figure 2 Most commonly reported zoonoses in the Region in 2015](image)

Top priority zoonotic diseases in the Asia-Pacific Region

Most of the countries that completed this survey recognised rabies as one of the top 5 priority zoonotic diseases in their countries (Fig. 3).

**Rabies** was recognised by 21 countries out of 23: Afghanistan, Australia, Bangladesh, Bhutan, Brunei, Cambodia, China PR, India, Indonesia, Japan, Korea RO, Laos, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam.

**Anthrax** was recognised by 14 countries out of 23: Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia, China PR, India, Indonesia, Korea RO, Laos, Mongolia, Myanmar, Nepal, Pakistan, Philippines and Vietnam.

**Avian influenza (HPAI and LPAI)** was recognised by 11 countries out of 23: Australia, Bangladesh, Bhutan, Cambodia, China PR, Indonesia, Japan, Korea RO, Laos, Myanmar and Philippines.
National Coordination mechanism for One Health

A total of 20 countries already have a national One Health coordination mechanism: Afghanistan, Australia, Bangladesh, Bhutan, Cambodia, China PR, India, Indonesia, Japan, Korea RO, Laos, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, Philippines, Sri Lanka, Thailand and Vietnam (Fig. 4). However, three countries (Brunei, Maldives and Pakistan) have yet to establish One Health coordination mechanism in their countries.

Among those 20 countries that have already established One Health coordination mechanisms, 16 countries (80%) are with legal recognition (Fig. 5A). Eighteen countries (90%) have coordination meetings on regular basis (Fig. 5B). Meeting frequency is shown in Figure 5C.

Most of reported countries (20 out of 23 countries; 87%) found the One Health coordination mechanism useful in their countries, and 21 out of 23 countries (91%) noticed that a One Health coordination mechanism resulted in changes in their countries.

As shown in Figure 6, a One Health Coordination mechanism has had the greatest impact in terms of motivating ‘Joint outbreak investigations’.
Some countries (11 out of 23 countries) receive funding for national One Health coordination meetings (Fig. 7). Twelve countries receive funding for national One Health activities other than meetings. The funding source was mainly by its own government; however, some countries also receive funding from other donors including the Tripartite.

![Figure 7 Funding sources for the National One Health coordination](image)

Countries continue to recognize gaps on their respective national OH coordination Mechanism. The major setbacks identified by the respondents were, mainly with respect to funding (Fig. 8).

Countries identified major gaps as follows: funding limit, lack of human resources, laboratory capacity, priority gap between different sectors, limited information sharing and lack of higher level coordination.

![Figure 8 Major gaps identified by reporting countries](image)
Key elements for One Health coordination

Countries indicated the current status of the multi-sectoral (animal-human-environmental health) collaboration in their country according to each of the identified key supporting elements as shown in Table 2. Also, countries identified key operational elements as shown in Table 3.

Table 2. National Key supporting elements identified by countries

<table>
<thead>
<tr>
<th>Key Supporting Elements</th>
<th>Not existing</th>
<th>Weak</th>
<th>Moderate</th>
<th>Strong</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Political will and high-level commitment</td>
<td>0</td>
<td>2</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>2. Trust</td>
<td>0</td>
<td>2</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>3. Common objectives and priorities</td>
<td>0</td>
<td>3</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>4. Recognition of shared benefits</td>
<td>0</td>
<td>4</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>5. Strong governance structures, aligned legal frameworks, and recognition of existing international standards</td>
<td>0</td>
<td>10</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>6. Adequate and equitably distributed resources</td>
<td>0</td>
<td>14</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7. Identification and involvement of all relevant partners</td>
<td>0</td>
<td>4</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>8. Coordinated planning of activities</td>
<td>0</td>
<td>7</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>9. Guidance on implementation of cross-sectoral collaborations</td>
<td>0</td>
<td>6</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>10. Capacity development</td>
<td>0</td>
<td>9</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>11. Strong and effective health systems within the individual sectors</td>
<td>0</td>
<td>1</td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3. Key operational elements identified by countries

<table>
<thead>
<tr>
<th>Key Operational Elements</th>
<th>No</th>
<th>Rarely and irregular</th>
<th>Rarely but regular</th>
<th>Frequent and regular</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Joint cross-sectoral coordination mechanisms</td>
<td>0</td>
<td>3</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>2. Routine communication (between A-H-E sectors)</td>
<td>0</td>
<td>4</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>3. Joint simulation exercises</td>
<td>7</td>
<td>8</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>4. Data sharing</td>
<td>1</td>
<td>9</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>5. Joint risk assessment</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>6. Active cooperation on disease control programmes (If yes, please identify which disease)</td>
<td>2</td>
<td>5</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>7. Other relevant initiatives not listed</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Regarding the Active cooperation on disease control programmes (6th key operational element), 10 countries implement this for avian influenza, 8 countries for rabies and 2 countries for anthrax.
AMR mitigation at the human-animal interface in the Asia-Pacific Region

Summary of the AMR Questionnaire at the 6th Asia-Pacific Workshop on Multisectoral Collaboration for the Prevention and Control of Zoonoses held in Sapporo, Japan on 28-30 October 2015

Background

Antimicrobial agents are essential substances for treating infections in both humans and animals. However, while discovery and development of new antimicrobial drugs have gradually slowed down in the recent years, full or partial resistance of microbes to existing antimicrobials are continuously and increasingly being documented worldwide. Preserving the effectiveness of antimicrobials has thus become a pertinent global health concern.

Antimicrobial resistance (AMR) in microorganisms found in humans, animals or the environment can spread vertically or horizontally across species and across geographic spaces. The increased globalisation and unprecedented increases in the movements of people, animals, and food commodities have also contributed in providing opportunities for global spread of resistant microbes. As such, addressing this rising threat requires a holistic, multi-sectoral approach as well as global concerted action. A shared action is needed to advocate for political commitment and good governance, to develop supporting legislation, and to establish relevant capacity across sectors implementing international standards and guidelines. Human and animal health sectors should cohesively work together nationally and globally to align policies, strategies and activities, in partnership with other stakeholders in the private and public sectors.

Leading the way to One Health, the Tripartite (FAO-OIE-WHO) speaks with one voice and takes collective action to minimize the emergence and spread of AMR. The aim is to ensure that antimicrobial agents continue to be effective and useful to cure diseases in humans and animals; promote prudent and responsible use of antimicrobial agents, and ensure global access to medicines of good quality. At the 68th Assembly in May 2015, global action plan to tackle antimicrobial resistance was endorsed- including antibiotic resistance, the most urgent drug resistance trend. This plan, which ensured a One Health approach and consistency with Codex Alimentarius and OIE international standards and guidelines, aims to ensure, for as long as possible, continuity of successful treatment and prevention of infectious diseases with effective and safe medicines that are quality-assured, used in a responsible way, and accessible to all who need them.

Guided by this global action plan, the Member States, the Secretariat, and their international and national partners aim to: (1) improve awareness and understanding of antimicrobial resistance; (2) strengthen knowledge through surveillance and research; (3) reduce the incidence of infection; (4) optimize the use of antimicrobial agents; and (5) develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions.

To determine how the AMR issue at the human-animal interface is presently addressed in the Asia-Pacific Region, the Tripartite developed a questionnaire for the 6th Asia-Pacific Workshop on Multisectoral Collaboration for the Prevention and Control of Zoonoses (28-30 October 2015, Sapporo, Japan). This included questions related to: (1) governance, legislation and political support on AMR issues, (2) capacity related to AMR surveillance and mitigation; and (3) existing Inter-sectoral collaboration in addressing AMR in the country.

To determine how the AMR issue is presently dealt with at the human-animal interface in the Asia-Pacific Region, a questionnaire was developed and distributed by the Tripartite.
AMR Questionnaire Responses

A total of 21 (91.3%) of the 23 participating countries responded to the questionnaire developed and distributed by the regional Tripartite.

It should be noted that some information provided herein is still subject to further validation, and thus reported results should be considered as provisional and needs to be viewed with due caution.

Part 1: Governance in AMR mitigation in the Asia-Pacific Region

AMR does not recognize geographic borders nor species barriers. As such, addressing this rising threat requires a One Health approach where human and animal health sectors work together nationally and globally to align policies, strategies and activities, in collaboration with other stakeholders in the private and public sectors.

A. Recognition of AMR issue at the human-animal interface

As AMR is not necessarily a new issue at hand, the majority of the countries already acknowledge that this is a common concern between human and animal health sectors: 17 of the 21 (81.0%) respondents indicated that AMR is indeed a recognized issue at the human-animal interface in their countries (Afghanistan, Australia, Bangladesh, Bhutan, Brunei, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Maldives, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam). Of these, the greater majority (15/17 or 88.2%) considers that its extent is “definitely significant” or “more likely significant”. Brunei, Cambodia, Mongolia and Pakistan (4/21 or 19.0%) all indicated that AMR is presently not a recognized issue at their human-animal interface. While Cambodia and Pakistan suggested that this issue could be definitely significant and more likely significant, respectively, Brunei considers only AMU in animals could be a concern while Mongolia indicated the extent of this issue is likely to be not significant.
With AMR recognized as a shared issue in several countries in the Asia-Pacific Region, working towards cognizance of its shared accountability and leveraging on shared solutions could indeed be considered promising. Continuing to reinforce One Health coordination mechanism at the national and sub-national levels would also thus be important for this flagship issue of the Tripartite, including in areas where there is no or little recognition of AMR as a common issue at the human-animal interface.

**B. Policies, National Plans and Political Engagement**

Australia, Bhutan, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Maldives, Myanmar, Nepal, New Zealand, Philippines, Thailand and Vietnam (15/21 or 71.4%) reported that they do have existing policies related to AMR Mitigation in their respective countries (Fig 2 and Table 1). Twelve of the 21 (57.1%) also confirmed they have an existing national plan to control AMR: Australia, Bhutan (animal health is still draft), Brunei, India, Indonesia, Laos, Malaysia, Myanmar, Pakistan, Philippines, Thailand and Vietnam. Nepal (1/21 or 4.8%) currently has a draft under approval from Ministry of Health and Population (MoHP) (Fig 3 and Table 2).

**Table 1. Policies and National Plans on AMR Mitigation**

<table>
<thead>
<tr>
<th>Country</th>
<th>Existing Law/Policies specific to AMR Mitigation</th>
<th>Existing National Plan to Control AMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Australia</td>
<td>Yes (not specified)</td>
<td>National AMR Strategy</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bhutan</td>
<td>National AMR Policy in Human Health (Animal health currently still in draft)</td>
<td>National Action Plan on AMR in Human Health (Animal health currently still in draft)</td>
</tr>
<tr>
<td>Brunei</td>
<td>-</td>
<td>Strengthening Infection and Prevention Control Practives in Healthcare</td>
</tr>
<tr>
<td>Cambodia</td>
<td>National Policy to Combat AMR</td>
<td>-</td>
</tr>
<tr>
<td>India</td>
<td>Yes (not specified)</td>
<td>National Programme on Containment of AMR under Ministry of Health and Family Welfare</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Yes (not specified)</td>
<td>Yes (not specified)</td>
</tr>
<tr>
<td>Japan</td>
<td>Yes (various)</td>
<td>-</td>
</tr>
<tr>
<td>Laos</td>
<td>Yes (not specified)</td>
<td>Yes (not specified)</td>
</tr>
<tr>
<td>Malaysia</td>
<td>National Antibiotic Guideline; Antimicrobial Stewardship Protocol in healthcare facilities; Animal Feed Act 2009; Veterinary Act 1974 (VSB)</td>
<td>National AMR Control Plan</td>
</tr>
<tr>
<td>Maldives</td>
<td>Drug regulation</td>
<td>-</td>
</tr>
<tr>
<td>Mongolia</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Myanmar</td>
<td>Registration and quality control</td>
<td>Residue Monitoring Program</td>
</tr>
<tr>
<td>Nepal</td>
<td>Drug Act 1978 and National Drug Policy (2013/14)</td>
<td>Yes (currently a draft plan in line with Global Action Plan</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Agricultural Compounds and Veterinary Medicines (ACVM) Act of 1997</td>
<td>-</td>
</tr>
<tr>
<td>Pakistan</td>
<td>-</td>
<td>Min overlap of antibiotics registered for use in animals and humans</td>
</tr>
<tr>
<td>Philippines</td>
<td>Administrative Order No. 42 (Creation of Inter-Agency Committee on AMR ICAMR)</td>
<td>National Action Plan to combat AMR in the Philippines</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Figure 4 indicates that majority of the respondents (14/21 or 55.76%) consider that political engagement relevant to AMR mitigation is presently existing in their respective countries. However, while some countries like Australia and Laos (2/21 or 9.5%) consider that their policy makers are fully engaged or have relatively strong engagement as in India, Japan, Malaysia and Sri Lanka (4/21 or 19.0%), majority of these involvements (12/21 or 57.1%) are actually weak or non-existent. The remaining 3 (14.3%) other responding countries did not present any opinion on the matter.

Responses show that there is now substantial proportion of countries in the Asia-Pacific Region with policies, plans and engagement relevant to AMR, although further progress remains to be pursued particularly in areas where these are lacking. Where existing, these National Plans need to be reviewed to ensure consistency with the 2015 Global Action Plan on AMR (GAP AMR), and developed accordingly following this in countries where National Plans are lacking. This will help warrant the Asia-Pacific Region in having a cohesive regional action that is consistent with the overarching global initiatives where AMR mitigation is concerned.

C. Designated National Committees/Groups working on AMR

Australia, Bhutan, Nepal, and the Philippines (4/21 or 19.0%) all identified a single national AMR committee that deals with AMR for both human and animal sectors. Australia also indicated separate groups involved in human and animal sectors. Thailand (1/21 or 4.8%) identified several committees and groups involved in AMR issues in their country, separately for human and animal health sectors, as well as for both. Bangladesh, Cambodia, India, Myanmar, Sri Lanka and Vietnam (6/21 or 28.6%) all identified a specific committee dealing with AMR, but only for the human health sector, while Indonesia and New Zealand (2/21 or 9.5%) confirmed having this in the animal health sector. Japan and Malaysia (2/21 or 9.5%) have separate distinct groups for human health and animal health, while Afghanistan, Brunei, Maldives, Mongolia, and Pakistan (5/21 or 23.8%) are still yet to establish a national committee that will particularly handle AMR issues in animal health, human health or both (Table 2).

Nature and Composition of the existing joint National AMR Committees in the Asia-Pacific Region. The multi-sectoral nature of the joint committees, where they exist, indicates recognition of the need for shared expertise in addressing this complex issue. Several good examples can be found in the region, which can serve as structural templates for other countries in the region and beyond. The Australian Antimicrobial Resistance Prevention and Containment Steering Group is a high level group established in February 2013 to provide leadership and expertise in developing a national framework and strategy for the prevention and containment of AMR in both humans and animals. This committee is co-chaired by the Secretaries of the Departments of Health and Agriculture, and includes the Chief Medical Officer and Chief Veterinary Officer as members. The Steering Group is supported by the Australian Strategic and Technical Advisory Group (ASTAG), an expert group which provides strategic, technical, scientific and clinical advice. The Drug Technical Advisory Committee of Bhutan also functions as the Steering Committee for AMR and is responsible for the development of the National Action Plan for AMR including public awareness and education, information material development and campaigns to improve awareness on AMR. It is composed of representatives from the Department of Medical Services, Drug Regulatory Authority, Department of Livestock with inclusion of AMR focal persons, medical doctors and program officials. Nepal’s National Alliance for
AMR Multi-Sectoral Committee for AMR is composed of Representatives from MOHP, experts, private sectors and other line ministries. The Inter-Agency Committee on AMR (ICAMR) was created in 2014 by virtue of Administrative Order No. 42 of the President of the Philippines for the formulation and implementation of a national plan to combat AMR in the Philippines. It is co-chaired by the Department of Health and the Department of Agriculture, with the Department of Science and Technology, Department of Trade and Industry and the Department of Interior and Local Government of the Philippines as members. Thailand identified four groups that deal with AMR issues in their country: (1) The National Re-Emerging Infectious Diseases Committee Sub-Committee for prevention control and resolving of AMR; (2) The National System Development Committee Sub-Committee for National Drug List Development and Sub-Committee for System Development of AMR prevention and control; (3) the National Surveillance and Control of Antimicrobial Resistance Committee and (4) the National Drug Committee Sub-Committee for Study on antibiotics reclassification. These are composed of representatives from the Department of Disease Control, Department of Medical Science, Department of Medical Services, Food and Drug administration, Professional Council, Professional Association, Pharmaceutical Company, Permanent Secretariat Office of the Ministry of Public Health and the Bureau of Health Administration.

Table 2. National Committees/Groups working on AMR

<table>
<thead>
<tr>
<th>Country</th>
<th>Committees/Groups working on AMR in…</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Humans</td>
<td>Animals</td>
<td>Both humans and animals</td>
<td></td>
</tr>
<tr>
<td>Afghanistan</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>Australian Commission on Safety and Quality Health Care</td>
<td>Animal Health Policy Branch, Department of Agriculture</td>
<td>Australian Strategy and Technical Advisory Group (AASTAG) AMR Prevention and Containment Steering Group</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Yes (name not indicated)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Bhutan</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Technical Advisory Committee (Steering Committee for AMR)</td>
</tr>
<tr>
<td>Brunei</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cambodia</td>
<td>Inter-Ministerial AMR Working Group</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>India</td>
<td>National Alliance for prevention and control of antimicrobial resistance</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Indonesia</td>
<td>-</td>
<td>Yes (name not indicated)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Japan</td>
<td>Nosocomial Infection Control Central Conference</td>
<td>Pharmaceutical Affairs and Food Sanitation Council, Food Safety Commission</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Laos</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Malaysia</td>
<td>National Infection and Antibiotic Control Committee, MoH</td>
<td>Committee for AMR Control and Surveillance, Department of Veterinary Services (DVS)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Maldives</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mongolia</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Myanmar</td>
<td>NFPI for AMR (Director National Health Laboratory) formation of National AMR committee ongoing</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nepal</td>
<td>National Alliance for AMR Multi-sectoral Committee</td>
<td>-</td>
<td>-</td>
<td>National Alliance for AMR Multisectoral Committee</td>
</tr>
<tr>
<td>New Zealand</td>
<td>-</td>
<td>Yes (name not indicated)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pakistan</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Philippines</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Inter-agency Committee on AMR (ICAMR)</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Yes (name not indicated)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Thailand</td>
<td>Sub-Committee for rational drug use encouragement; Working Group for AMR data collection and analysis</td>
<td>Committee for control, prevention and resolving of AMR for animals; Sub-Committee for SOP of AMU in animals; Working Group on human capacity development to strengthen reasonable antibiotic usage; sub-committee for Drug and vaccine</td>
<td>National re-emerging infectious diseases committee; National Drug system development committee; National Surveillance and Control of AMR Committee; National Drug committee</td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td>Steering Committee in AMR</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
D. AMR Surveillance

Surveillance of AMR at targeted intervals or ongoing monitoring of the prevalence of resistance in bacteria from animals, food, environment and humans, constitutes a critical part of animal health and food safety strategies aimed at limiting the spread of AMR and optimising the choice of antimicrobial agents used in therapy (OIE Terrestrial Animal Health Code, 2014). To determine the relevant bodies on AMR surveillance in the Region, participants were also asked to identify agencies or institutions involved in AMR surveillance in humans, animals, the environment or other settings.

**AMR surveillance in the human health sector.** A total of 19 countries (90.5%) identified agencies conducting AMR surveillance in the human sector (Fig 5). These are: Afghanistan, Australia, Bangladesh, Bhutan, Brunei, Cambodia, India, Japan, Laos, Malaysia, Maldives, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam. These are mostly the national health authorities in the countries or their subunits, while others identified a combination of various agencies including hospitals, institutions and other government units conducting surveillance work (Table 3). Two countries did not indicate any unit doing AMR surveillance in their countries.

**AMR surveillance in the animal health sector.** Sixteen countries (76.2%) indicated that there are involved agencies or institutions doing AMR surveillance in animals (Fig 6). These are: Afghanistan, Australia, Bangladesh, Bhutan, Brunei, Indonesia, Japan, Laos, Malaysia, Myanmar, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam. As with the human health sector many identified their respective national Veterinary Authorities and/or their subunits as the responsible units for AMR surveillance in animals (Table 3).

**AMR surveillance in the environment.** Afghanistan, Australia, Bangladesh, Bhutan, Thailand and Vietnam (6/21 or 28.6%) indicated they have responsible units for AMR surveillance in the environment (Fig 7). Except for Thailand who indicated that their Department of Agriculture was responsible for this, AMR surveillance in the environment, where present, is managed by their Department of Environment or its equivalent (Table 3).

**AMR surveillance in other sectors.** Malaysia, Myanmar, Philippines and Vietnam all indicated that there is AMR surveillance in aquaculture/fisheries as handled by their respective fisheries departments. Bhutan also added that imported meat and poultry are tested for AMR by BAFRA (Table 3).
Table 3. Agencies/institutions involved in AMR surveillance

<table>
<thead>
<tr>
<th>Country</th>
<th>Agency</th>
<th>Country</th>
<th>Agency</th>
<th>Country</th>
<th>Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>MoP</td>
<td>Bangladesh</td>
<td>Directorate of General Health Services</td>
<td>DoE</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>Dept of Health</td>
<td>Bangladesh</td>
<td>National Center for Animal Health, Dept. of Livestock</td>
<td>DoF</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Raja Isteri Pengiran Anak Saleha Hospital (RIPAS)</td>
<td>Bangladesh</td>
<td>Nat. Conservation Div. (NCD), Dept of Forestry (DoF)</td>
<td>Bhutan Agriculture and Food Regulatory Authority (BAFRA) (imported meat and poultry)</td>
<td></td>
</tr>
<tr>
<td>Brunei</td>
<td>Various</td>
<td>Cambodia</td>
<td>National Center for Disease Control (NCDC) and Indian Council of Medical Research (ICMR)</td>
<td>Pending</td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>Various</td>
<td>Mongolia</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>National Institute of Infectious Diseases (NIID)</td>
<td>Laos</td>
<td>CDC, Dept, Ministry of Health</td>
<td>Dept of Livestock and Fisheries; Ministry of Agriculture and Fisheries</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>Regional Labs (8)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>National Institute of Infectious Diseases (NIID)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Laos</td>
<td>CDC, Dept, Ministry of Health</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>Ministry of Health (MoH)</td>
<td>-</td>
<td>Department of Veterinary Services (DVS) (Various)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Maldives</td>
<td>Indira Gandhi Memorial Hospital</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Mongolia</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Myanmar</td>
<td>DPH, National Health Laboratory (NHL)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Nepal</td>
<td>MoHP/National Public Health Laboratory (NPHL)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>Ministry of Health</td>
<td>-</td>
<td>Ministry of Primary Industries</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>National Institute of Health (NIH); PMHL</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>Research Institute for Tropical Medicine (RITM)</td>
<td>-</td>
<td>Aquaculture (soon)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>AMR – Task Force of College of Microbiologists</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>Dept of Medical Sciences</td>
<td>-</td>
<td>Dept of Agriculture</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td>Administration of Medical Services, Ministry of Health</td>
<td>-</td>
<td>National Agro-Forestry Fisheries Quality Assurance Department and Department of Animal Health; Development Partners</td>
<td>Pollution Control Dept, Ministry of Natural Resources and Environment</td>
<td></td>
</tr>
</tbody>
</table>

While some of the surveillance activities considered here could be under a planned strategy by the countries, many of these are more likely to be either passive in nature or driven by research and use varying methodologies (and are therefore not comparable) nor collected and collated centrally. More critically, the questionnaire does not establish whether the approach used would generate representative information that accurately reflects the national AMR situation.

Planned AMR surveillance and monitoring are core parts of national antimicrobial resistance surveillance programmes. These are necessary to: (1) assess and determine the trends and sources of antimicrobial resistance in bacteria; (2) detect the emergence of new antimicrobial resistance mechanisms; (3) provide the data necessary for conducting risk analyses as relevant to animal and human health; (4) provide a basis for policy recommendations for animal and human health; (5) provide information for evaluating antimicrobial prescribing practices and for prudent use recommendations. A cohesive, well-planned, active and targeted AMR surveillance should thus be the goal, rather than disjointed and sporadic focal initiatives that do not build upon each other. Sharing of information and regional cooperation between Member Countries conducting AMR surveillance should also be encouraged.
E. Monitoring Antimicrobial Usage (AMU)

AMR is largely driven by massive inappropriate use of antimicrobials, resulting from over-prescription, easy access through over-the-counter sales and more recently, widespread online sales that has little or no appropriate medical oversight. Such abuse is further reinforced by industry spending on promoting such products, and limited or no counter-investment promoting their rational use or providing objective information to the interest of human and animal health alike.

The survey showed that 18 of the 21 responding countries (85.7%) and 16/21 (76.2%) have existing agencies and institutions involved in monitoring antimicrobial usage for humans and animals, respectively (Table 4).

**Table 4. Agencies/institutions involved in monitoring antimicrobial usage**

<table>
<thead>
<tr>
<th>Country</th>
<th>Agencies/Institutions involved in monitoring AMU in...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Humans</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>MOP</td>
</tr>
<tr>
<td>Australia</td>
<td>Department of Health, Australian Medical Association, Hospitals</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Drug administration</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Hospitals</td>
</tr>
<tr>
<td>Brunei</td>
<td>Dept of Pharmacy/Ministry of Health</td>
</tr>
<tr>
<td>Cambodia</td>
<td>-</td>
</tr>
<tr>
<td>India</td>
<td>Drug Controller General through schedule H&amp;HI</td>
</tr>
<tr>
<td>Indonesia</td>
<td>-</td>
</tr>
<tr>
<td>Japan</td>
<td>Ministry of Health Livestock and Welfare (MHLW)</td>
</tr>
<tr>
<td>Laos</td>
<td>DCDC, Food and Drug Department, UHS, National Center for Laboratory and Epidemiology, Ministry of Health</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>Maldives</td>
<td>Maldives Food and Drug Authority/IGMH Lab</td>
</tr>
<tr>
<td>Mongolia</td>
<td>-</td>
</tr>
<tr>
<td>Myanmar</td>
<td>Dept of medical services</td>
</tr>
<tr>
<td>Nepal</td>
<td>MoHP/Dept of Drug Administration</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Drug regulatory authority of Pakistan, Federal and Provincial Health Services</td>
</tr>
<tr>
<td>Philippines</td>
<td>Research Institute for Tropical Medicine</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>AMR Task Force of College of Microbiologist</td>
</tr>
<tr>
<td>Thailand</td>
<td>Thai FDA</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Admin of Med Services, MoH</td>
</tr>
</tbody>
</table>
Countries need to prioritize finding means to optimize and prudently utilize antimicrobials in human and animals alike. Complementary to this, antimicrobial usage monitoring needs to be at the core of any national program as part of the national oversight of antimicrobial use in the country and also to serve as a means to measure success in the initiatives to promote rational use of antimicrobials. Collecting such information would enable countries to better control the quality and effectiveness of the products in use. It is in this context that the OIE has been mandated by its Member Countries to collect relevant information and establish a worldwide database to monitor the use of antimicrobial agents in animals. This database, which will eventually be linked to the Worldwide Animal Health Information System, will make it easier to analyse and control the source of imported medicines, improving their traceability.

**Part 2: Capacity related to AMR surveillance & mitigation**

Some of the major needs identified during a Technical Consultation on Global Surveillance of AMR (WHO, 2013) include competent and sufficiently resourced laboratories that can provide quality-assured laboratory testing and those which can serve as part of a wider network of service providers for AMR surveillance. It was highlighted that AMR testing is limited, and where available, there is often a lack of quality assurance, quality-assured reagents, reference strains and trained staff. The same observations were reflected in the responses from the Asia-Pacific Region.

**A. Reference Laboratories and Recognized Experts on AMR**

Bangladesh, Bhutan, Brunei, India, Japan, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam (13/21 or 61.9%) identified at least one reference laboratory for AMR for humans, while Indonesia, Japan, Laos, Malaysia, Pakistan, Philippines, Sri Lanka and Thailand (8/21 or 38.1%), also indicated the same for animals (Figure 11). The identified national reference laboratories are listed in Table 5 below.

**Table 5. National Reference Laboratories for AMR in the Asia-Pacific Region**

<table>
<thead>
<tr>
<th>Country</th>
<th>National Reference Laboratories</th>
<th>With Recognized Laboratory Experts in AMR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Humans</td>
<td>Animals</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Australia</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>Institute of Epidemiology, Disease Control and Research</td>
<td>-</td>
</tr>
<tr>
<td>Bhutan</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Brunei</td>
<td>Raja Isteri Pengiran Anak Saleha Hospital (Limited)</td>
<td>-</td>
</tr>
<tr>
<td>Cambodia</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>India</td>
<td>NCDC is being set up as NRL, Delhi under the National Programme for AMR containment</td>
<td>-</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>Japan</td>
<td>National Institute for Infectious Diseases (NIID)</td>
<td>National Veterinary Assay Laboratory (NVAL); Food and Agricultural Materials Inspection Center (FAMIC)</td>
</tr>
<tr>
<td>Laos</td>
<td>Mahosot Hospital</td>
<td>NAHL</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Institute of Medical Research, MOH</td>
<td>Veterinary Public Health Laboratory</td>
</tr>
<tr>
<td>Maldives</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mongolia</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Myanmar</td>
<td>National Health Laboratory</td>
<td>Veterinary Assay Laboratory, LBVD</td>
</tr>
<tr>
<td>Nepal</td>
<td>National Public Health Laboratory</td>
<td>-</td>
</tr>
<tr>
<td>New Zealand</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pakistan</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Philippines</td>
<td>Research Institute for Tropical Medicine</td>
<td>Veterinary Laboratory Division (PAHC)</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Thailand</td>
<td>National Institute of Health</td>
<td>National Institute of Animal Health</td>
</tr>
<tr>
<td>Vietnam</td>
<td>NIHE (?)</td>
<td>(?)</td>
</tr>
</tbody>
</table>

Page 60
In addition to these, there is also the WHO Collaborating Centre (WHO CC) for Antimicrobial Resistance Surveillance and Training in Nonthaburi, Thailand, as well as future additional CCs elsewhere in the Region. Outside of the Asia-Pacific, there are also WHO collaborating centres in Copenhagen, Denmark (WHO Collaborating Centre for Antimicrobial Resistance in Foodborne Pathogens), in Boston, USA (WHO Collaborating Centre for Surveillance of Antimicrobial Resistance), in Bilthoven, Netherlands (WHO Collaborating Centre for Antimicrobial Resistance Epidemiology and Surveillance), and in London UK (WHO Collaborating Centre for Reference & Research on Antimicrobial Resistance and Healthcare Associated Infections). For the animal health side, there is OIE Reference Laboratory for AMR in Webridge, UK. These agencies can potentially extend expertise to national laboratories in the region where AMR is concerned.

B. Identified critical needs related to AMR laboratory capacity

Overall, the countries identified four major areas of need: (1) improvement in testing capacity, (2) strengthening human resource, (3) networking and coordination, and (4) finance and logistical support for systematic and regular surveillance.

**Improvement in testing capacity.** Countries indicated that they need to improve the quality of testing, and in particular on consistency and adherence to standards and methods, improvement of equipment, infrastructure and facilities, capacity for early detection in hospitals, as well as molecular and genotypic identification of resistance. There was also mention of specific needs such as capacity on Tuberculosis drug sensitivity testing and a reference laboratory for residue in food.

**Strengthening human resource.** Another area of concern raised was on human resource improvement and sustainability including improvement on quality and quantity of laboratory staff trained on AMR detection for both screening and confirmation.

**Networking and coordination.** Networking and coordination at the regional and national levels were also indicated by the responding countries. This includes critical need for proficiency testing, exchange of information, sharing of isolates, and exchange on data utilization.

**Financial and logistical support for systematic and regular surveillance.** Budgetary and technical support to approaching AMR surveillance was also acknowledged as some of the critical needs by the countries.
C. AMR Research

Mitigating initiatives on AMR can be further reinforced by AMR research which can (1) provide scientific basis for measuring the extent of reduction of the AMR prevalence based on data collected through integrated programmes for surveillance of AMR in all countries; or (2) fill major gaps in knowledge including those are critical for developing more effective interventions or advocating for support and reinforcing policies.

To determine points of potential contact for AMR research networks in the Asia-Pacific Region, agencies and institutions involved in AMR research in the countries were also identified.

Table 6. Agencies/institutions involved in monitoring antimicrobial research

<table>
<thead>
<tr>
<th>Country</th>
<th>Humans</th>
<th>Animals</th>
<th>Environment</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>Academe</td>
<td>Academe</td>
<td>Academe</td>
<td></td>
</tr>
<tr>
<td>Bangladesh</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bhutan</td>
<td>Hospitals</td>
<td>Academe</td>
<td>Dept of Livestock</td>
<td>Nature Conservation Division, Dept of Forests</td>
</tr>
<tr>
<td>Brunei</td>
<td>Raja Isteri Pengiran Anak Saleha Hospital (RIPAS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>NiID, IP, Silhanouk Hospital, Center of Hope/Institute of TropMed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>National Centers for Disease Control, Indian Council of Medical Research; individual institutions and medical colleges</td>
<td>CSI</td>
<td>NCDC is detecting AMR in common pathogens in sewage examples</td>
<td>Dept of Fisheries</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Ministry of Health, Labor and Welfare; Japan Agency for Medical Research and Development</td>
<td>National Veterinary Assay Laboratory (NVAL); Food and Agricultural Materials Inspection Center (FAMIC)</td>
<td></td>
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</tr>
<tr>
<td>Laos</td>
<td>CDC Department</td>
<td>Department of Livestock and Fisheries; National Animal Health Laboratory</td>
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<tr>
<td>Malaysia</td>
<td>Ministry of Health</td>
<td>Dept of Veterinary Services</td>
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<tr>
<td>Maldives</td>
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<tr>
<td>Mongolia</td>
<td>National University of Med</td>
<td></td>
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<tr>
<td>Myanmar</td>
<td>Dept of Pub Health, NH, Dept of Medical Research</td>
<td>Livestock Breeding and Veterinary Department</td>
<td>Fisheries Department</td>
<td></td>
</tr>
<tr>
<td>Nepal</td>
<td>Academic Institutes, NPHIL</td>
<td></td>
<td></td>
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<tr>
<td>New Zealand</td>
<td>Ministry of Health</td>
<td>Ministry of Primary Industries</td>
<td></td>
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<tr>
<td>Pakistan</td>
<td>NIH, Public and private medical colleges, universities and research laboratories</td>
<td>Nat’l Vet Labs, Public and private veterinary colleges, universities and research laboratories</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>Dept of Health; Department of Science and Technology</td>
<td>Academe</td>
<td></td>
<td></td>
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<tr>
<td>Sri Lanka</td>
<td>College of Microbiologist</td>
<td></td>
<td></td>
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<tr>
<td>Thailand</td>
<td>Dept of Medical Science; Academe</td>
<td>Dept of Livestock Development; Veterinary Schools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td>Admin of Med Services Epidemiology and Pasteur Institute, hospitals, universities, Development partners</td>
<td>NIRV and NIAH; Nat Institute of Vet Research National Institute of Animal Husbandry, NIHE, Development partners</td>
<td>Research on the accumulation and transport of AMR residuals in food chain and the ecosystem</td>
<td></td>
</tr>
</tbody>
</table>
The national health and veterinary services, the academe, and hospitals (for human sector) were among those identified as involved in AMR research in the countries, reflecting the variety of already existing contributions and technical resources that the countries can leverage from and further invest into in an effort to escalate national and regional initiatives on AMR.

**Part 3: Inter-sectoral collaboration in AMR mitigation**

Aside from political commitment, good governance, and relevant capacity across sectors, there is also a need for human and animal health sectors to work together nationally and globally, in collaboration with other stakeholders in the private and public sectors to align policies, strategies and activities. This joint pursuit of public good will benefit from shared expertise, pooled resources while serving respective complementary interests.

**Human-Animal Health Collaboration on AMR issues.** Australia, Bangladesh, Bhutan, Japan, Laos, Malaysia, Myanmar, Nepal, New Zealand, Philippines, Sri Lanka, Thailand and Vietnam (13/21 or 61.9%) all indicated that human-animal health collaboration exists in their countries where AMR is concerned. This is largely reflected in the multi-sectoral nature of their National AMR committees, programmes and strategies (Australia, Philippines, Sri Lanka, Thailand and Vietnam), shared drafting of relevant policies (Bhutan), One Health meetings and collaboration (Bhutan, Nepal and Vietnam), as well as collaborative AMR surveillance (Japan).

**Public-Private sector coordination on AMR issue.** Public-private partnership on AMR mitigation reportedly exist in Australia, Bhutan, Indonesia, Japan, Malaysia, Maldives, Nepal, New Zealand, Philippines, and Thailand (10/21 or 47.6%). In Japan, for example, such partnership is seen in the combined forces of researchers and officials from the academia, the government, and pharmaceutical companies involved in the Committee for Innovation and Development of Novel Antimicrobials. Cooperation of relevant veterinarians and/or farmers associations and local government units has also been fundamental in MAFF’s promotion of responsible and prudent of antimicrobials in animals and monitoring of AM quantities in animals.

In Malaysia, public and private health facilities collaborate in awareness programmes, training and education, and AMR surveillance through Patient Safety Council. In Maldives, the pharmacy association is engaged in AMR awareness and modifying over-the-counter selling of antibiotics. In Nepal, AMR sentinel sites include private medical college hospitals and government hospitals. Thailand has a consumer network on AMR in food such as the Centre for Drug Surveillance and System Development which is a private organization. Cambodia also indicated that such partnership exist for their malaria programme which engaged the private sector in providing training, appropriate diagnosis and treatment according to the national malaria drug policy.