Food and Agriculture Organization of the United Nations

World Health Organization

World Organisation for Animal Health

Regional benchmarking workshop on AMR surveillance in human health, animal health and environment sectors

8-10 May 2024

Bangkok, Thailand

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Abbreviations

ACT	Action to support implementation of Codex AMR Texts (ACT)
AIS	AMR/AMU integrated surveillance
AMC	Antimicrobial consumption
AMR	Antimicrobial resistance
AMR MPTF	AMR Multi-Partner Trust Fund
AMR NAPs	AMR national action plans
AMU	Antimicrobial use
ANIMUSE	Database for ANImal antiMicrobial USE
APQA	Animal and Plant Quarantine Agency
ARSP	Antimicrobial Resistance Surveillance Program
ARSRL	Antimicrobial Resistance Surveillance Reference Laboratory
ASEAN	Association of Southeast Asian Nations
ATLASS	Assessment Tool for Laboratories and Antimicrobial Resistance Surveillance Systems
BBLK	Balai Besar Laboratorium Kesehatan
BPMSPH	Balai Pengujian Mutu dan Sertifikasi Produk Hewan (Animal Products Quality Testing and Certification Center)
CARSS	China AMR Surveillance System
CAS	Centre for Antimicrobial Surveillance
CDC	Centers for Disease Control and Prevention
CPCB	Central Pollution Control Board
DARDFH	Directorate of Aquaculture Regional Development and Fish Health
DICs	Disease investigation centres
DLD	Department of Livestock Development
DOF	Department of Fisheries
ECDC	European Centre for Disease Prevention and Control
EFSA	European Food Safety Agency
EMA	European Medicines Agency
EQA	External quality assessment
ESBL	Extended Spectrum Beta-Lactamase
FAMIC	Food and Agricultural Materials Inspection Center
FAO	Food and Agriculture Organization of the United Nations
FAO RAP	FAO Regional Office for Asia and the Pacific
GLASS	Global Antimicrobial Resistance and Use Surveillance System
GLG	Global Leader's Group
GLLP	Global Laboratory Leadership Program
HAI	Hospital-acquired infections
HLM	High-Level Meeting
ICAR	Indian Council of Agricultural Research
ICMR	Indian Council of Medical Research
IMR	Institute for Medical Research
INFAAR	Indian Network for Fishery and Animal Antimicrobial Resistance
InFARM	International FAO Antimicrobial Resistance Monitoring System
IPC	Infection prevention and control

JACS	Japanese Antimicrobial Consumption Surveillance
JANIS	Japan Nosocomial Infections Surveillance
JIACRA	Joint Interagency Antimicrobial Consumption and Resistance Analysis
JVARM	Japanese Veterinary Antimicrobial Resistance Monitoring
KARMS	Korean Antimicrobial Resistance Monitoring System
KONAS	Korea Antimicrobial Use Analysis System
KVARMS	Korean Veterinary Antimicrobial Resistance Monitoring System
LMICs	Low- and middle-income countries
MARA	Ministry of Agriculture and Rural Affairs
MDR	Multidrug resistant
MoEF&CC	Ministry of Environment, Forest and Climate Change
MRSA	Methicillin-resistant *Staphylococcus aureus*
MyAP-AMR 2	Malaysia Action Plan for AMR 2
NAPs	National action plans
NARC	National AMR committee
NARST	National AMR Surveillance Thailand
NCC	National coordination centre
NCDC	National Centre for Disease Control
NFTEC	National Fisheries Technology Extension Centre
NIER	National Institute of Environmental Research
NIID	National Institute of Infectious Diseases
NRL	National Reference Laboratory
NVAL	National Veterinary Assay Laboratory
PBPKL	Kuala Lumpur Fisheries Public Health Laboratory
PTAST	Proficiency testing program for antimicrobial susceptibility testing
PVS	Performance of veterinary services
QPT	Quadripartite
RENOFARM	Reduce the Need for Antimicrobials on Farms
SAAHRDC	Songkhla Aquatic Animal Health Research and Development Center
SAARC	South Asian Association for Regional Cooperation
SFBU	State Fisheries Biosecurity Unit
SFVP	Substandard and Falsified Veterinary Products
TAG	Technical advisory group
TIUs	Technical implementing units
TORs	Terms of reference
TrACCS	Tracking Antimicrobial Consumption System
TWG	Technical Working Group
UNEP	United Nations Environment Programme
UNGA	United Nations General Assembly
WaSH	Water, sanitation and hygiene
WGS	Whole genome sequencing
WHO	World Health Organization
WHO SEARO	WHO Regional Office for South-East Asia
WHO WPRO	WHO Regional Office for the Western Pacific

WOAH	World Organisation for Animal Health (formally OIE)
WOAH-RRAP	WOAH Regional Representation for Asia Pacific
WOAH-SRR-SEA	WOAH Sub-regional Representation for Southeast Asia

Executive Summary

To build a better understanding of antimicrobial resistance (AMR) surveillance activities at all levels, concerned agencies convened the *regional benchmarking workshop on AMR surveillance in human health, animal health and environment sectors* in Bangkok, Thailand, from 8–10 May 2024. The workshop aimed to build a better understanding of AMR surveillance activities in the aforementioned sectors and to identify priority areas for focus to strengthen an integrated AMR surveillance system.

The FAO Regional Office for Asia and the Pacific organized the workshop in close collaboration with its Tripartite partners WHO and WOAH and under the auspices of the European Union-funded Regional Tripartite AMR Project. The gathering brought together government representatives from the human health, animal health (terrestrial and aquatic animals), and environment sectors engaged in AMR surveillance, along with international experts, development sector partners and regional economic integration organizations. Also attending were members of the Quadripartite organizations (FAO, UNEP, WHO, WOAH) at the global, regional and country levels. The FAO Reference Centre for AMR and veterinary epidemiology, WHO and WOAH Collaborating Centres for AMR, and the European Food Safety Agency were also represented.

The workshop provided a platform for the Quadripartite organizations to share updates on AMR surveillance within sectors and efforts for integration, and also organizational activities leading up to the United Nations General Assembly (UNGA) High-Level Meeting (HLM) in September 2024. Moreover, the meeting allowed for the stocktaking and mapping of surveillance initiatives, materials, tools, and approaches across international organizations and implementing partners at the global, regional and country levels.

The workshop consisted of a total of 9 sessions.

Session 1: Global Quadripartite partners presented their work worldwide on AMR and AMU surveillance contributing to sectoral and integrated surveillance and preparations for the UNGA HLM in September 2024. Regional Quadripartite partners and Mott MacDonald also presented their work in the region contributing to country capacity for AMR and AMU surveillance.

Session 2: Countries made joint presentations on AMR surveillance activities in different sectors. Prior to the workshop, country participants were given a template to prepare their presentation and encouraged to coordinate with others to develop one joint presentation for their country. Participants appreciated this approach as it led to working collaboratively during the run up to the workshop. This session built a better understanding of AMR surveillance activities in different sectors with examples of integrated surveillance.

Session 3: A series of presentations covered the Quadripartite's joint work on AMR/AMU integrated surveillance, updates from the Quadripartite Technical Group on AMR/AMU Integrated Surveillance (QTG-AIS), work across organizations on strengthening sectoral surveillance and contributions to integrated surveillance. At the end of the session, participants gained a better understanding of ongoing initiatives on sector-specific and integrated surveillance, including data reporting to GLASS, ANIMUSE and InFARM.

Session 4: Participants worked in their country groups and identified the strengths, available resources, areas for improvement and immediate needs (relating to laboratory methods, sampling, data management and analysis) for AMR surveillance in different sectors. This session generated a dialogue and discussions to take stock of capacities. The discussions were facilitated by FAO, WHO, and WOAH colleagues and their reference centres or collaborating centres.

Session 5: Key areas were identified where countries need capacity building support for sector-specific and integrated surveillance, including laboratory capacity and epidemiology skills. This was crucial to identify the priorities and direction for project activities for the remainder of 2024 and work plans for 2025.

Session 6: Representatives of different projects at FAO RAP and the partners presented their anticipated capacity-building activities in the region over the next 12 to 18 months. This resulted in a better understanding of ongoing and planned capacity building initiatives from various actors in the region to achieve synergy and avoid duplication.

Session 7: A better understating of AMR lab networks within sectors and their coordination at the country level was achieved, along with deeper knowledge of AMR lab networks at the regional level through presentations from regional partners. The session recognized the need for formalization and coordination mechanisms of lab networks in countries and their linkages with regional and global networks.

Session 8: In the time leading up to the workshop, FAO RAP, in collaboration with the Quadripartite partners and international experts, developed functions and proposed the composition and modality for the Regional Technical Working Group on the Use of AMR/AMU surveillance data.

Session 9: Participants evaluated the workshop for monitoring and evaluation (M&E) purposes, and closing remarks were delivered. To draft the workshop recommendations, a meeting was held with the Tripartite participants and subject matter experts. To facilitate the process, a link to a short questionnaire was sent to participants to understand the issues that could be reflected in the recommendations.

Among the participants responding to the evaluation survey 48.3 percent were male while 46.6 percent were females. Others preferred not to declare. Of the respondents, 98.2 percent indicated that the workshop met their expectations. Participants were pleased with the variety of experts and organizations represented in the meeting and expressed their pleasure, stating that the workshop provided them with a unique opportunity for networking. When participants were asked about the barriers to integrated surveillance, an overwhelming majority said coordination was the biggest barrier, while data sharing, governance, funding, expertise and priorities were also named.

Background

Antimicrobial resistance (AMR) is a clear and present danger to human lives, health and livelihoods. Bacterial AMR is estimated to have directly caused 1.27 million human deaths worldwide in 2019. The World Bank forecasts that AMR could cause low-income countries to lose more than 5 percent of their gross domestic product and push up to 28 million people into poverty by 2050. AMR also threatens the sustainability of animal and crop production and environmental health.

The use of antimicrobials (AMU), or rather, the overuse and misuse of antimicrobials in humans, animals, and plants, are fundamental contributors to the accelerating rate of AMR. Many antimicrobials are shared in agriculture, veterinary and human medicine. AMR can spread within and across sectors through multiple channels, including direct contact, via the food chain and aquatic and terrestrial animal environmental pathways. This complex setting for AMR underscores the need to address AMR through an integrated One Health approach.

Data are essential to understand the evolution and scale of the problem and to be able to develop and implement appropriate and effective policies at the least cost. However, the data needs to be the right data – reliable, compatible and comparable – and collected for the right reasons. Data also needs to be collected from various sources to understand the problem fully. This requires the active participation of multiple sectors providing and sharing comparable data.

Not all countries and sectors are currently able to provide adequate data to inform their policy decision-making, so the Quadripartite (comprising FAO, UNEP, WHO and WOAH[1]) is doing what it can to support improvement. FAO, WHO and WOAH have developed platforms, such as InFARM, GLASS and ANIMUSE, to strengthen sector-specific surveillance of AMR and AMU. These organizations are also working towards integrating AMR/AMU surveillance across sectors. However, no uniform information is available from countries on specific AMR/U Integrated Surveillance (AIS) activities and the level at which integration is happening. Also, there is no uniform definition available for AIS.

The Quadripartite Technical Group on Antimicrobial Resistance and Use Integrated Surveillance (QTG-AIS) is charged with providing advice to the Quadripartite and, hence, to the wider global community on the needs, scope and format of integrated surveillance. It is also responsible for reviewing and refining the current definition of integrated surveillance and agreeing on priority needs in different contexts. A definition and guidance document is expected to emerge from QTG-AIS in 2025. The QTG-AIS is working on a policy brief for the United Nations General Assembly (UNGA) 2024 that will ask countries to commit resources to surveillance efforts, focusing on integrated surveillance.

The EU-funded Regional Tripartite AMR Project, "Working Together to Fight AMR in Asia", funded the workshop as part of its strong commitment to implement activities to strengthen an integrated surveillance system for AMR and AMU utilizing a coherent One Health approach. The objective of the project is to contribute to countries' preparedness to tackle AMR by engaging with major global players and strategic countries and assist in achieving the

[1] Food and Agriculture Organisation of the United Nations, United Nations Environment Programme, World Health Organisation and World Organisation for Animal Health

objectives of the Global Action Plan on AMR by sharing experiences, advocating best practices, and stimulating actions.

The workshop presented a significant opportunity for the QTG-AIS to interact with global and regional experts and countries from a region which is the largest consumer of antimicrobials and where surveillance is being taken seriously, and policies are beginning to have some impact. A major two-way flow of information and opinions would significantly increase everyone's understanding of the challenges and opportunities for integrated AMR surveillance in Asia and the Pacific.

Objectives and Expected Outcomes

By the end of the workshop, it was hoped that participants would:

- have a better understanding of AMR surveillance activities at the global and regional levels;
- be aware of ongoing support from the Quadripartite and its development-sector partners (EU, USAID, Republic of Korea, Fleming Fund, Mott MacDonald, etc.);
- understand partner countries' AMR surveillance across sectors (capacity, communication, coordination);
- see areas of synergy and sectoral strengths that will facilitate integrated surveillance;
- have identified priority actions for establishing and/or strengthening an integrated surveillance system for AMR;
- understand existing networks of laboratories in the animal and human health sectors (national, subregional and regional) and future support to strengthen these networks; and
- have a plan for a regional One Health AMR Technical Working Group on using joint surveillance data for informed decision-making.

Participants

Participants (Annex I – List of Participants) came from all nine of the Regional Tripartite AMR Project countries (the People's Republic of China, India, Indonesia, Japan, Republic of Korea, Malaysia, Philippines, Thailand and Viet Nam) and from other countries with which Quadripartite partners are working (Cambodia, Mongolia, Nepal and Pakistan). Most of the project countries in the region had representatives attending from the human health, terrestrial and aquatic animal health and environment sectors.

Members of the Quadripartite were variously represented at headquarters, regional and country levels. Reference and collaborating centres for FAO, WHO and WOAH came from Australia, Denmark, India, Japan, Republic of Korea, Singapore, Thailand, the United Kingdom of Great Britain and Northern Ireland (the United Kingdom), and the United States of America (the United States). The European Food Safety Agency (EFSA) was a significant presence. In addition, the South Asian Association for Regional Cooperation (SAARC) attended, and representatives joined from the Fleming Fund Management Agent, Mott MacDonald, the interim Australian CDC, US-CDC India, USAID and the European Union. International subject matter experts from the Kingdom of the Netherlands and the United States also joined.

Workshop Highlights

The workshop comprised nine sessions over two and a half days (Annex II – Concept Note and Agenda, Annex III – Workshop presentations).

Session 1: Introduction, overview of the workshop and global and regional activities

Opening remarks

Andreas Roettger, First Counsellor and Head of Foreign Policy Instruments Asia Pacific in the European Delegation to Thailand, welcomed everyone to the meeting. He stressed that the European Union (EU) is providing financial support and also technical guidance through the Joint Inter-agency Antimicrobial Consumption and Resistance Analysis (JIACRA) reports, through which European Union agencies, including the European Food Safety Agency (EFSA), deliver their findings. He appreciated EFSA's participation in this meeting.

Scott Newman, Senior Animal Production and Health Officer at FAO RAP, thanked the European Union for supporting the Regional Tripartite AMR Project and for this meeting. He reconfirmed AMR is a leading global health threat impacting humans, animals, plants and the environment, threatening the sustainability of animal and crop production, environmental health, food and nutrition security, and livelihoods. He pointed out the high-level global priority given to both sector-specific and integrated surveillance of AMR and AMU by the Global Leaders Group on AMR and the UN General Assembly High-Level Meeting on AMR in September 2024. However, the focus is not just on collecting data on resistance and use of antimicrobials but on using the data to drive actions.

Scott explained that the EU-funded Regional Tripartite AMR Project, "Working Together to Fight AMR in Asia", has a strong commitment to implement activities to strengthen sector-specific and an integrated surveillance system for AMR and AMU. The project's objective is to contribute to countries' preparedness to tackle AMR through sharing experiences, advocating best practices, and stimulating actions. This would include supporting the global platforms developed by the three organizations to strengthen sector-specific surveillance of AMR and AMU:

- The International FAO Antimicrobial Resistance Monitoring (InFARM) platform, launched in May 2024, covers AMR in animals and food, and AMU in plant production and protection. It will assist countries to collect, collate, analyse, visualize and effectively utilize their data. Two weeks before this meeting in Chongqing, China, FAO launched a 10-year global initiative, "Reduce the Need for Antimicrobials on Farms for Sustainable Agrifood Systems Transformation" (RENOFARM), which has as one of its three main targets that "80 percent of all participating countries contribute data to InFARM."
- The Global Antimicrobial Resistance and Use Surveillance System (GLASS – WHO) looks at AMR and AMU in humans, providing a standardized approach to the collection, analysis, interpretation and sharing of data by countries. It seeks to actively support

capacity building and monitor the status of existing and new national surveillance systems.

- The ANImal antiMicrobial USE Global Database (ANIMUSE – WOAH) monitors types of animal antimicrobial products, measures trends over time, traces circulation and use patterns globally, and evaluates the quality and authenticity of the antimicrobials products.

Scott acknowledged the technical contributions and participation of staff and countries implementing other AMR projects supported by the Fleming Fund, Republic of Korea, AMR Multi-Partner Trust Fund, USAID's Global Health Security Program, the Pandemic Fund, and the valuable presence of EFSA and the Quadripartite Technical Group on AMR/AMU Integrated Surveillance (QTG-AIS). QTG-AIS leads on AMR/U integrated surveillance matters, including definitions, targets, indicators and resource requirements in different resource settings, specifically in low- and middle-income countries (LMICs).

Scott closed his introduction by emphasizing that the workshop will:

- allow us to take stock and map surveillance initiatives and laboratory capacity across international organizations and implementing partners at the global, regional and country levels;
- enable us to build on existing sectoral strengths and move stepwise towards integrated surveillance for AMR and AMU;
- pave the way to establish a regional One Health AMR technical working group on using joint surveillance data for informed decision-making, possibly anchored to regional Quadripartite mechanisms to help ensure sustainability; and
- remind us to collect data to drive interventions and actions.

Background and objectives of the workshop

The Regional Tripartite AMR Project Coordinator, David Sutherland (Animal Production and Health Officer, FAO RAP), gave a short presentation on the workshop background and objectives (see above) and emphasized that this workshop was:

- part of the continuing commitment of the Quadripartite and its partners to help deliver appropriate and effective AMR surveillance; and
- a step in the process to guide future direction, improvements and self-sufficiency in AMR surveillance, and the Quadripartite would be following up with tangible support for countries.

AMR surveillance activities at the global level

Alejandro Dorado Garcia (Animal Health Officer, AMR Surveillance Coordination, One Health and Disease Control Group, FAO Headquarters) explained that FAO's work was guided by its Action Plan on AMR 2021–2025 (which has as its Objective 2: strengthening surveillance and research to support evidence-based decisions) and by the recently launched RENOFARM initiative which seeks "Farm 5Gs" (good production practice, good health service, good alternatives, good incentives and good connection). RENOFARM also has three supporting workstreams (Agri-environment Enabling Actions, National Enabling Actions, and International

Enabling Actions), five Action Accelerators (Education and Awareness, Behaviour and Social Approach, Public-Private Collaboration, Research/Innovation and New Technologies, and Youth Engagement) and three overarching targets:

- One hundred countries participate in the initiative, with their NAPs for AMR fully implemented in food and agriculture;
- Fifty percent of animal/plant health workers from participating countries are trained; and
- Eighty percent of all participating countries contribute data to InFARM.

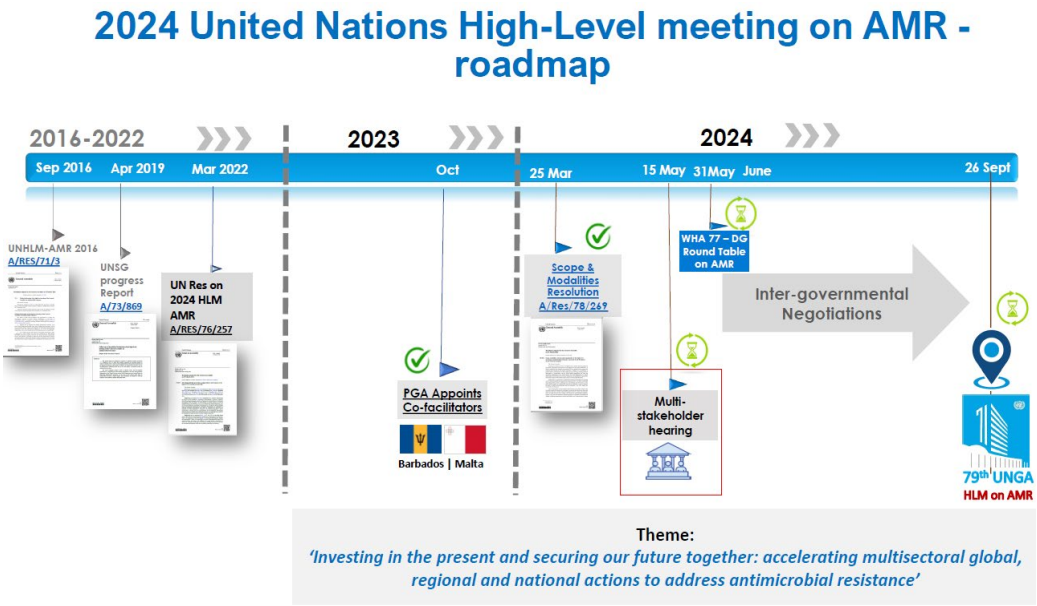
Alejandro explained the Quadripartite Global Integrated System for Surveillance of AMR/AMU (GISSA), which will integrate data from WHO (human AMR/AMU through GLASS), WOAH (animal AMU through ANIMUSE) and FAO (animal/food AMR and plant AMU through InFARM). He described InFARM and FAO's Community of Practice for AMR Laboratory Innovators (AMRLab-CoP) as well as the FAO-ATLASS tool for laboratories and AMR surveillance systems. He concluded by saying that one of FAO's key messages to the UNGA was to strengthen evidence generation in agrifood systems through surveillance.

Mushtaq Memon (Regional Coordinator for Chemicals and Pollution Action Sub-programme, UNEP Asia and the Pacific Office) pointed out that UNEP's approach to AMR is based on the triple planetary crisis of climate change, biodiversity loss and pollution. UNEP's publication *Bracing for Superbugs* lists the priority actions to take to the UNGA HLM in September 2024 as enhancing environmental planning and governance, legal and regulatory frameworks (especially international standards for effluent discharge, national regulatory changes and industry and private sector engagement), identify and target priority AMR relevant pollutants, improve reporting, surveillance and monitoring and prioritize financing, innovation and capacity development.

Delfy Gochez (Data Management Officer, AMU, WOAH Headquarters) summarized WOAH's one hundred years of work since its creation in 1924 to deal with a global rinderpest outbreak. WOAH's AMR Strategy comprises four pillars. First is improving awareness and understanding of AMR among veterinarians and the general public. Second is strengthening knowledge through surveillance and research based on the nine rounds of data collection for ANIMUSE and, in response to the recommendation of their second global conference, establishing the Substandard and Falsified Veterinary Products (SFVP) project. Third is supporting good governance and capacity building through the Performance of Veterinary Services (PVS) Pathway, and fourth is encouraging implementation of international standards, particularly WOAHs Terrestrial and Aquatic Animal Health Codes and their Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.

Chinyere Okoro (Technical Officer, Quadripartite Joint Secretariat, WHO Headquarters) presented on behalf of the Quadripartite Joint Secretariat on the roadmap and process leading up to the UNGA High-Level Meeting on AMR during its 79th session (UNGA 79) in New York on 26 September 2024 (Figure 1). Chinyere also described what the 26 September UNGA meeting would look like.

Figure 1: Roadmap 2024 United Nations General Assembly High-Level Meeting on AMR



AMR surveillance activities at the regional level

Tikiri Wijayathilaka (Technical Officer, WOAH Subregional Representation for Southeast Asia) described the ANIMUSE data collection and the participation of 23 countries from Asia and the Pacific in the eighth round. Eighteen of those countries provided quantitative data. The global message in the eighth report was that AMU had increased by 3 percent in the previous three years, while the use of antimicrobials critical to human health remains low at 16 percent of antimicrobials used in 2021. However, the use of antimicrobials for growth promotion is still reported in 20 percent of WOAH members. Quantitative data on use for aquatic animals was given by only 17 of the 94 participating members. Asia and the Pacific are the biggest users of antimicrobials in the animal health sector in the world due to the very active and intensified production of the livestock, poultry, and aquaculture sectors. At the same time, the legislation and regulations, or their enforcement, are still behind the human health sector.

Tikiri also described WOAH's regional support to data collection through country workshops (e.g. Pakistan, Timor-Leste and the Philippines), a regional symposium on data collection systems on veterinary medicine at the farm level, its work with FAO[2] on guidelines for monitoring antimicrobial use at the farm level and with collaborating centres for training, and the SFVP project.

Sophie Dennis (Technical Officer, WHO WPRO) emphasized why tackling AMR is important. WHO WPRO's "Health and Economic Impacts of AMR in the Western Pacific Region, 2020–2030" shows that mortality rates from AMR are many times higher than for TB and HIV/AIDS. The "Western Pacific Regional Antimicrobial Consumption Surveillance System (WPRACSS) and web portal" and "Guidance on establishing national and local AMR surveillance systems in the Western Pacific Region" provide a link between AMC surveillance and AMR pathogen surveillance, respectively. The AMR surveillance guidance includes an assessment tool (similar

[2] https://openknowledge.fao.org/items/719061e5-03e9-4ddf-a3ee-64e42944c4f8

to FAO's ATLASS for the food and agriculture sector) that aims to assess the current capacity and identify gaps at different levels of the surveillance system (national surveillance system, national reference laboratory and surveillance sites). These, plus the guidance for the Western Pacific Region on "Responding to outbreaks of AMR pathogens in health-care facilities," provide a systems approach to addressing AMR in the region.

Benyamin Sihombing, Technical Officer, WHO Regional Office for South-East Asia (WHO SEARO) reported that many countries in the Southeast Asia Region have a higher burden of AMR pathogens than the rest of the world, although testing coverage is still low. Data from member states was being submitted to GLASS and TrACCS, but further work will be done to strengthen laboratory capacity for an AMR prevalence survey and investment case for AMR, facilitate quality assurance for national reference labs, support data analysis on the use of AMR, AMC, and AMU surveillance data for informed decision-making, and facilitate integrated One Health AMR surveillance in countries.

Mushtaq Memon (UNEP) described the main pollution sources affecting AMR in the environment as effluent and waste from communities, pharmaceutical manufacturing, health care facilities, and animal production, plus the use of antimicrobials and manure in crop production. He explained that UNEP focuses on its key sectors to stop the spread of AMR, namely pharmaceuticals and chemical manufacturing (Global Framework on Chemicals and Industrial Wastewater Management through the circular economy), agriculture and food production (Sustainable Food Systems – chemicals in the food value chain and the Kunming-Montreal Global Biodiversity Framework), healthcare systems (healthcare waste management, e.g. COVID-19 waste and wastewater); and municipal systems (holistic waste management of solids, liquids, and gaseous waste). He explained the results of a study that showed the significant impact of COVID-19 on wastewater, including the huge increase in the use of plastics. He stressed the importance of both water and air-based epidemiology. Mushtaq emphasized the importance of a circular economy in waste management and reducing one of the causes of the spread of AMR, and the relative roles that government, business and citizens play. "The Environmental Dimensions of AMR" by UNEP and the "Technical brief on water, sanitation, hygiene and wastewater management to prevent infections and reduce the spread of AMR" were cited as two important documents by the Tripartite and UNEP on which UNEP's work is based.

Robert Rosenthal, Asia Regional Director, Fleming Fund Management Agent, Mott MacDonald reported on the achievements of Phase 1 (2017–2023) of the Fleming Fund programme, which worked in 21 countries, including ten in Asia and the Pacific, strengthening AMR surveillance systems in LMICs. Support was given to 269 laboratories (176 human health and 93 animal health), and 22 713 laboratory staff were trained. Through the Fleming Fund Fellowship programme 181 fellows improved their technical skills in microbiology and epidemiology (156 professional fellows and 22 policy fellows). There was a particular focus on improving data quality, using the London School of Hygiene and Tropical Medicine Roadmap and the Massey Animal Health Roadmap. Marked improvement in laboratory competencies was observed in all countries supported by the Fleming Fund. Phase 2 (2023–2025) has a budget of GBP 24.7 million to support country grants and fellowships in Southeast Asia.

Mary Joy Gordoncillo (Project Officer, FAO RAP) placed FAO RAP's work within the context of FAO's Action Plan (2021–2025). Objective 2 is strengthening surveillance and research to support evidence-based decisions and RENOFARM. FAO RAP's approach to surveillance is described by five strategies:

1. understanding the organizational, technical, political, and socio-cultural context;
2. developing and applying tools and frameworks to address identified gaps;
3. providing training and support to build needed capacities in food and agriculture;
4. facilitating coordination and partnerships that can reinforce effective AMR mitigation in food and agriculture; and
5. enabling sustained implementation.

She described the timelines for the various projects FAO RAP is currently implementing with international and country partners. Projects are variously supported by:

- the Republic of Korea – Implementation of Codex standards to support containment and reduction of foodborne AMR in Cambodia, Mongolia, Nepal and Pakistan;
- the United States – Global Health Security Project in Thailand and Asia Pacific region
- the United Kingdom through the Fleming Fund – Engaging the food and agriculture sectors in sub-Saharan Africa and South and South-east Asia in the global efforts to combat antimicrobial resistance using a One Health approach in Bangladesh, Cambodia, Philippines, Viet Nam, Lao PDR; and
- the European Union: "Working together to fight AMR in Asia" by sharing experiences, advocating best practices and stimulating actions in China, India, Indonesia, Japan, Republic of Korea, Malaysia, Philippines, Thailand and Viet Nam.

For surveillance, the approach starts with an overarching design and then goes through data generation, data management and analysis, evidence collation and policy recommendations. A large body of work has been created under each area and is described in the Mural presentation.[3]

[3] https://app.mural.co/t/amr3565/m/amr3565/1714740508770/53c0e25aed626fb20e0e828810e1524cc460456d?sender=4de82781-174a-4f4c-8034-c3bc8c7d4075

Session 2: AMR surveillance at the country level

Countries made joint presentations on AMR surveillance across sectors, and key highlights are summarized below. More detailed information is provided in Annex III.

How One Health issues are addressed at the national level

Each country emphasized cross-sectoral collaboration to tackle health challenges, and a summary is presented below, linked to the country presentations in Annex III.

- China's Fourteenth Five-Year Plan emphasizes strengthening disease surveillance, early warning systems, public health campaigns, comprehensive social health management, maintaining environmental health, food and drug safety, and scientific research.
- India promotes multisectoral coordination through One Health committees, such as multisectoral coordination, an apex steering committee, a One Health action group, and workstream-specific committees.
- Indonesia has Presidential Decree Instruction No. 4 2019: Increased Ability to Prevent, Detect, and Respond to Disease Outbreaks, Global Pandemics, and Nuclear, Biological, and Chemical Emergencies. In addition, supporting ministerial decrees and orders exist.
- Japan holds ministerial meetings on emerging infectious diseases led by the prime minister.
- Republic of Korea has an AMR Committee integrating human and non-human sectors.
- Malaysia established the National AMR Committee (NARC) in 2017, involving multiple sectors under the One Health approach.
- The Philippines formed an Inter-Agency Committee on AMR (ICAMR) in 2014, with members from different ministries and departments.
- Thailand has a One Health Working Group focusing on AMR, with members from different ministries and departments.
- Viet Nam has a national AMR strategy for 2023–2030 under the 2045 vision, involving various ministries and international organizations.

How AMR control and mitigation are coordinated

AMR control and mitigation are coordinated in different countries, linked to the country presentations in Annex III.

- China has an AMR NAP (2022–2025) with the involvement of multiple ministries, including health, traditional medicine, and agriculture.
- India has a Multisectoral AMR NAP, which is currently being updated. The country has a multisectoral coordination committee and multisectoral working groups.
- Indonesia has a steering committee that meets annually led by the Coordinating Minister for Human Development. The Multisectoral AMR Control Task Force (Technical Working Group) meets biannually.
- Japan has established an AMR One Health Surveillance Committee that meets once a year. The Second AMR NAP (2023–2027) is ongoing.
- Republic of Korea has a One Health Portal System that integrates sectors for coordinating AMR control and mitigation.

- Malaysia has NARC TWG-2, which is responsible for the coordination of AMR surveillance activities under the MyAP 2.0.
- The Philippines has ICAMR coordinating AMR control and mitigation activities.
- Thailand integrates public, private, academic and civil organizations to coordinate AMR mitigation and control.
- Viet Nam holds monthly AMR coordination committee meetings.

Capacity for AMR epidemiology and data management

Each country has different capacities and employs various systems and agencies to monitor and manage AMR data, linked to the country presentations in Annex III.

- China identified the need to continuously improve data surveillance and analysis methods.
- India manages and analyses AMR data using the WHONET system.
- Indonesia collects and shares data across ministries during an annual task force meeting, with separate systems for the human and animal health sectors.
- Japan relies on specialized institutions for AMR surveillance data management, including the National Institute of Infectious Disease, the National Center for Global Health and Medicine, and the National Veterinary Assay Laboratory.
- Republic of Korea uses systems for comprehensive AMR surveillance data analysis, such as the Korea Antimicrobial Use Analysis System (KONAS), the Korean Antimicrobial Resistance Monitoring System (KARMS), and the Global Antimicrobial Resistance Surveillance System in Korea (Kor-GLASS).
- Malaysia's AMR National Coordination Centre (NCC) lacks epidemiologists for AMR surveillance and epidemiologic analysis.
- The Philippines has an Epidemiology Bureau under the Department of Health and a Veterinary Epidemiology Section under the Bureau of Animal Industry (BAI), using WHONET for data management.
- Thailand's AMR data are analysed separately by each agency and then shared for the national One Health report published annually.
- Viet Nam uses WHONET and MS Excel for descriptive data analysis.

AMR surveillance in human health

A summary of AMR surveillance in the human health sector, linked to the country presentations in Annex III.

- China established the China AMR Surveillance System (CARSS) in 2016, and the Centre for Antimicrobial Surveillance (CAS) promotes the rational use of antimicrobial drugs, with over 7 000 hospitals participating. The China Antimicrobial Surveillance Network is a network of 73 medical institutions.
- India has a National AMR Surveillance Network (coordinated by NCDC), covering 50 sentinel sites; the state-level networks are established in three states, while ICMR coordinates the AMR Research and Surveillance Network.
- Indonesia has two National Reference Laboratories (NRL) and 24 sentinel sites for AMR surveillance. The NRLS are the Balai Besar Laboratorium Kesehatan Surabaya (BBLK

Surabaya) and the Balai Besar Laboratorium Kesehatan Jakarta (BBLK Jakarta), and they participate in international quality assurance programmes.

- Japan's Nosocomial Infections Surveillance (JANIS) is a national programme covering 30 percent of hospitals in Japan, or 2 340 hospitals. The National Institute of Infectious Diseases (NIID) and the National Center for Global Health and Medicine support research, data collection and reporting. Antimicrobial Consumption Surveillance in Humans is under the JACS.
- Republic of Korea's Kor-GLASS system has ten sentinel sites and seven centres for data analysis.
- Malaysia's National AMR Surveillance Network is coordinated by the Bacteriology Unit of IMR (NRL), covering 47 MOH and two MOE hospitals and reports data via WHONET.
- The Philippines' Antimicrobial Resistance Surveillance Program (ARSP) includes the Antimicrobial Resistance Surveillance Reference Laboratory (ARSRL), 22 government hospitals, two private hospitals, and two *gonococcal* surveillance sites.
- Thailand's National AMR Surveillance Thailand (NARST) includes one NRL, four regional medical sciences centres, and 112 provincial hospitals. NARST holds annual meetings and publishes reports.
- Viet Nam's National Coordination Unit on AMR surveillance is under the Medical Service Administration and operates a hospital-based surveillance system.

AMR surveillance in terrestrial animal health

A summary of AMR surveillance in terrestrial animals, linked to the country presentations in Annex III.

- China's Ministry of Agriculture and Rural Affairs has several initiatives, such as the 2023 AMR Surveillance Plan and the National Action Plan for Reducing the Use of Veterinary Antimicrobials (2021–2025). Moreover, the China Institute of Veterinary Drug Control provides technical guidance, developing databases, and analysing AMR surveillance data.
- India established the Indian Network for Fishery and Animal Antimicrobial Resistance (INFAAR) to oversee the planning and implementation of AMR surveillance in animals and food, collaborating with veterinary and fisheries research institutes and veterinary colleges. Eleven animal science laboratories conduct surveillance in the livestock sector.
- Indonesia has a national AMR surveillance network consisting Balai Pengujian Mutu dan Sertifikasi Produk Hewan (BPMSPH) and eight Disease Investigation Centers (DICs) focusing on AMR surveillance in healthy animals since 2018.
- Japan's Japanese Veterinary Antimicrobial Resistance Monitoring (JVARM) monitors antimicrobial sales and resistance in foodborne and animal pathogens. Participating agencies are the National Veterinary Assay Laboratory (NVAL), Veterinary AMR Center, the Food and Agricultural Materials Inspection Center (FAMIC), livestock hygiene service centers and contracted laboratories in local governments.
- Republic of Korea's Korean Veterinary Antimicrobial Resistance Monitoring System (KVARMS) provides data for the annual One Health portal system report. The data are

used for decision-making to inform the ban on antimicrobials in feed and veterinary prescription.

- Malaysia's AMR surveillance in terrestrial animals involves the Veterinary Public Health Division (National Coordination Centre), Disease Control and Veterinary Biosecurity Division, State DVS and District DVS. TWG-2 of NARC coordinates the surveillance.
- The Philippines' Antimicrobial Resistance Surveillance Program for Animal Health (ARSP-AH) has three components (healthy food animals, diseased livestock and diseased aquatic animals). The Department of Agriculture TWG coordinates it.
- Thailand's Department of Livestock Development (DLD) AMR Secretariat coordinates monitoring efforts. Agencies involved are the Division of Animal Feed and Veterinary Products Control, National Institute of Animal Health, Bureau of Quality Control of Livestock Products, Veterinary Research and Development Centres, and provincial livestock offices and regional livestock offices.
- Viet Nam has a national action plan for AMR control in agriculture for 2021–2025. The data are generated by three designated regional labs.

AMR surveillance in aquatic animal health

AMR surveillance initiatives in aquatic animals across several countries are summarized below, linked to the country presentations in Annex III.

- China has established a National Coordination Centre under the Bureau of Fisheries (MARA), expanding from five provinces in 2015 to 16 provinces by 2023. The NRL is the National Fisheries Technology Extension Centre (NFTEC). Also, an analytical system for tracking antimicrobial resistance was established.
- India has INFAAR. AMR surveillance has been ongoing at nine centres of the Indian Council on Agriculture Research (ICAR) fisheries institutes across the country since 2019.
- Indonesia conducts surveillance through the Directorate of Aquaculture Regional Development and Fish Health (DARDFH), engaging 15 Technical Implementing Units (TIUs).
- Japan relies on the National Veterinary Assay Laboratory (NVAL), fisheries research institutes in local governments and contracted labs to monitor AMR.
- Republic of Korea provided no information in the country presentation.
- Malaysia has included AMR surveillance for aquatic animals in its MyAP-AMR 2022–2026 plan. It coordinates efforts through various laboratories and biosecurity units (sampling - State Fisheries Biosecurity Unit (SFBU); isolation - Fish Health Lab/Public Health Lab/Fisheries Research Institute/Fish Health Research Institute; AST - Kuala Lumpur Fisheries Public Health Laboratory (PBPKL); review and analysis - Fisheries Biosecurity Division DOF).
- The Philippines' ARSP-AH for AMR monitoring in aquatic animals involves the National Fisheries Laboratory Division and regional fisheries laboratories.
- Thailand's NRL is the Aquatic Animal Health Research and Development Division (AAHRDD), Department of Fisheries, while the lab network includes Songkhla Aquatic Animal Health Research and Development Centre (SAAHRDC).
- Viet Nam provided no information in the country presentation.

AMR surveillance in the environment sector

AMR monitoring in the environment sector across countries is summarized below, linked to country presentations in Annex III.

- China provided no specific information in its country presentation.
- India's Central Pollution Control Board (CPCB) has established guidelines for monitoring antibiotic residues alongside environmental standards for the pharmaceutical industry set by the Ministry of Environment, Forest and Climate Change (MoEF&CC) in 2021.
- Indonesia monitors AMR in the environment through the Research Organization for Health (seven research centres). The National Research and Innovation Agency (BRIN) is also engaged.
- Japan conducts research and monitoring of antimicrobial-resistant organisms and residual antimicrobials in aquatic and terrestrial animal production environments. The research is conducted by environmental research institutes and institutes of public health in local governments.
- Republic of Korea's National Institute of Environmental Research (NIER), Ministry of Environment, is engaged in environmental monitoring of AMR.
- Malaysia's MyAP 2 plan (2022–2026) includes environmental research and surveillance activities. The Water Quality Laboratory (NAHRIM) has been designated as an NRL.
- The Philippines provided no specific information in its country presentation.
- Thailand samples water from the surface, and hospital and municipal wastewater treatment plants.
- Viet Nam provided no specific information in its country presentation.

Communication and data sharing

Below is a summary of communication and data sharing for AMR in various countries, linked to the country presentations in Annex III.

- In China, CARSS publishes an annual report on bacterial resistance monitoring. An AMR tracking system has been established for the aquatic animal health sector.
- India has developed the i-AMRSS, a user-friendly portal for the integrated management of AMR data. In addition, ICMR and ICAR are collaborating to understand the relationship between AMU and AMR.
- Indonesia uses AMR data as an indicator for monitoring control efforts in the health sector, examining blood specimens with the aim of reducing *E. coli* that produces Extended Spectrum Beta-Lactamase (ESBL). The NCC shares AMR findings with stakeholders annually.
- Japan publishes an annual One Health report on AMR findings from different programmes.
- Republic of Korea publishes an annual report in the One Health portal system.[4]
- Malaysia has established the TWG-2 for sharing AMR surveillance findings.
- The Philippines uses national AMR surveillance data to guide policy recommendations and to inform clinical therapy decisions.

[4] https://www.nih.go.kr/nohas/

- Thailand utilizes AMR surveillance to inform policy and clinical decision-making and publishes an annual One Health report.
- Viet Nam shares surveillance results through workshops and congresses.

Funding for surveillance

As summarized below, funding for AMR surveillance varies from country to country, with links to country presentations in Annex III.

- China provided no information in its country presentation
- In India, various government programmes make funding available for AMR surveillance laboratories, data collection, and analysis. The Pandemic Fund will also soon help with funding.
- Indonesia has allocated a government budget (APBN) for routine AMR surveillance across the human, animal, aquatic, and environment sectors, supplemented by donor support for national data collection and analysis.
- In Japan, funding comes from multiple sources, including the Ministry of Health, Labor and Welfare (MHLW), the Ministry of Agriculture (MAFF), pharmaceutical companies, and various research agencies, enabling comprehensive AMR surveillance efforts.
- Republic of Korea relies on government support for its AMR surveillance initiatives.
- Malaysia lacks dedicated funding, with laboratories using operational budgets for AMR surveillance and donor support.
- The Philippines relies on government funding and donors.
- Thailand has secure government funding and support from international organizations like WHO and FAO for different sectors.
- Viet Nam has not reported information on funding sources. However, donors are supporting the implementation of activities in different sectors.

Examples of integrated surveillance

India, Indonesia, and the Philippines are engaged in the project "WHO integrated global surveillance on ESBL-producing *E. coli* using a One Health approach" (otherwise known as the Tricycle Project[5]) to integrate AMR data from different sectors. Japan produces One Health AMR reports, enabling comparisons of AMU across sectors and identifying resistance trends in companion animals and food. The Republic of Korea employs a One Health portal for integrated surveillance, addressing challenges in legal frameworks and harmonization of methods. Malaysia participated in the Tricycle and is currently engaged in two TRIuMPH projects – extension projects for monitoring AMR in three countries that implemented WHO's Tricycle Project. Thailand emphasizes consensus criteria for pathogen monitoring while addressing budget and laboratory capacity challenges. Viet Nam struggles with inadequate data-sharing mechanisms, limited laboratory participation in the animal sector, and insufficient funding and personnel for effective AMR surveillance.

[5] https://www.who.int/publications/i/item/9789240021402

Session 3: AMR/U integrated surveillance

The second day of the workshop started with a series of presentations on the Quadripartite's joint work on AMR/AMU integrated surveillance, updates from the Quadripartite Technical Group on AMR/AMU Integrated Surveillance (QTG-AIS), work across organizations on strengthening sectoral surveillance and contributions to integrated surveillance. At the end of the session, participants gained a better understanding of ongoing initiatives on sector-specific and integrated surveillance, including data reporting to GLASS, ANIMUSE and InFARM.

Quadripartite efforts to strengthen AMR integrated surveillance

Chinyere Okoro explained that the Quadripartite's work globally on AMR was defined by the "Quadripartite strategic framework for collaboration on AMR," which had as one of its outcomes "Monitoring and surveillance of antimicrobial resistance and use are undertaken in humans, animals and plants, and analysed in an integrated manner." For the UNGA HLM on 26 September 2024, there is a concerted effort to ensure that integrated surveillance is prioritized. As such:

- The Global Leader's Group (GLG) on AMR recommends that "All countries should strengthen human resources, diagnostic, laboratory, and other infrastructure capacity to support sustainable sector-specific and integrated surveillance systems and the use of data for action and, by 2030, report quality-assured AMR and AMU surveillance data through global surveillance systems."
- The AMR-Multistakeholder Partnership Platform strengthens sector-specific AMR and AMU surveillance, building towards integrated surveillance for evidence-based action to reduce the risk and impact of AMR.

The GLG on AMR has published a *Pocket guide on integrated surveillance for political decision-makers* designed to show the need for and identify actions to support integrated surveillance of AMR and AMU across sectors.

Chinyere briefly introduced the Quadripartite Technical Group on AMR/AMU Integrated Surveillance (QTG-AIS) before Jaap Wagenaar (Professor, Utrecht University and Co-Chair QTG-AIS) explained more about their work on harmonizing and streamlining integrated surveillance. The group aims to develop a technically feasible public health value proposition for implementing integrated One Health surveillance by all member states. The main task of the QTG-AIS is to prepare guidance on One Health integrated surveillance of AMR and AMU.

The guidance document, currently in draft form and due to be published in 2025, will provide a definition of integrated surveillance and stress its benefits and purposes. In draft form, these are as follows:

> Fundamentals of integrated surveillance
>
> Definition of One Health integrated surveillance of AMR and AMU
>
> Integrated AMR and AMU surveillance is the continuous, collaborative, coordinated, and systematic collection, collation, validation, analysis, interpretation, communication, and sharing of AMU and AMR data.
>
> This includes data from humans, animals and products, plants/crops and products, and the environment to produce information across sectors and actions aimed at reducing the burden

of AMR-associated infections and preserving the efficacy of antimicrobial agents across One Health sectors.

Benefits and purposes of integrated surveillance

- detects AMR reservoirs, hotspots and emerging AMR;
- determines the drivers of resistance and their trends – inappropriate AMU (AMR-specific) or sub-optimal WASH/IPC (AMR-sensitive);
- identifies potential transmission routes and directionality; and
- provides data for action, informs risk management policy, legislation and practice strategies and serves as an indicator to measure the effectiveness of interventions to mitigate AMR and optimize AMU.

Definitions of indicators for AMR and AMU

An indicator used for AMR surveillance is defined as a "microorganism or resistance gene," or "molecular marker or surrogate," or a microbial population with reduced susceptibility to an antimicrobial or antifungal agent.

AMU surveillance indicators are metrics used to monitor and assess the patterns, quantities and types of antimicrobial agents used across the various sectors (human health, animal health, plant health, agrifood and environment)

Integrated surveillance of AMR and AMU: a One Health approach

Jaap Wagenaar shared that QTG-AIS is working on developing the "Quadripartite Guidance on One Health Integrated Surveillance of AMR and AMU" to serve as a technically feasible public health value proposition for implementing integrated One Health surveillance by all member states. The guide is expected to provide a definition and purposes for One Health integrated surveillance of antimicrobial resistance and use, priority measures and indicators, resources and requirements, and considerations for implementation and operationalization.

ANImal antiMicrobial USE (ANIMUSE)

Delfy Gochez introduced the ANImal antiMicrobial USE (ANIMUSE) global database, which was developed in response to a recommendation to WOAH at the first Global Conference on the Responsible and Prudent Use of Antimicrobial Agents for Animals in France in March 2013. In 2013, only 41 of the 152 countries responding (27 percent) had an official system in place for collecting AMU data. By the eighth round of reporting in 2023 (report 2024), this had risen to 80 percent reporting quantitative data. Both the Terrestrial (Chapter 6.9) and Aquatic (Chapter 6.3) Animal Health Codes guide the monitoring of quantities and usage of antimicrobial agents. The database was designed, with WOAH support, to monitor the type and use of agents, measure trends, trace circulation and use patterns globally and evaluate the quality and authenticity of products in use. The results confirm the highest level of usage is in Asia and the Pacific. Tetracyclines and penicillins are the commonly used antimicrobial classes and there has been a slight increase in use in animals from 2019 to 2021 after six years of decreases.

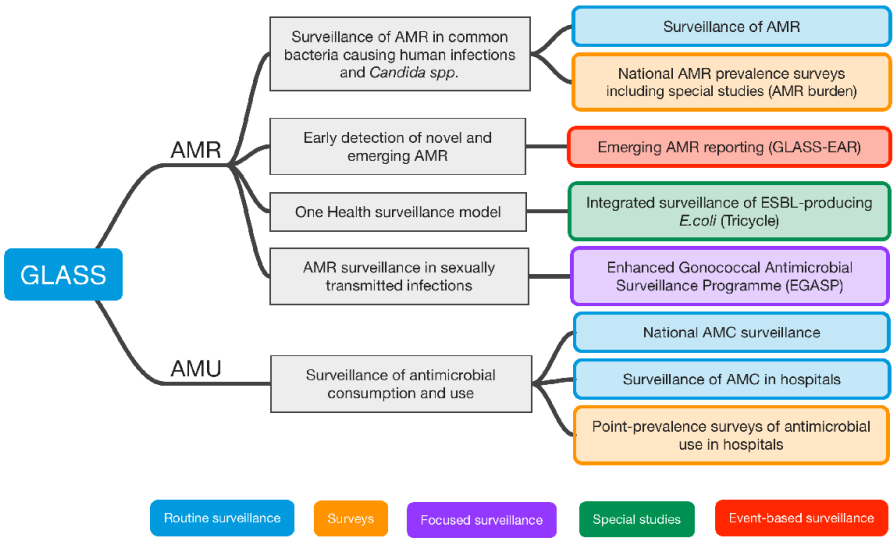
WOAH will continue to support ANIMUSE to increase the number of AMU national reports, work with WHO to integrate AMU/AMC analyses with the human sector, increase reporting on aquatic animals (which is lagging) and enable reporting at the species level.

Global Antimicrobial Resistance and Use Surveillance System (GLASS)

Chinyere Okoro on behalf of Sergey Eremin (The Surveillance, Prevention and Control Department, AMR Division, WHO HQ) provided an update on GLASS. She indicated that 137 countries were enrolled as of February 2024, highlighting that GLASS can accommodate data on AMR and AMU in the human health sector from various sources and programmes (Figure 2). In 2024, GLASS will accept data on 13 bacterial pathogens, nine specimen types, and 32 antibiotics across 11 antimicrobial classes. The deadline for countries to submit data is 31 August 2024, and the report is expected to be published duly after final validations. She shared that the new GLASS interactive dashboard is an online, fully interactive and flexible data visualization portal, allowing users to interact with and download data, graphs, maps and GLASS indicators. She also presented the methodological principles of new national prevalence surveys, including:

- cross-sectional (< 12 months survey);
- hospitals selected using probability sampling methods;
- independent of the availability of microbiology diagnostic;
- services (access to be granted);
- inclusion of consecutive patients with suspected bloodstream infections;
- quality-assured microbiology laboratory;
- minimum set of demographics and clinical information; and
- ethical principles adhered to.

Figure 2: WHO GLASS Framework



The International FAO Antimicrobial Resistance Monitoring (InFARM) System

Agnes Agunos, InFARM Operationalization Specialist, FAO Headquarters, provided a comprehensive overview of InFARM implementation and requirements for participation. InFARM is a global platform for AMR surveillance in the agrifood sector. It involves identifying national focal points responsible for data collection and reporting across the food chain, from

healthy and diseased animals to food commodities. The platform emphasizes integrating surveillance across different programmes and enhancing laboratory capacities using FAO-ATLASS. Countries are invited to participate through an open call until 31 October 2024 (now 15 December 2024), starting with the nomination of focal points, identification of surveillance components and AMR data file submission overview. InFARM enables the submission of AMR data following a harmonized data model (Option A: individual isolates; Option B: summarized AMR measurements). The system has the flexibility for different levels of confidentiality and representativeness (pilot local, pilot national and systematic). Tools like WHONET can be used for managing AMR data before submission (i.e., transforming national data to InFARM data models). It also allows data visualization and interpretation to inform national and global policies.

Global lessons on the development of AMR and HAI surveillance networks

Daniel VanderEnde, Medical Officer, US CDC (India), shared 12 lessons in the development of AMR and hospital-acquired infections (HAI) surveillance networks, including:

- Ministry of Health must lead to improve the system;
- leadership at the healthcare facility;
- without a reliable source of supplies for all sites, surveillance is very difficult;
- promote internal and external quality control assessments;
- quality specimen collection is good for patient care and data usefulness;
- standardizing practices is important for sites and scaling of surveillance;
- when conducting HAI surveillance, use case definitions that apply to the country;
- standardized data collection and reporting is less work;
- regular and accessible ongoing training opportunities sets the standards;
    - ongoing virtual training opportunities build expectations and a community of practice;
- a phased approach to implementing surveillance works best;
- early monitoring is important to quickly address gaps and understand challenges before scaling; and
- have a plan, people and priority for the use of data for action.

Fourth joint interagency report on integrated analysis of AMC and occurrence of AMR in bacteria from humans and food-producing animals in the European Union

Pierre Alexandre Beloeil, Veterinary Epidemiologist, EFSA, shared that the European Commission (EC) has tasked ECDC, EFSA and EMA to produce the fourth JIACRA report (Figure 3). The JIACRA report is one of the examples of the One Health integrated surveillance of AMR/U, and the aims of the JIACRA report are to:

- compare antimicrobial consumption (AMC) data in humans and animals (expressed in mg/kg of biomass);
- investigate possible associations between AMC in humans and food-producing animals and the occurrence of AMR in bacteria in both sectors, considering 2019 to 2021 data; and

- identify significant trends in AMR and AMC and assess whether trends were concomitant over the period.

Primary key indicators during 2014–2021 were:

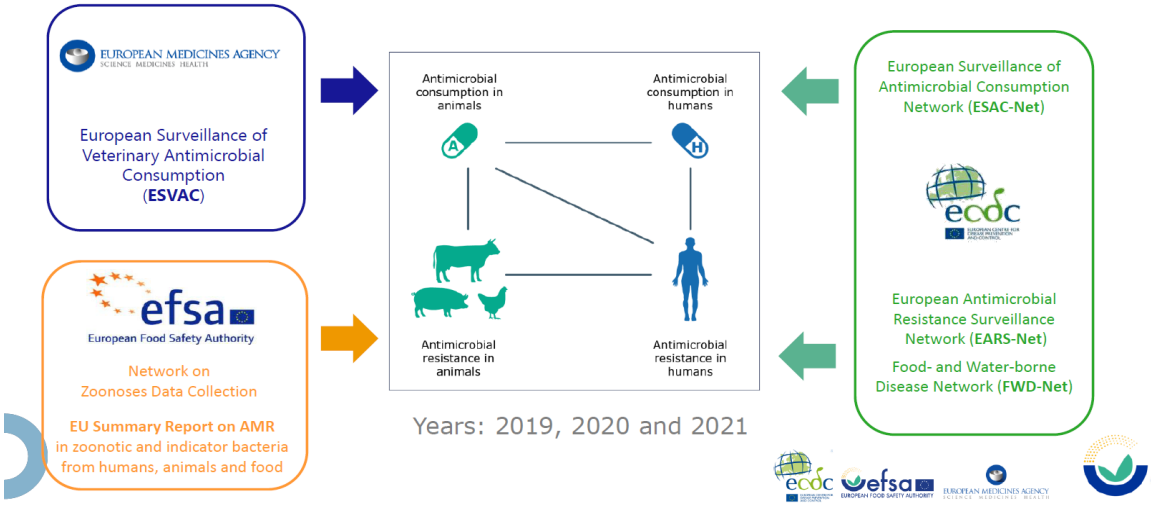
AMC

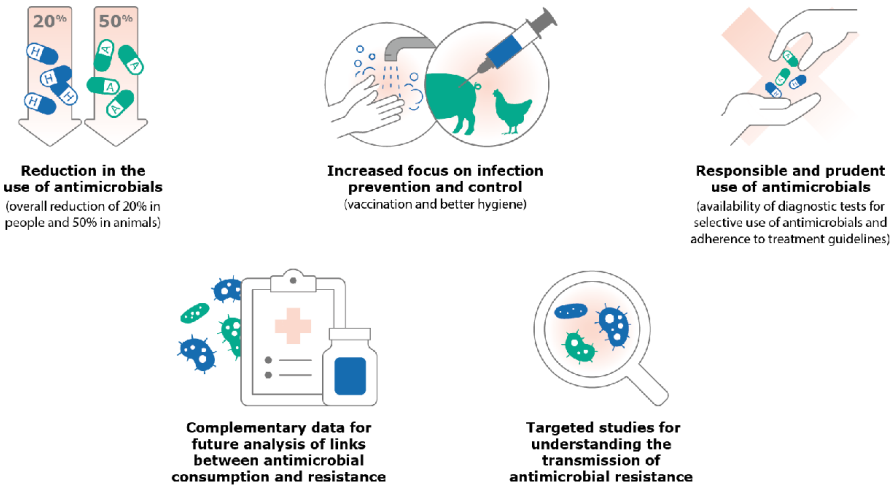
- total consumption of antimicrobials in humans, expressed as defined daily doses per 1 000 inhabitants per day; and
- the overall sales of veterinary antimicrobials in milligrams in food-producing animals in mg/PCU.

AMR

- proportion of *E. coli* from humans with resistance to third-generation cephalosporins;
- proportion of *Staphylococcus aureus* resistant to methicillin (MRSA) in humans; and
- proportion of *E. coli* from food-producing animals with complete antimicrobial susceptibility.

Figure 3: Fourth joint interagency report on integrated analysis of antimicrobial consumption and occurrence of antimicrobial resistance in bacteria from humans and food-producing animals in the European Union – process and key recommendations (JIACRA IV: 2019–2021)





Session 4: Supporting AMR surveillance systems at the country level

In this session, countries were asked to use a template that they had been sent before the meeting to discuss their strengths, available resources, areas for improvement and immediate needs (relating to laboratory methods, sampling, data management and analysis). Participants worked in their country groups (representatives from the human, terrestrial and aquatic animals and environment sectors), generating a dialogue and discussions to take stock of capacities. These discussions were facilitated by FAO, WHO, and WOAH colleagues and their reference centres and collaborating centres. After discussions, countries were asked to prepare and deliver short presentations based on the template. This session resulted in a better understanding of laboratory capacities on AMR diagnostics and AST, data collection, analysis and epidemiology in the human, animal and environment sectors in different countries.

Session 5: Identifying national capacity building needs

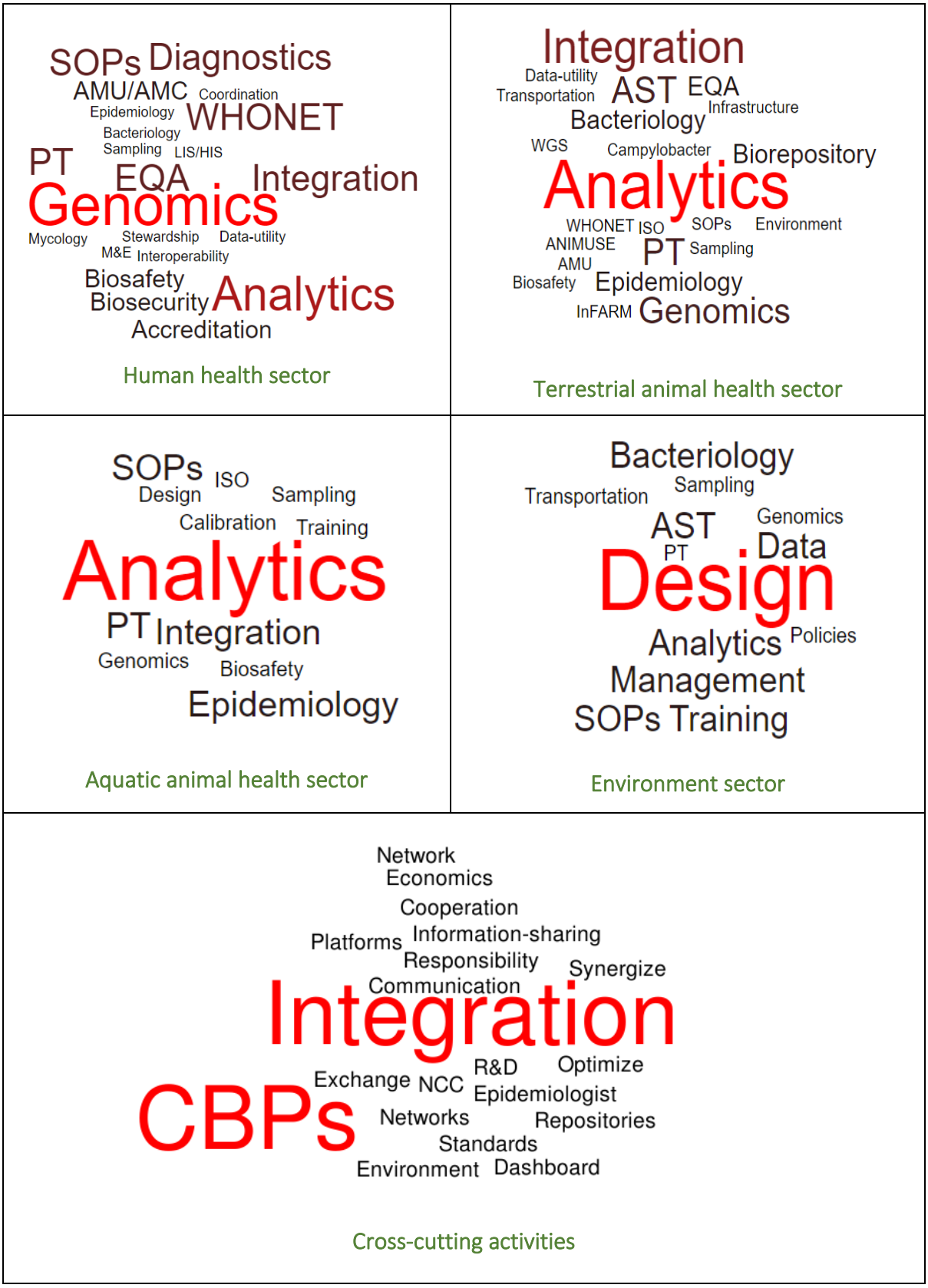
All nine Regional Tripartite AMR Project countries prepared slides and presented them to the workshop. This session resulted in identifying key areas where countries need capacity building support for sector-specific and integrated surveillance, including laboratory capacity and epidemiology skills. The key areas for capacity building across countries in different sectors are presented as word clouds in Figure 4. This form of analysis helped to identify the priorities and direction for project activities for the remainder of 2024 and work plans for 2025.

Key to acronyms in the figures below

AMU	Antimicrobial use
AMC	Antimicrobial consumption
AST	Antimicrobial susceptibility testing
CBP	Clinical breakpoints
EQA	External quality assessment
ISO	International Organization for Standardization

LIS/HIS	Laboratory information system/ Hospital information system
M&E	Monitoring and evaluation
NCC	National coordination centre
PT	Proficiency testing
SOP	Standard operation procedures
WGS	Whole genome sequencing

Figure 4: Key areas where support is needed in the human, terrestrial and animal and environmental health sectors and for cross-cutting activities



Session 6: Regional Tripartite AMR Project and partners' strategies for delivering capacity building for strengthening AMR surveillance

Different projects at FAO RAP and partner organizations presented their anticipated capacity-building activities in the region over the next 12 to 18 months. This resulted in a better understanding of ongoing and planned capacity building initiatives from various actors in the region and should help achieve synergy and avoid duplication.

Fleming Fund Phase 2

Technical Lead for One Health and Animal Health, Fleming Fund Management Agent, Mott MacDonald presented the expanding focus of the Fleming Fund Phase 2, implemented over 2024–2025 and based on country needs, assessed priorities and country investment strategies.

- Country grants build on Phase I work to support national surveillance system development and collection, and sharing and use of AMR data through a One Health approach.
- The Fleming Fellowship Scheme provides in-depth professional development and leadership training to enhance investments made through country and regional grants.
- Regional grants support regional One Health approaches to improve surveillance of AMR.

The expected results from Phase 2 are:

- quality AMR/U/C and data on the burden of disease are produced;
- quality data analyses were conducted;
- quality analysed data shared with decision-makers; and
- sustainable investments at country and global levels to counter AMR.

The specific areas of work in Phase 2 include:

- animal health
- One Health
- environment
- data use
- economic case
- burden of disease
- gender and equity
- sustainability
- clinical/practitioner engagement

Specifically, a regional AMR One Health grant will work on areas of animal health, one health, environment, and practitioner engagement.

FAO RAP joint presentation

FAO RAP's joint presentation on planned capacity-building activities was co-delivered by Regional Project Coordinators Peter Flanagan and Jutamart Jattuchai, and Regional AMR/U Data Specialist Jutanat Srisamran.

Flanagan shared that the "Action to Support the Implementation of Codex Texts on AMR (ACT project)" works on raising awareness, expanding surveillance capacity and supporting governance and good practices. Under the surveillance output, the goal is to expand surveillance and laboratory capacity and the following activities are planned:

- laboratory assessment (FAO-ATLASS);
- ATLASS laboratory assessor training;
- proficiency testing for antimicrobial susceptibility testing (PTAST);
- support pilot studies on AMR;
- ACT Tool – legal and technical gaps;
- support InFARM data platform; and
- support Antimicrobial Residue Assessment Tool.

Jutamart highlighted that under the Fleming Fund, the following activities are planned:

- regional InFARM training;
- ATLASS assessments and training;
- Philippines: training on *Salmonella* serotyping, *Campylobacter* isolation, ESBL detection, and clinical breakpoint and epidemiological cut-off determination;
- Cambodia: planning – pilot the residue monitoring capacity assessment and trainings (co-financing with ACT Global project); and
- PTAST 2024 participation: Cambodia, Philippines.

Jutamart shared that the USAID-funded Global Health Security Project supports efforts in several countries.

- Cambodia: efforts include developing national AMR surveillance strategies;
- Fiji: advancing national AMR surveillance plan;
- India: refresher training for INFAAR scientists and workshops on AMR and ATLASS;
- Myanmar and the Philippines: national surveillance plan and trainings are being developed, including laboratory focal point training;
- Indonesia: enhancing laboratory capacity and surveillance design for AMR in high-risk environments;
- Viet Nam: establishing networks for diagnostic and AMR testing in animals; and
- Thailand: building advanced capacities in AMR surveillance for animal health, particularly in swine, poultry and aquaculture.

Muhammad Usman Zaheer shared that the EU-funded Regional Tripartite AMR project's anticipated activities in the animal health sector and along the One Health interface are country capacities for laboratory diagnostics, AMR epidemiology, data analytics, reinforcing the lab networks at different levels, coordination among sectors, and strengthening country capacity for integrated AMR/AMU surveillance. The presentations from other projects and partners, together with the needs identified in Session 5, will shape the project's work plan for the remainder of 2024 and 2025.

Session 7: Existing and potential AMR laboratory networks at the country and regional levels

This session resulted in a better understating of AMR lab networks within sectors and their coordination at the country level. In addition, presentations from regional partners produced a better understanding of AMR lab networks at the regional level.

Country networks

Countries briefly presented on their existing AMR and One Health laboratory networks in the human, terrestrial and aquatic animals, and the environment sectors. A panel discussion and Q&A session followed. One of the main issues that emerged from the presentations was that the countries have networks within the sectors that may not be formalized with clear TORs; and so efforts should be made to strengthen, formalize, and reinforce the sectoral and intersectoral networks with clear TORs. Strengthening the coordination and collaboration of these networks will be included in the recommendations of this workshop.

The presentations provided a comprehensive overview of country-level challenges and gaps regarding the AMR surveillance lab networks, namely:

- The essential role of laboratories in any surveillance system should be highlighted, particularly in an integrated setup.
- While all presented countries demonstrated the presence and support of laboratory components in their surveillance systems, significant gaps were identified within different sectors across the countries.
- Country-level lab networks exist informally, but not necessarily with the agreed TORs. Roles are not well defined, and the coordination mechanism is not well developed.
- Variations exist in the initiation points for capturing AMR data, including sampling types across various stages involving human patients, live animals, slaughtered animals, and food products. While this diversity can aid in identifying the source of the problem, it requires specific tools for reliable data analysis and interpretation.

Challenges and gaps Identified:

- Each country requires a leading entity, which need not necessarily be within the laboratory system unless there is an established surveillance system structure.
- Formal laboratory working groups for each sector and with clear TORs and frequency of meetings are lacking.
- Establishing a reporting system for regular feedback on laboratory data can serve as an incentive for laboratories and aid in verification purposes.
- Countries should focus on a specific common issue within AMR as a starting point, rather than maintaining a general approach, for instance, targeting multi-drug resistant or MRSA as initial points to gather pertinent data from the laboratory network.

Subregional and regional laboratory networks

Tikiri Wijayathilaka, WOAH SRR-SEA, presented that WOAH organized a One Health Laboratory Network, First Core Group Consultation Meeting in 2023. This was aimed at facilitating knowledge exchange and capacity building among experts and coordinators and creating

collaborative frameworks for laboratories and laboratory networks involved in zoonosis diagnosis, AMR analysis, and food and feed safety (networking of networks). The objectives included:

- strengthen analysis and surveillance capacities for emerging zoonotic diseases, AMR, food and feed safety by sharing best practices among regional public health and animal health laboratories;
- facilitate communication and collaboration among existing lab networks;
- improve regional preparedness for pandemics; and
- support ASEAN member states in building sustainable laboratories and enhancing their ability to detect and respond to emerging zoonotic diseases, AMR, and food and feed safety.

Sophie Dennis, WHO Regional Office for the Western Pacific (WPRO), presented the WHO AMR Surveillance and Quality Assessment Collaborating Centres Network, which aims to assist WHO in supporting countries to build capacity to develop and implement AMR surveillance, particularly LMICs. The collaborating centres also play a pivotal role in providing international external quality assessments to labs in the human health sector.

Baseem Zayed, Regional Advisor, WHO SEARO and Dhamari Naidoo, Scientist, WHO SEARO (virtual), presented WHO SEARO's work on strengthening the AMR lab networks in the region and the work on the Global Laboratory Leadership Programme (GLLP).

Mary Joy Gordoncillo from FAO RAP presented on FAO's work on supporting lab networks at the country level and the regional level together with WOAH on lead laboratories engaged in AMR.

Manisha Bista, Regional One Health Specialist, and Areeya Disratthakit, SEA Regional Microbiologist/ Laboratory Specialist, Fleming Fund Management Agent, jointly presented the work of the Fleming Fund at the country level to strengthen laboratory networks for AMR surveillance across South Asia and Southeast Asia LMICs. The core level of laboratory functions is depicted in Figure 5, while Figure 6 illustrates the approach to strengthening information management for integrated surveillance of AMR/AMU.

Figure 5: The Core level of laboratory functions strengthened through the laboratory networks

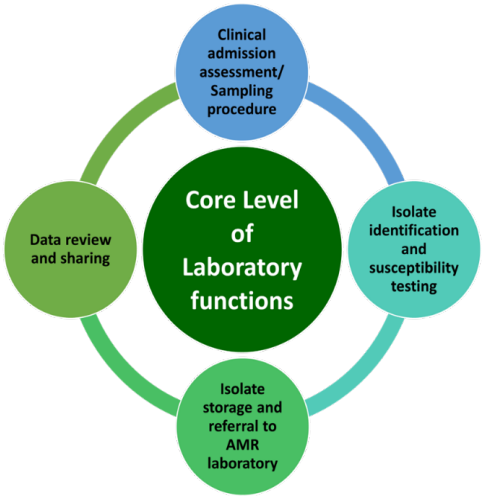
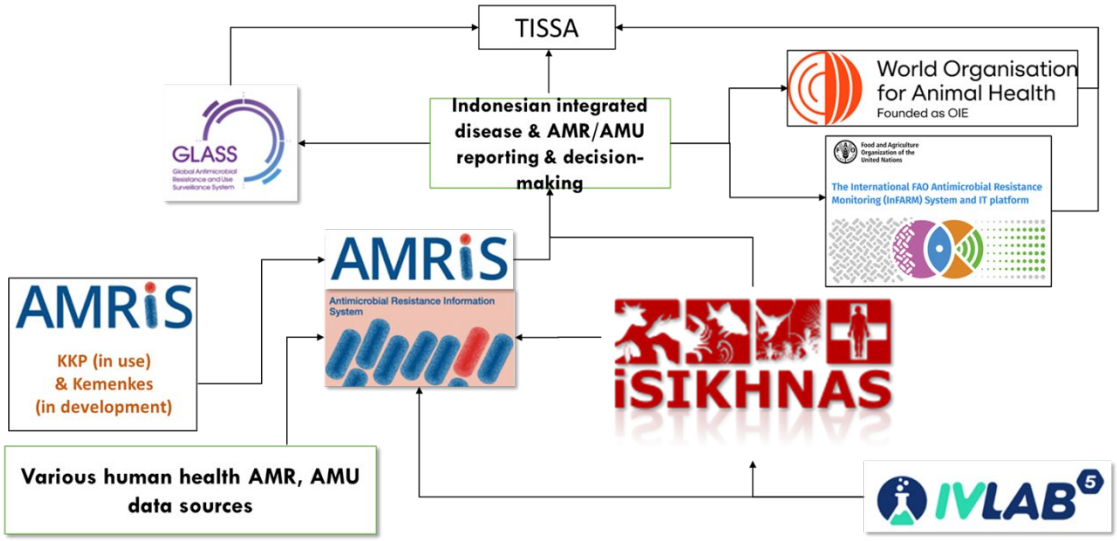


Figure 6: One Health integrated AMR, AMU (AMC) information management, an example from Indonesia



Session 8: Need for a regional One Health AMR TAG/TWG on the use of surveillance data

Leading up to the workshop, FAO RAP, Quadripartite partners and international experts developed functions and proposed the composition and modality for the Regional Technical Working Group on the use of AMR/AMU surveillance data.

Functions

- The TWG will provide technical advice to countries on how to use integrated AMR/U surveillance data at the national and regional level, making use of available sector-specific data for integration at the data analysis stage, disseminating results at the national level and incorporating them into decision-making processes (risk analysis of activities at any stage of risk analysis process).
- The TWG should advocate for regional/country implementation of AMR/U guidance and initiatives generated at the global level (QTG-AIS guidelines, international standards, Codex, WOAH, sector-specific information systems InFARM, GLASS and ANIMUSE and the joint QPT GISSA platform).
- The TWG must collaborate and coordinate with regional and global stakeholders and QPT to cover technical gaps or to expand implementation of integrated surveillance, for example, to cover more sectors, specific purposes, or using new technologies like WGS.
- The TWG will synthesize and analyse surveillance data from individual countries on a regional level and utilize these findings to inform decision-making and policy formulation associated with regional priorities. This synthesis must harmonize data across different animal sectors with truthful coordination with the public and environmental sectors.
- The TWG will serve as the primary communications channel with relevant stakeholders in the region and internationally, providing regular reports or dashboards.

Composition

- regional and country experts with knowledge of technical areas relevant to sector-specific or integrated surveillance, and experience in academia and public sectors (MoH, MoA, MoE, food safety authorities);
- technical representative(s) from each engaged country, directly involved in the design and implementation of their country's strategies;
- subject matter experts from outside the region (surveillance, laboratory systems and integration of sectors), capable of linking the TWG to the international community and contributing to its functions; and
- ex-officio as needed.

Modality

- The TWG should convene regularly, ideally monthly, either online or in person, with pre-approved agendas and action plans toward their goals.

  - This is also a platform (venue) for knowledge exchange and sharing of country and regional experiences in integrated approaches to surveillance data integration processes.
  - Discussion of harmonized reporting of AMU/AMR metrics and indicators should be held.
- Administratively, the TWG should operate with support from a secretariat responsible for setting meeting agendas and following up on action plans.
  - This TWG can be anchored to Regional QPT TWG AT5 (AMR).

Session 9: Recommendations and way forward

Representatives from FAO, WHO, WOAH and subject matter experts held a meeting to draft the recommendations. To facilitate the process, a link to a short questionnaire was sent to participants to understand the issues that can be reflected in the recommendations.

About half of the respondents indicated that their country does not have an epidemiology unit responsible for ensuring data quality and a structured methodology for data cleaning and validation. Through a show of hands, an overwhelming majority of the participants shared that they had a limited understanding of AMR epidemiology and data utility and analysis, and they did not come from an epidemiology background.

Participants identified barriers to integrated AMR/AMU surveillance, such as lack of coordination, siloed structure, governance, lack of expertise, lack of human resources, lack of political commitment, and a lack of priority and consensus among sectors. A word cloud is presented in Figure 7.

Figure 7: Word cloud of barriers to AMR/AMU One Health integrated surveillance

Natalie Kapinga, Regional M&E Specialist, FAORAP, ran a workshop evaluation using an online form to get participants' insights about their experience with the workshop (Annex IV).

David Sutherland elaborated that, in the coming months, the project team will develop the workshop report and share it with the participants. This will involve:

- synthesizing the rich information shared in the workshop;
- identifying short- and medium-term priorities for capacity building and integrating surveillance; and
- proposing next steps.

The recommendations and discussions from the workshop will shape the project's work for the rest of 2024 and 2025. The project team will maintain contact with countries to:

- support priority needs and national laboratory networks;
- explore potential country mapping exercises to help identify possible entry points for integrating AMR/U surveillance at One Health interfaces;
- prepare case studies demonstrating practical approaches to integrating surveillance;
- encourage intersectoral laboratory linkages nationally and regionally; and
- establish a regional One Health AMR Technical Working Group on AMR/AMU integrated surveillance.

Draft recommendations

Quadripartite organizations

1. The Quadripartite organizations will provide technical support to the ongoing activities in the animal health sector and the environment for surveillance design.
   1.1. They shall support the development of clinical breakpoints for AMR surveillance of bacterial pathogens from diseased terrestrial and aquatic animals.
   1.2. They shall support countries in the design of AMR surveillance plans and strategies for specific surveillance programs in animals, terrestrial and aquatic, as per the InFARM framework and FAO guidelines (healthy terrestrial and aquatic food animals and their products, point of sale including the production environment, diseased terrestrial and aquatic animals).
   1.3. They shall support countries in the integration of the environment sectors into AMR surveillance, including surveillance in agrifood systems environment as an add-on to existing surveillance programmes (healthy terrestrial and aquatic animal surveillance).
2. The Quadripartite should provide leadership on integrated surveillance. The QTG-AIS will provide a definition and guidance for countries to establish or strengthen existing systems for One Health AMR/AMU integrated surveillance.
   2.1. The organizations must support the Quadripartite Technical Group on Antimicrobial Resistance and Use Integrated Surveillance (QTG-AIS) in completing the guidance on One Health AMR/AMU integrated surveillance and its implementation in the short to medium term.
   2.2. They need to conduct country-level workshops to map AMR/AMU data sources and identify areas of integration and expansion.
   2.3. They should develop case studies and examples of AMR/AMU integrated surveillance in countries with varying resources.
   2.4. They must establish a regional technical working group on integrated AMR/AMU surveillance to foster collaboration and use of data for policy decisions.
3. The Quadripartite organizations should strengthen sectoral and intersectoral laboratory networks and surveillance networks, including NCCs.
   3.1. They should facilitate coordination and collaboration among laboratories (peripheral and reference laboratories) in the networks through annual meetings and conferences for information sharing, sharing of expertise and funding.
   3.2. They should connect national-level lab networks with subregional, regional and global networks for information exchange, the community of practice, advancing in

harmonization of methods, and sharing of expertise, possibly through the regional and global Communities of Practice.

3.3. They should strengthen the capacity of the national coordination centre – NCC (sectoral or centralized), national reference labs, and sentinel or peripheral labs or sites to perform their respective roles in AMR surveillance (sectoral and integrated).

4. The Quadripartite organizations need to provide capacity building for surveillance (facilities and knowledge).
   4.1. They should support countries in the assessment of laboratories and AMR surveillance systems in different sectors.
   4.2. They should provide capacity-building support to countries in sample collection, handling, transportation, data collection, bacteriology and AST, WGS, data analysis, surveillance design, data reporting and communication. This should also include diagnostic stewardship.
   4.3. They should provide capacity-building support to countries in initiation, strengthening or expanding integrated AMR/AMU surveillance, including integrated analysis.
   4.4. They must support countries in the collection, collation, analysis and reporting of data to InFARM, ANIMUSE and GLASS.

Countries

Funding

1. Countries should allocate funds for AMR and AMU monitoring and surveillance in all priority sectors.

Coordination

2. They should consider identifying a leading entity, which need not necessarily be within the surveillance system (e.g. One Health or multisectoral AMR committees), to secure funds, lead and facilitate the implementation of surveillance activities within NAPs for sector-specific and intersectoral coordination of the different components of surveillance systems (peripheral laboratories, national reference laboratories and NCCs) from different sectors at the subnational and national levels.
3. Countries should enhance or strengthen national-level coordination among authorities (such as MoH, MoA, food safety authorities, MoE, etc.) responsible for AMR/U surveillance in sectors and subsectors for strengthening sector-specific and integrated surveillance of AMR/AMU.
4. They should establish or strengthen the existing NCC for AMR. This could be a sectoral NCC for AMR surveillance, with intersectoral activities conducted at the level of the multisectoral coordination body. If the situation permits, it could be a centralized NCC covering multisectoral AMR surveillance that coordinates activities from multiple sectors. This NCC should have clear terms of reference within each sector, including a description of interlinkages for shared tasks between sectors. (NCC is the common language in GLASS and InFARM, but it can refer to committees, institutes, or any other structure overseeing surveillance design implementation and results dissemination.)

Laboratory

5. Countries must strengthen the capacity of labs within each sector at different tiers to perform their role in quality data generation, such as bacteriology, AST, biosafety and biosecurity, genomics, isolate archiving, external quality assessment (EQA), and data management.
6. They should establish or strengthen the laboratory networks within each sector with clear terms of reference for peripheral, hospital, diagnostic and national reference laboratories.

Epidemiology

7. Countries should strengthen institutional commitment and capacity of national authorities (responsible for surveillance in each sector) for AMR/AMU data collection, collation, analysis and sharing of information on AMR/AMU regularly (e.g. annual).
8. They should strengthen or establish national epidemiology units sitting in NCC (sectoral or centralized for multisectoral – as per the InFARM and GLASS frameworks) with the mandate on AMR epidemiology to lead the process of developing the national AMR surveillance plans suitable to country contexts and purposes.
    a. Some of the functions could include, but are not limited to, the development or revision of national AMR surveillance strategies, the coordination of AMR data collection, collation, analysis, and reporting processes, the dissemination of AMR results, and a key role in engaging diverse stakeholder groups.
    b. For instance, identification and allocation of time for epidemiology personnel in national authorities to support NCC tasks in an annual or periodic basis. This should include the analysis of data and dissemination of information on AMR, sector-specific and across sectors.
9. Countries should have a strong epidemiological rationale and clear aims and objectives for the surveillance designs and use a risk-based approach to prioritize the use of the limited resources efficiently in key sectors.
10. They should strengthen capacities for using AMR/AMU surveillance information for feeding into risk analysis processes (at different levels of complexity and stages of the process) for informed decision-making.

Implementation plan

The recommendations from the workshop in May and the discussions afterwards have shaped the workplan for the project under the component 2. Some of the planned activities to address the recommendations are listed below. This list is not exhaustive and there are several other activities being conducted across organizations through other funding sources.

Strengthening AMR surveillance and laboratory capacity

1. regional laboratory capacity-building workshop for personnel from lead national labs engaged in animal health surveillance (terrestrial and aquatic);
2. national capacity-building workshops for AMR laboratory diagnostics, data management and analysis;

3. assessment of AMR surveillance systems and laboratory networks in the food and agriculture sectors using the FAO-ATLASS tool;
4. national training for monitoring and surveillance of AMR in wastewater from the food-animal production environment;
5. hands-on training for AMR laboratory technicians, collaborating with the Animal and Plant Quarantine Agency (APQA), Korea and the National Veterinary Assay Laboratory (NVAL), Japan;
6. Tricycle project in one country;
7. AMR surveillance and lab-strengthening missions to countries in the human health sector;
8. capacity building for AMR outbreak response in hospital settings; and
9. backstopping missions to countries for enhancing InFARM data preparation and reporting.

Strengthening sectoral and intersectoral lab networks

10. national AMR lab network group meetings, potential linkages with ATLASS assessment where possible; and
11. mapping existing AMR lab networks in the countries and linking with the FAO Community of Practice on Antimicrobial Resistance Laboratory (AMRLab-CoP) and holding virtual meetings.

Strengthening AMU surveillance

12. national workshops to map AMU supply chains in the countries;
13. in-country workshop on piloting the implementation of AMU data monitoring guidelines for aquaculture; and
14. workshop with a few targeted countries that have never published an AMU annual report but have already provided good data quality in ANIMUSE during the last several years.

Leadership on One Health AMR/AMU integrated surveillance

15. national workshops to map the country landscape and identify data sources for AMR/AMU integrated surveillance and recommendations for strengthening integrated surveillance;
16. meeting of the regional technical working group on AMR/AMU integrated surveillance (could be virtual or back-to-back with #17);
17. regional multisectoral workshop to provide an awareness for the participants to interpret and use AMR and AMU surveillance data to make informed decisions at the country level; and
18. regional meeting on AMR surveillance and how to use data to inform clinical practice and policy in the human health sector.

Scott Newman closed the workshop with thanks to the country participants, Quadripartite participants and the subject matter experts.

Annexes

Annex I – List of participants

List of participants.pdf

Annex II – Concept note and agenda

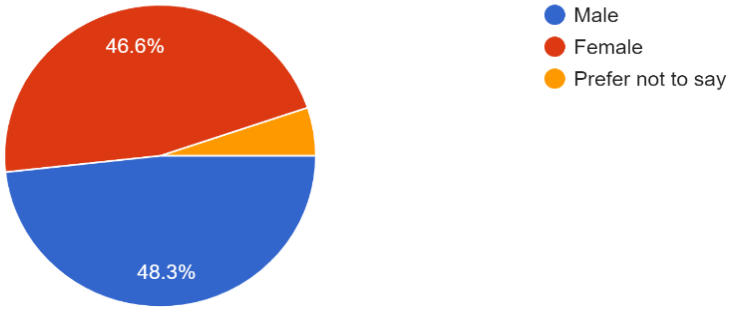
https://drive.google.com/file/d/1pDebrVkLI9x5q6HE3hYwdBQg4DcNlu3s/view?usp=drive_link

Expected Agenda - Regional Benchmarkir

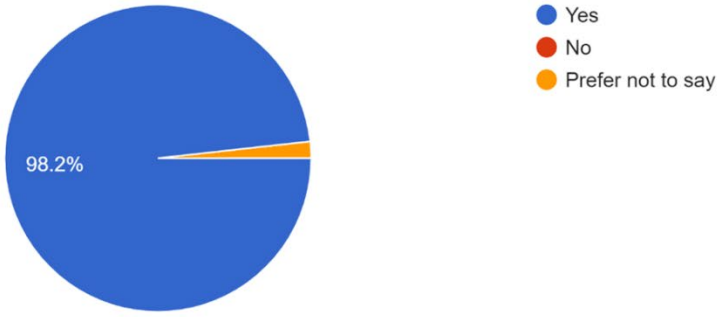
Annex III – Workshop presentations

Annex IV: Workshop evaluation

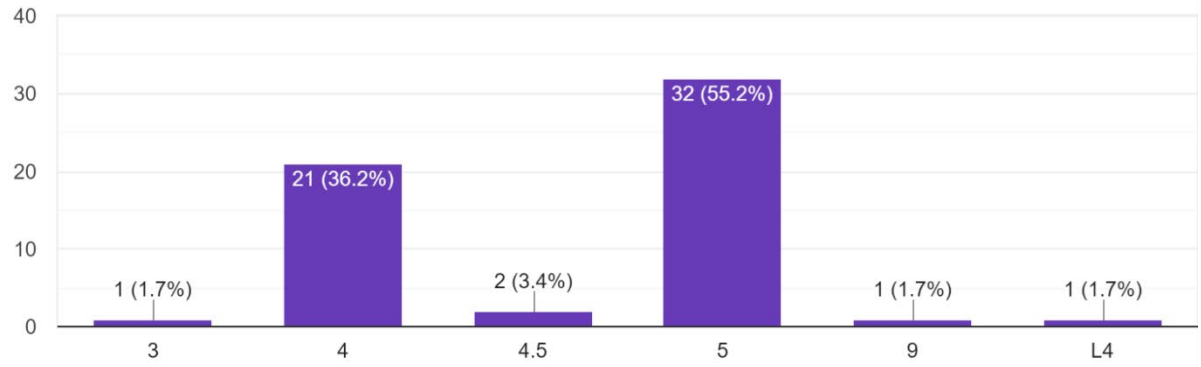
Sex
58 responses



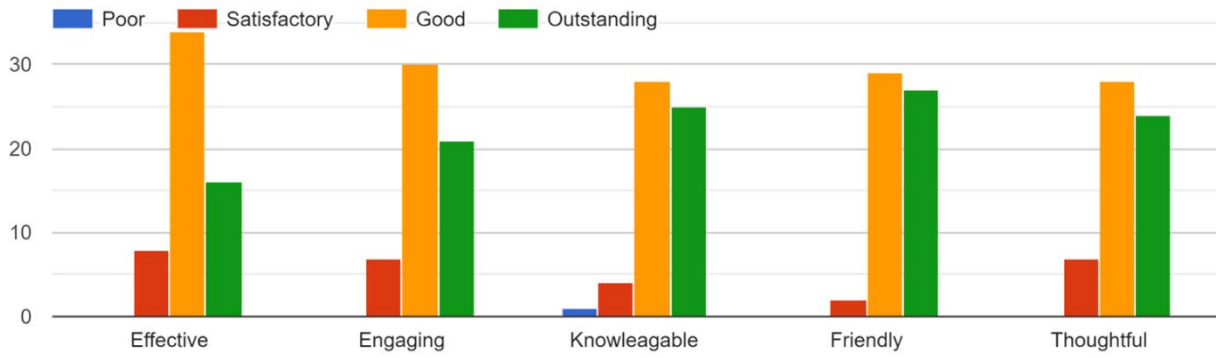
Did the workshop meet your expectations?
57 responses



How would you rate the overall quality of the workshop? (On a scale of 0 to 5, 0 = low, 5 = high)
58 responses

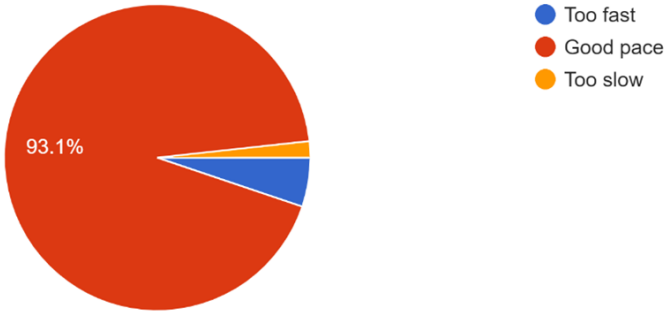


How would you describe the moderation and facilitation of the workshop



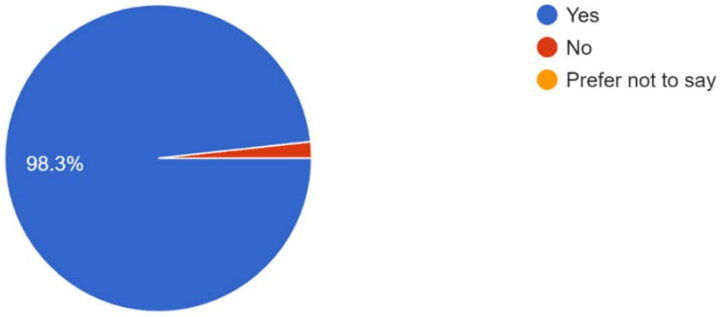
Was the delivery of the workshop at a comfortable pace?

58 responses



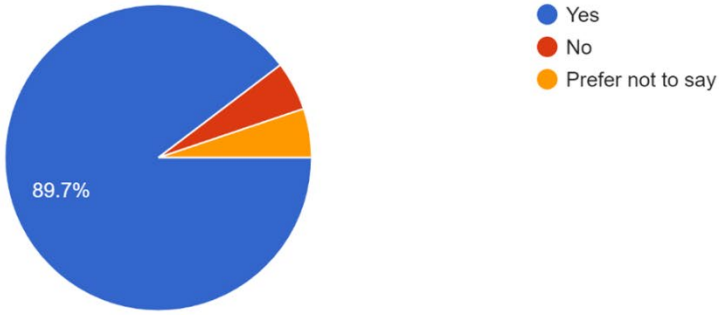
Was the workshop programme easy to follow?

58 responses

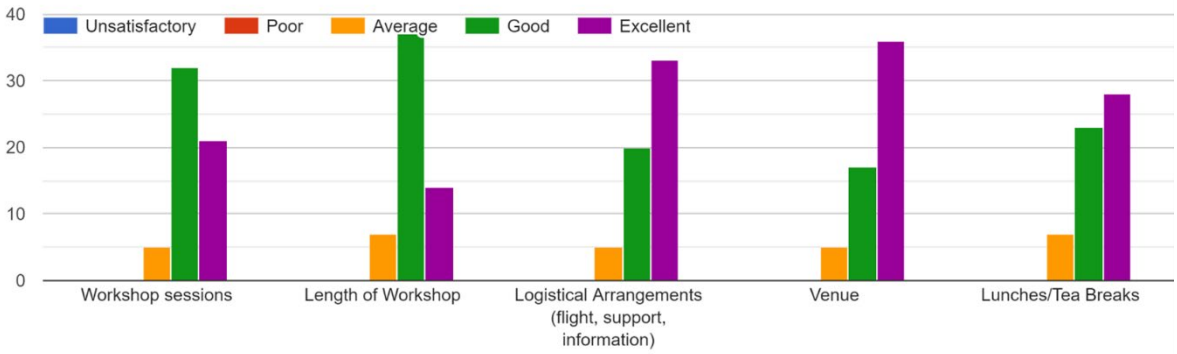


Did you find the workshop materials practical and helpful/easy to understand

58 responses

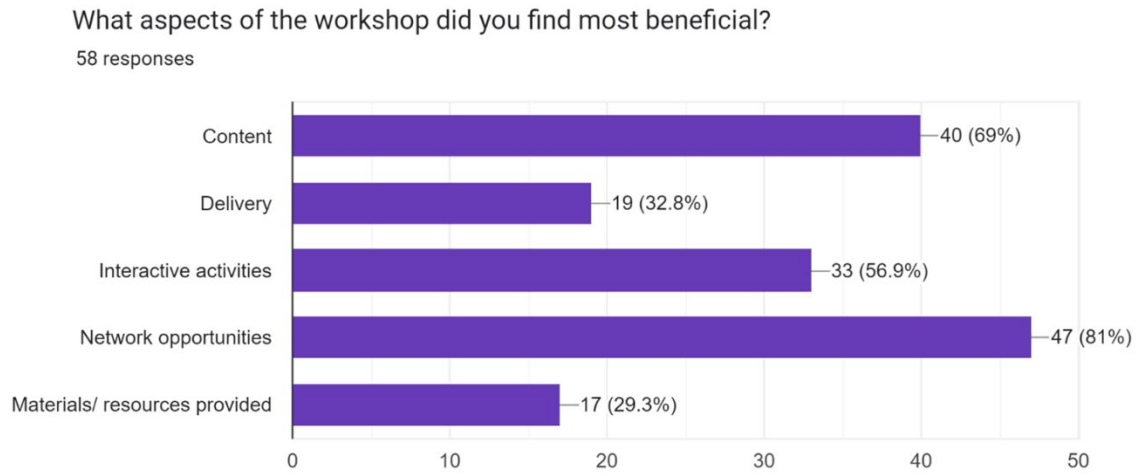


How would you rate the following workshop components in meeting workshop objectives?



Was the workshop relevant to your job or area of work?

58 responses


What aspects of the workshop did you find most beneficial?
58 responses
Content
Delivery
Interactive activities
Network opportunities
Materials/ resources provided
40 (69%)
19 (32.8%)
33 (56.9%)
47 (81%)
17 (29.3%)
0
10
20
30
40
50