In recent years, progress has been made to further enhance collaboration between human health, animal health and relevant sectors such as wildlife, environment to share the best practices and innovative ideas to address zoonotic and other emerging and re-emerging diseases at the human, animal and ecosystem interfaces. The Asia-Pacific Workshop on Multisectoral collaboration for the prevention and control of zoonoses was organized by WHO in collaboration with FAO and OIE in Kathmandu, Nepal from 27 to 29 November, 2013. A total of 114 participants from 19 countries, representing the animal and human health, wildlife and environment sectors, academic institutions, donors and partners attended the workshop.

This year 2013 was significant with the emergence of avian influenza (H7N9) and Middle East respiratory syndrome coronavirus and escalating the outbreaks of avian influenza A(H5N1) in a number of Asian countries. Zoonotic influenza, rabies and antimicrobial resistance were priority issues discussed for multisectoral collaboration. Participants were actively involved in group discussions on live bird market management for surveillance, prevention and control of avian influenza. The workshop recommended partners and countries to strengthen and consolidate ongoing national efforts for cross-sectoral collaboration and to further enhance national and subnational mechanisms for information sharing, communication, joint risk assessment and response for zoonoses prevention and control. The workshop also recommended to develop and/or implement a comprehensive national strategy for rabies elimination and to advocate and support multi-sectoral national action plans for the prevention of antimicrobial resistance development.
Asia–Pacific workshop on multisectoral collaboration for the prevention and control of zoonoses

Report of the meeting
Kathmandu, Nepal,
27–29 November 2013
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WHO is grateful to the European Union for their financial support to the Highly Pathogenic Emerging Diseases (HPED) project. The Asia-Pacific workshop on multisectoral collaboration for the prevention and control of zoonoses and report publication have been funded through the HPED Project.
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<td>AMR</td>
<td>antimicrobial resistance</td>
</tr>
<tr>
<td>APSED</td>
<td>Asia-Pacific Strategy for Emerging Diseases</td>
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<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
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<tr>
<td>AusAID</td>
<td>Australian Agency for International Development</td>
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<tr>
<td>CCHF</td>
<td>Crimean-Congo Haemorrhagic Fever</td>
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<tr>
<td>COMBI</td>
<td>communication for behavioural impact</td>
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<td>EIDs</td>
<td>emerging infectious diseases</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>EWARS</td>
<td>early warning and alert response system</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<tr>
<td>GALVmed</td>
<td>Global Alliance for Livestock Veterinary Medicine</td>
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<tr>
<td>GF-TADs</td>
<td>Global Framework for Progressive Control of Transboundary Animal Diseases</td>
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<tr>
<td>HPAI</td>
<td>highly pathogenic avian influenza</td>
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<td>HPED</td>
<td>Highly Pathogenic and Emerging and Re-emerging Diseases programme</td>
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<tr>
<td>ILI</td>
<td>influenza-like illness</td>
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<tr>
<td>JICA</td>
<td>Japan International Cooperation Agency</td>
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<tr>
<td>LBM</td>
<td>live bird market</td>
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<td>MERS- Cov</td>
<td>Middle East respiratory syndrome coronavirus</td>
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<td>NTDs</td>
<td>neglected tropical diseases</td>
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<tr>
<td>OIE</td>
<td>World Organisation for Animal Health</td>
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<td>PDSR</td>
<td>participatory disease surveillance and response</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>PVS</td>
<td>Performance of Veterinary Services</td>
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<td>SAARC</td>
<td>South Asian Association for Regional Cooperation</td>
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<tr>
<td>SARI</td>
<td>severe acute respiratory infection</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
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<tr>
<td>WAHID</td>
<td>World Animal Health Information Database</td>
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<td>WAHIS</td>
<td>World Animal Health Information System</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<td>WSPA</td>
<td>World Society for the Protection of Animals</td>
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Executive summary

Population expansion, higher demands for agriculture and livestock production, extensive use of antimicrobials and global warming all trigger the emergence of new and re-emergence of old pathogens, contributing significant threats to public health. The year 2013 was significant with the emergence of avian influenza (H7N9) and Middle East respiratory syndrome coronavirus (MERS-CoV) and escalation of outbreaks of highly pathogenic avian influenza (H5N1) in a number of Asian countries.

In recent years, progress has been made to further enhance collaboration between human health, animal health and other relevant sectors, such as wildlife and the environment, to share best practices and innovative ideas to address zoonoses and other emerging and re-emerging diseases at the human–animal–ecosystems interface. An Asia-Pacific workshop on multisectoral collaboration for the prevention and control of zoonoses was organized by the World Health Organization (WHO) in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and World Organisation for Animal Health (OIE) in Kathmandu, Nepal, from 27 to 29 November 2013. It was the fourth regional workshop organized by WHO, FAO and OIE since 2010.

A total of 114 participants, representing the animal and human health, wildlife and environment sectors, academic institutions, donors and partners, attended the workshop. The recommendations of the previous workshop and global updates on zoonoses were reviewed. There were presentations on zoonotic influenza and novel coronaviruses as these emerging infectious diseases were major challenges in 2013. FAO, OIE and WHO highlighted regional tripartite activities on zoonotic influenza, rabies and antimicrobial resistance (AMR), all of which have been considered as priority issues for operationalization of One Health. The People’s Republic of China, Cambodia, Indonesia and Nepal shared country experiences in combating avian influenza A(H5N1) and A(H7N9). There were poster presentations by 19 Asian countries, which highlighted the status of zoonotic diseases, progress made in prevention and control of zoonoses, and the best practices to further enhance intersectoral coordination mechanisms. The implementation of the One Health approach was analysed by extracting key issues from country poster presentations and information provided through questionnaires by participating countries. The
gaps and challenges were discussed, and progress in the application of the One Health approach was reviewed.

As compared to previous regional tripartite workshops, more female participants (40%) were present, and all participants were satisfied with the organizational and technical part of the workshop as it provided a good platform for sharing country experiences in prevention and control of endemic, emerging and re-emerging zoonoses. Participants were actively involved in group discussions on live bird market (LBM) management, that is, joint outbreak investigation and risk assessment, surveillance and monitoring, risk reduction and control measures at LBMs. In addition, participants were given opportunities to attend one of three parallel sessions on: socioeconomic dimensions of zoonoses, wildlife and communication.

The regional tripartite group acknowledged and thanked the Government of Nepal for hosting this event. The generous support from donor agencies, including the European Union (EU), Australian Agency for International Development (AusAID), United States Agency for International Development (USAID) and Japan International Cooperation Agency (JICA) were also appreciated. The workshop recommended that partners and countries should:

- strengthen and consolidate ongoing national efforts for cross-sectoral collaboration;
- further enhance national and subnational mechanisms for information sharing, communication, joint risk assessment and response;
- give greater consideration to One Health initiatives at national and local levels;
- consider socioeconomic impacts of zoonoses including cost–benefit analysis for prevention and control measures;
- enhance surveillance of influenza A virus at LBMs and prioritize risk reduction interventions and joint implementation strategies;
- develop and/or implement a comprehensive national strategy for rabies elimination based on mass dog vaccination and dog population management;
➤ advocate and support multisectoral national action plans for the prevention of antimicrobial resistance development;

➤ support countries in developing and operationalizing common communication guidelines, standard tools for joint risk assessment, outbreak investigation and risk communication for zoonotic events;

➤ promote active involvement of wildlife authorities and experts in One Health activities.

As a continuation of regional tripartite activity, it was agreed that the next workshop will be organized by FAO in collaboration with OIE and WHO, focusing upon evaluating the effectiveness/efficiencies of the workshops and lessons learned.
1. Introduction

Approximately 60% of all human infectious diseases and 70% of those reported in the last 30 years are thought to have originated in animals. Close interaction between humans, domestic animals and wildlife, intensification of agricultural practices, excessive use of antimicrobials and adverse environmental changes have contributed to the emergence of new and re-emergence of old pathogens. Emerging and re-emerging zoonotic infections pose significant threats to health security, livelihood, food security and international trade in livestock and livestock products.

To effectively address zoonoses and emerging infectious diseases (EIDs) at the human, animal and ecosystem interfaces, a One Health approach is being increasingly adopted, emphasizing a multisectoral and multidisciplinary approach at various levels (international, regional, national and community). The World Health Organization (WHO) Regional Offices for South-East Asia and the Western Pacific came up with a common bioregional strategy called the Asia Pacific Strategy for Emerging Diseases (APSED), which is designed to support Member States in developing the core capacities required for implementation of the International Health Regulations (2005) (IHR (2005)). Control of zoonoses is one of the priority areas of APSED and establishment of a functional coordination mechanism for prevention and control of zoonoses is a pillar of this strategy. WHO, in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and World Organisation for Animal Health (OIE), has developed a guideline for establishing coordination mechanisms for prevention and control of zoonoses at the country level.

As part of the arrangements, tripartite regional workshops have been organized annually to review progress in zoonoses prevention and the way forward to further strengthen multisectoral collaboration at the human–animal–ecosystems interface by Member States and partner organizations. One of the first initiatives to discuss collaboration and coordination between human and animal health sectors was a Regional Workshop on Collaboration between Human and Animal Health Sectors for Zoonoses
Prevention and Control held in Sapporo, Japan in 2010. This work was expanded to multisectoral collaboration through a second workshop in Chiang Mai, Thailand in 2012 and a third in Bali, Indonesia in 2012. The Bali workshop recognized the need to consider the recommendations of the High-level Technical Meeting to Address Health Risks at the Human-Animal-Ecosystems Interfaces, held in Mexico City, Mexico in 2011, and recommended that:

- FAO, OIE and WHO, regional organizations (Association of Southeast Asian Nations (ASEAN) and South Asia Association for Regional Cooperation (SAARC)) and other international partners should continue to collaborate closely to provide support to Member States in strengthening functioning of national coordination mechanisms between animal, human, environmental and other relevant sectors to address zoonotic and other emerging and re-emerging diseases;

- animal and human health sectors of Member States should continue to collaborate in zoonoses prevention and control including documentation of good practice, taking into consideration supporting key operational elements of One Health;

- Member States are encouraged to continue improving functioning of national coordination mechanisms between animal, human, environmental and other relevant sectors to address zoonotic and other emerging and re-emerging diseases at the national and subnational level and document activities;

- Member States and partners explore mechanisms to assess and determine the impact and benefit of using a One Health approach on the control of zoonoses, and emerging and re-emerging infectious diseases.

In order to ensure a multidisciplinary approach to the prevention and control of zoonoses and to progress current collaboration with representatives of the human health, animal health and other relevant sectors, such as wildlife and the environment, the Asia-Pacific Workshop on Multisectoral Collaboration for the Prevention and Control of Zoonoses was organized by WHO in collaboration with FAO and OIE in Kathmandu, Nepal, from 27 to 29 November, 2013. The objectives of the workshop were to:
provide an update on zoonotic diseases at global, regional and country levels;

- review progress and experiences, identify the opportunities, barriers and gaps in coordination mechanisms between various relevant sectors at the international, regional and national levels for operationalization of One Health;

- share the lessons learned from recent outbreaks of avian influenza (H7N9) in China and Middle East respiratory syndrome coronavirus (MERS-CoV);

- prepare plans to develop standard approaches and tools for detecting, investigating and responding future threats due to emerging zoonotic diseases;

- make recommendations on how to improve collaboration and coordination between human health, animal health and environmental sectors for zoonoses prevention and control, focusing on unexpected emerging events.

The three-day workshop included seven sessions applying various modalities, such as presentations, panel discussions, poster presentations, questionnaire surveys, group discussions, and parallel sessions on thematic issues: socioeconomic dimensions, wildlife and communication.

2. **Session 1: Inauguration**

The workshop was inaugurated by the Secretaries of the Ministries of Health and Population and Agricultural Development of Nepal and representatives from WHO, FAO and OIE.

Dr Lin Aung, WHO Representative to Nepal (on behalf of the Regional Director, WHO South-East Asia Region), welcomed all the participants and acknowledged the Government of Nepal for hosting the workshop. He emphasized that there is a periodic emergence of highly pathogenic infectious diseases at the human–animal interface and this demands coordinated, multidisciplinary and community-based action to address the threat of EIDs. He highlighted that the emergence of avian influenza A(H7N9) in the People’s Republic of China and MERS-CoV in the Middle East clearly reinforces the need for active surveillance and response
at regional and country levels, as required by the IHR (2005). He mentioned that FAO, OIE and WHO are working together to enhance multisectoral collaboration at regional and country levels for the prevention and control of emerging diseases including zoonoses through implementation of the European Union (EU) funded Highly Pathogenic and Emerging and Re-emerging Diseases (HPED) Programme and the United States Agency for International Development (USAID) funded IDENTIFY Project in ASEAN and SAARC countries.

Dr Somsak Pipoppinyo, FAO Representative to Nepal, highlighted the importance of multisectoral collaboration for prevention and control of zoonoses and transboundary animal diseases through the One Health approach. He highlighted ongoing close collaboration with ASEAN, SAARC and the Secretariat of the Pacific Community for capacity-building and promotion of One Health at regional and country levels. Avian influenza, rabies, brucellosis and antimicrobial resistance (AMR) may be considered as regional priorities for operationalization of One Health. He elaborated on the impact of using chemicals and antimicrobial substances in the name of maximizing agricultural and livestock production, and stressed the urgent need for multisectoral collaboration for containment of AMR in both human and animal health. He illustrated the challenges for multisectoral coordination and collaboration and the need for greater involvement of international nongovernmental organizations at country and regional levels.

Dr Hirofumi Kugita, OIE Regional Representative for Asia and Pacific, mentioned that the growing human population and higher income generation demand more livestock products to be made available through intensification of agriculture and livestock production. As a result, the world is facing unexpected outbreaks of EIDs, 70% of which are of animal origin. He highlighted the importance of awareness and education to control EIDs at source and to guard against threats to public health. He explained the role of OIE in developing animal health standards and guidelines for regulating international trade and movement of animals, animal products and prevention of transboundary animal diseases including zoonoses. He also mentioned the OIE/WHO collaboration for development of a joint assessment tool for IHR and Performance of Veterinary Services (PVS) and there is a plan to do pilot testing of this tool in Thailand and the Philippines in 2014. He urged Member States and partners to promote the One Health approach for prevention and control of zoonoses and transboundary animal diseases at the country level.
Mr Jaya Mukund Khanal, Secretary, Ministry of Agricultural Development, Nepal, welcomed the participants and appreciated the opportunity for hosting the workshop. He shared Nepal’s experience in dealing with highly pathogenic avian influenza (HPAI) in the poultry population and its devastating economic impact on the national economy. He also praised the gain in momentum of tripartite coordination at the regional level. The One Health approach has been already integrated into Nepal’s country programme in the wake of avian influenza outbreaks. He anticipated that this workshop will sensitize those countries where One Health is still only a concept and will come up with practical thoughts to consolidate progress made in operationalization of One Health.

Dr Praveen Mishra, Secretary, Ministry of Health and Population, Nepal, welcomed all participants and hoped the workshop will provide a platform for sharing countries’ experiences and best practice in zoonoses prevention and control. He thanked partners for proposing the workshop on multisectoral collaboration in Kathmandu at a time when Nepal was successful in containing avian influenza outbreaks in poultry. Since agriculture is the basis of the national economy, it is impossible to think about livelihood and trade without livestock and livestock products. He stated that it is difficult to tackle the challenges created by climate change, environmental degradation and emerging diseases without considering a holistic multidisciplinary approach at the human–animal interface. He also explained the correlation of intensification and commercialization of animal production and the market-driven economy with health and sustainable development. He stressed the need for a robust surveillance system, cost-effective and efficient intervention tools for control of zoonoses, generation of convincing scientific evidence for policy decisions, and multisectoral collaboration among national bodies for zoonoses prevention and control.

The WHO Secretariat introduced the participants and highlighted the objectives of the workshop. A vote of thanks was delivered to the Government of Nepal for hosting the workshop and to the partners for supporting the successful organization of the workshop.
3. **Session 2: Update on the regional disease situation**

The session for the updates on the regional disease situation was chaired by Dr Huma Qureshi (Human health) from Pakistan and co-chaired by Dr Sithong Phiphakhavong (Animal health) from Lao People’s Democratic Republic.

**The review of recommendations of the third tripartite workshop**

The recommendations of the third tripartite workshop were presented by Dr Ronel Abila from OIE, the coordinating organization in 2012, on behalf of the tripartite group. The workshop made the following recommendations:

- to engage and closely collaborate with regional organizations, such as ASEAN and SAARC, as well as other international partners to support the national coordination mechanism between animal health, human health and other sectors to address zoonoses and other EIDs;

- to support prevention and control of important zoonoses and priority emerging and re-emerging diseases by using existing regional strategies, such as APSED and the Global Framework for Progressive Control of Transboundary Animal Diseases (GF-TADs), and by strengthening the capacity of the human and animal health sectors of Member States to meet the IHR requirements and OIE standards;

- to promote adoption of the One Health approach through enhanced communication and advocacy at all levels;

- to continue collaboration of Member States on zoonosis prevention and control specifically for priority diseases, rabies, zoonotic influenza and AMR;

- to encourage Member States to continue improving the function of their national coordination mechanisms and documentation of activities and progress;
to explore the mechanism to determine the benefit of applying of the One Health approach through socioeconomic assessment and case-studies;

to organize the fourth regional workshop on collaboration between animal and human health sectors on zoonoses prevention and control within a year.

Dr Abila presented a list of activities carried out for implementation of recommendations by Member States and the tripartite group. Progress made by Member States in operationalization of One Health was included in the meeting report of the third tripartite regional workshop, which was shared with participants. The fourth regional workshop had been organized by the WHO Regional Office for South-East Asia in collaboration with FAO, OIE and the host country in Kathmandu. The programme schedule was developed to address priority issues and to share experience and case-studies on wildlife, socioeconomics and communication. Poster presentations and questionnaire surveys were designed to evaluate country progress in establishment of a functional coordination mechanism, One Health activities and best practice in the past year.

Regional updates on zoonoses

The regional update on zoonoses covering human health was presented by Dr Frank Konings from WHO Regional Office for the Western Pacific. He described the international response to the emergence of two novel viruses, namely avian influenza A(H7N9) in China and MERS-CoV in Middle East countries. The WHO emergency response mechanism and management of an emergency operation centre during an outbreak of avian influenza A(H7N9) in China was elucidated. The major hotspots of EIDs and the evolution of influenza A virus in the Asia-Pacific region were described. The status of human cases of avian influenza A(H5N1) in Cambodia, Crimean-Congo Haemorrhagic Fever (CCHF) in India, dengue fever and hand-foot-and-mouth disease in the Asia-Pacific region was summarized in light of strengthening surveillance and response activities through implementation of a APSED/IHR workplan at regional and country levels. Implementation of the APSED strategy is key for regional health security and it has been tested by real-time outbreaks and emergency responses. Concluding the presentation, he reiterated the international partnership as an “All for one, one for all” approach to update the capacity of countries for public health security.
The regional update on animal health aspects of zoonoses was jointly presented by Dr Tikiri Wijayathilaka from OIE and Dr Wantanee Kalpravidh from FAO. Dr Tikiri Wijayathilaka explained the OIE disease reporting and monitoring system for transboundary animal diseases including zoonoses, that is the World Animal Health Information System (WAHIS) and the World Animal Health Information Database (WAHID). The rumour-tracking system of OIE and the disease trends of Japanese encephalitis, avian influenza, rabies, echinococcosis and anthrax in animals were highlighted. Dr Wantanee Kalpravidh presented the outlook towards better prevention and control of zoonotic diseases by expressing key observations and challenges involved in outbreak reporting, information sharing, joint risk assessment and capacity-building to detect diseases including multisectoral coordination. The technical scope for enhancing laboratory capacity and quality standards through regional laboratory quality assurance and biosafety programmes was emphasized. She provided an update on the status of the Field Epidemiology Training Programme for Veterinarians in Thailand and China, and the requirement for further support for sustainability. In addition, she gave an update on the status of development of guidelines for surveillance and control of priority zoonoses. It was stressed that sustainability of institutional and capacity-building is greatly challenged by political situations, economic stability, human resources and climate change. There is the need for a tripartite effort to cope with these challenges, to concurrently build institutional capacity, policy and strategic planning, and advocacy for policy decisions in Member States. Dr Wantanee Kalpravidh also urged Member States to ensure transparency for disease reporting and control through political commitment and good governance.

**Scientific updates on key emerging diseases of international concern**

Professor Hiroshi Kida from Hokkaido University, Japan, WHO Collaborating Centre for Zoonoses Control/OIE Reference Laboratory for Avian Influenza, presented updates on zoonotic influenza including avian influenza control strategy and pandemic preparedness. He elaborated on the changing ecology of the influenza in birds and mammals in terms of origin, subtypes, virus evolution, emergence of pandemic strains, mutation and genetic reassortment. The status of bird flu vaccine production and its use in different countries, as well as the potential risk of avian influenza outbreaks due to diverse antigenic variants and mismatching of locally circulating strains with vaccine strains were highlighted. Comparative
surveillance data on avian influenza, from 1991 to 2013, were provided. The importance of understanding pathogenicity and transmissibility of influenza viruses and the role of pigs in the advent of pandemic influenza virus was also illustrated. He cautioned that it is impossible to eradicate zoonotic influenza because of the existence of diverse antigenic variants in humans and domestic and wild birds and continuous interaction among different influenza viruses in nature. He stressed the need for molecular study of influenza viruses to develop appropriate diagnostic tools and effective control measures, which should be accompanied by development of information and data-sharing mechanisms and capacity-building in resource-constrained countries.

Dr Elizabeth Mumford, WHO headquarters, presented updates on novel coronavirus MERS-CoV. Between 2012 and November 2013, 176 human cases were reported with 68 deaths. It constitutes a rising public health concern, due to the increase in case-loads and spread of infection in health-care facilities. The lack of a standard mechanism for data collection was stressed, in particular index and secondary cases, where 59 out of 156 were index cases and the other 97 were secondary cases. Little is known about the epidemiology, source of infection, mode of transmission and role of animal species in maintenance and spread of MERS-CoV to humans. Known facts include the assumption of a virus ancestor in bats, serological evidence in camels, and ambiguity of human contact with camels. Challenges include cross-sectoral collaboration, communication among ministries in several affected countries and epidemiological/virological investigation in animals.

A participant from Bangladesh mentioned that rabies is claiming many lives and has become a serious public health problem in the region; however, it was neglected by the media as well as policy-makers. He suggested that more attention should be given to rabies at regional and country levels. WHO responded that rabies is one of the key priorities for operationalization of One Health and is an important issue on the tripartite agenda.

A participant from India suggested that it is important to compare human cases of avian influenza with possible poultry outbreaks in Cambodia. WHO responded that a detailed comparison would be shown in the avian influenza (H5N1) presentation by Cambodia in the next session.
A participant from Malaysia was curious to know any particular reason for the localized occurrence of MERS-CoV in the Middle East region and Dr Mumford explained that little information is available about epidemiology and mode of transmission of MERS-CoV; it was still premature to say anything at present. The chairperson had a view that there may be a possible connection of camels with localized outbreaks of MERS-CoV in the Middle East region.

4. **Session 3: Updates on facilitating One Health coordination at regional and country levels**

The poster session was facilitated by Dr Wantanee Kalpravidh from FAO and Dr Mary Gordoncillo from OIE. The aim of the poster session was to encourage active participation and interaction among participants to share countries’ experiences and best practices in operationalization of One Health and to identify key action points based on country-level experiences.

There were 19 posters presented by the representing countries and additional posters from the partner organizations, such as Hokkaido University, Chulalongkorn University, University of Melbourne, WHO, FAO and OIE. The participants were given three tasks when attending poster presentations:

- list the top three priority gaps and constraints that participants face when applying the One Health concept in their own country;
- list the countries that are facing similar gaps and constraints;
- identify the solutions learned from the posters of other countries that can be applied to address the priority gaps and constraints.

The poster presentation helped participants to assess progress made for operationalization of One Health at the country level pertaining to zoonoses prevention and control.

There was a plenary session to review gaps and challenges in operationalizing One Health at country level after the poster presentations. The plenary session included two agendas: clarification of the country
posters by questions and answers on the specific issues, and a quiz on sharing countries’ experiences and best practice.

**Major highlights of discussion on country poster presentations**

**Malaysia:** Malaysia has established an interministerial committee and an intersectoral working group committee that include representatives of the Ministry of Health, Department of Disease Control, Department of Veterinary Services, Department of Wildlife, Department of Education. Both committees are co-chaired by the Director General Ministry of Health and the Director General Department of Veterinary Services. Meetings are held every six months and during outbreaks. The documents and meeting minutes are shared between members by email.

**Mongolia:** There were still many challenges to operationalization of One Health in Mongolia, such as documentation and reference materials for One Health, collaboration between animal and human health laboratories, and insufficient capacity for the prevention and control of zoonoses at the subnational level.

**Thailand:** There were requests to share the experiences of operationalizing One Health through multisectoral collaboration and the One Health University. One Health in Thailand is operationalized through regular meetings of the human health, animal health and wildlife sectors at a high level, networking at the provincial level, and participation of multidisciplinary professionals in the Field Epidemiology Training Programme, Field Epidemiology Training Programme for Veterinarians and Field Epidemiology Training Programme for Wildlife. There are international partners supporting multidisciplinary and multisectoral activities to apply the One Health concept. The One Health University is a network of academic institutions and universities involved in operationalizing One Health by implementing joint research projects on zoonoses.

**Japan:** Participants were interested to know about multisectoral collaboration for zoonoses and the rabies-free initiative in Japan. Direct and day-to-day communication between the Ministry of Health and the Ministry of Agriculture was key to the success of intersectoral coordination. Active rabies surveillance, mandatory dog registration and vaccination, control of
ownerless dogs by local municipalities and strict regulation of importing dogs are key intervention for maintaining Japan as a rabies-free country.

**Pakistan:** There was a query on the scope and functional aspect of the intersectoral coordination committee in Pakistan. Such committees and mechanisms exist only for two provinces, and it will be necessary to expand to other provinces.

In addition, there were queries on public health interventions for controlling leptospirosis and toxoplasmosis in Myanmar and Maldives, respectively; brucellosis situation in humans and animals in China; and, the dog rabies control programme in Nepal.

### 5. Session 4: Strategic update for rabies and AMR in the Asia-Pacific Region

This session provided updates and recommendations of international meetings and workshops on multidisciplinary action for rabies, zoonoses and AMR. It was moderated by Dr James Gardner Murray from OIE.

Dr Gyanendra Gongal, WHO Regional Office for South-East Asia, highlighted the establishment of a functional tripartite coordination mechanism in the region, which has been successful in coordinating regional- and country-level activities. There has been active work by FAO, OIE and WHO to facilitate participation in multidisciplinary groups from various countries in the region and coordination of technical discussions during the One Health Conference in Bangkok, Thailand. Participants were briefed on specific supports for One Health initiatives in India, Bhutan, Lao People’s Democratic Republic, Mongolia and Nepal. The WHO Regional Office for South-East Asia organized a bi-regional meeting on APSED in Kathmandu which strongly urged Member States to further strengthen the functional coordination mechanism between the human health, animal health and other sectors.

The WHO Regional Office for South-East Asia organized the Regional Meeting on Zoonotic Diseases in Chiang Mai, Thailand in August 2013, which was attended by human health and animal health officials from 10 Member States. WHO in collaboration with FAO and OIE briefed the meeting about tripartite coordination for the containment of AMR and
prevention and control of avian influenza, rabies and other zoonoses. The meeting recognized AMR as an emerging problem at the human–animal interface and recommended that the tripartite group support Member States to develop a multisectoral action plan for containment of AMR through advocacy and awareness at policy and professional levels. Rabies elimination has been identified by ASEAN and SAARC countries as a regional public good and the WHO Regional Office for South-East Asia has been advocating Member States to develop a comprehensive rabies elimination programme based on the Regional Strategic Framework for Rabies Elimination. All countries in WHO South-East Asia Region have discontinued production and use of nerve tissue rabies vaccine, and WHO has been advocating for introduction of cost-effective intradermal rabies vaccination in order to improve accessibility and affordability of modern rabies vaccine in rabies-endemic countries. He elaborated on the tripartite collaboration for supporting ASEAN and SAARC initiatives for rabies elimination.

Dr Katinka de Balogh, FAO headquarters, provided the background on the use of antimicrobial substances for animal production and disease control. The need for a holistic multidisciplinary approach and global partnership for containment of AMR was emphasized. She rationalized the FAO/OIE/WHO tripartite collaboration for AMR in awareness, situation analysis, policy development and implementation, and defined methodology for assessment and management for AMR. She highlighted the socioeconomic burden of rabies and described the impact of mass dog vaccination in elimination of human rabies in Indonesia and Mexico. She also addressed the requirements of legislation, political support and funding for the development of the conceptual framework for control and subsequent elimination of dog rabies.

Dr Mary Gordoncillo, OIE Sub-Regional Representative for South-East Asia, described the OIE standards and guidelines for rabies prevention and control. The OIE has established a regional rabies vaccine bank under the EU-funded HPED programme, and dog rabies vaccines have been distributed to ASEAN and SAARC countries to control rabies at source. She highlighted OIE support for rabies awareness, such as development of information, education and communication materials for mass dog vaccination, World Rabies Day events and intersectoral workshops for ASEAN rabies prevention and control. She also described future support to Member States for the development of national dog rabies control plans and implementation of special regional pilot projects.
Dr Gordoncillo also described the OIE Code, Standards and Recommendations for prudent use of antimicrobial substances in animal production and disease control and highlighted the need for containment of AMR in animals. She provided the OIE list of important antimicrobial agents for veterinary use and scientific publications for containment of AMR. The recommendations of the Global Conference on Responsible and Prudent Use of Antimicrobial Agents for Animals, which was hosted by the OIE in Paris in March 2013, were highlighted. The conference discussed issues such as implementation of international guidelines, legislation and regulation, compliance with ethics and codes, advocacy, sharing good practices, and research and innovation for responsible and prudent use of antimicrobial agents.

**The panel discussion following the presentations is summarized below.**

Details of WHO plans to support implementation of the Regional Strategic Framework for Rabies Elimination were requested. WHO is working together with FAO and OIE to support ASEAN and SAARC initiatives for rabies elimination. WHO has been working with the SAARC Secretariat to advocate Member States to work for rabies elimination and to support SAARC countries in developing national rabies control/elimination plans and building national capacity. It is necessary to use innovative approaches for resource mobilization. WHO facilitated development of the SAARC Rabies Elimination Project, which has been submitted to the SAARC Development Fund for consideration. WHO is engaged with international partners to develop partnerships for rabies elimination in the region.

Regarding the supply of human and dog rabies vaccines through rabies vaccine banks, the OIE has already established a regional dog rabies vaccine bank which is available for rabies-endemic countries and may be reinforced through various pilot projects in future. FAO highlighted the principle and effectiveness of vaccine banks for emergencies and development of a roadmap for rabies elimination. It was stressed that understanding the epidemiology of dog rabies is important for planning the dose and supply of vaccine as well as convincing partners about cost-effectiveness of funding dog vaccination campaigns for prevention of human rabies. However, there is no plan for establishment of such a bank for human rabies vaccine and WHO is focusing on promoting cost-effective intradermal rabies vaccination, as accessibility and affordability of modern rabies vaccine is critical.
The participant from Timor-Leste acknowledged WHO and FAO for providing technical support in development of a contingency plan for rabies prevention and asked the tripartite group to help in declaring and maintaining the rabies-free status of Timor-Leste. Timor-Leste is historically rabies-free, but it will be necessary to follow OIE/WHO guidelines for officially declaring it a rabies-free country. In addition, it will be necessary to build national capacity for surveillance and response as outlined in the rabies contingency plan. It is important to initiate dialogue with Indonesia to arrange diagnosis of rabies and an emergency supply of human vaccine. OIE explained the technical requirements to be met for declaring rabies-free status. FAO suggested that Timor-Leste should develop a national committee for rabies surveillance and try to arrange capacity-building through bilateral collaboration with Indonesia.

India was interested to know about the role of wildlife in maintaining sylvatic rabies. OIE explained the successful use of oral bait rabies vaccine for elimination of fox rabies in Europe. There is spillover of dog rabies virus into the wildlife population and therefore it is important to focus on dog rabies elimination. Member States had raised the issue of wildlife rabies during the regional OIE conference and it would be the priority issue for the next meeting.

A participant from Malaysia drew attention to technical criteria for declaring rabies-free areas or zones. The OIE explained that there is an OIE Code for declaration of rabies-free status. The WHO Regional Office for South-East Asia informed the participants that the conditions for declaration and maintenance of rabies-free status have been included in the Strategic Framework for rabies elimination. It was stressed that active surveillance, responsible dog ownership, strict control of dogs at point of entry and epidemiology-based preventive activities are key criteria for declaring and maintaining rabies-free status.

The chairman highlighted that participants were very concerned about rabies but less worried about AMR. Many publications show that AMR is going to be a major problem in future unless the animal health and human health sectors work together to advocate and promote responsible and prudent use of antimicrobial agents in humans and animals. He urged the need for a multidisciplinary approach, country commitment and resource allocation for protection of antimicrobial arsenal for saving human and animal life and containment of AMR.
6. **Session 5: Application of the One Health strategy to specific zoonotic diseases**

A recap of the previous day was presented by Dr Pasang Tshering from FAO. The session was chaired by Professor Be-Nazir Ahmed from Bangladesh and co-chaired by Dr Sithong Phiphakhavong from Lao People’s Democratic Republic. There was an overview of the avian influenza situation in Cambodia, China, Indonesia and Nepal, and these countries shared their experience in controlling avian influenza.

Dr Yuni Yupiana from the Livestock and Animal Health Services, Indonesia, presented an overview of HPAI in Indonesia. She described the epidemiology of HPAI and identified live bird markets (LBMs) and movement of poultry through transportation networks as important factors in the spread of the HPAI virus. She then shed light on implementation of the national strategy for control of HPAI including intersectoral coordination. Human health and animal health sectors are working together for active surveillance of HPAI, and focal culling, decontamination and poultry vaccination are carried out for containment of HPAI outbreaks. She gave updates on extended surveillance of LBMs for avian influenza A(H7N9): all poultry samples have given negative test results. She emphasized the effectiveness of integrated zoonotic disease control at the community level through joint training, information sharing and coordination among all stakeholders for better implementation of the control programme.

Dr Bodh Nath Adhikari from the National Poultry Diseases Diagnostic Laboratory, Chitwan, Nepal, presented the background situation of HPAI in Nepal. He reported that the poultry sector contributed 3–4% of gross domestic product, and recent epizootics of HPAI in Nepal have had a direct impact on the poultry industry and national economy. He also explained the epidemiological reporting systems for HPAI in Nepal and focused on surveillance in LBMs, backyard and commercial poultry, and wild birds. He explained the risk zoning of HPAI in Nepal and explained the trend of HPAI outbreaks between 2009 and 2013. The government had to spend a huge budget to carry out culling and to compensate poultry farmers in 2013 outbreaks. He highlighted the challenges for HPAI control due to evolution of HPAI viruses and continuous outbreaks between 2009 and 2013 due to movement of poultry and poultry products. He also
stressed the need of technical and financial resources, communication and public awareness for prevention and control of HPAI.

Dr LY Sovann from the Department of Health, Cambodia, presented the avian influenza situation in Cambodia, as large numbers of human cases of influenza A(H5N1) were reported in 2013. He shared information on systematic human influenza case detection through event-based surveillance, influenza-like illness (ILI) surveillance and severe acute respiratory infection (SARI) surveillance. The epidemiology of avian influenza A(H5N1) in poultry and humans, between 2005 and 2013, was explained. Regarding risk assessment, HPAI is endemic in the backyard poultry population and therefore sporadic human cases are expected due to risky behaviours, such as contact with dead and sick poultry and defeathering practices in rural areas. So far, no human-to-human transmission has been reported in Cambodia. Regarding intersectoral coordination and collaboration, he stated that there is a Memorandum of Understanding between the ministries of health and agriculture, and human and animal health sectors are closely working together for prevention and control of zoonoses, including avian influenza. There is a strategic framework for prevention and control of priority zoonoses and the workplan for 2014 has been drafted. He also described case investigation, laboratory testing, health education and surveillance systems for avian influenza A(H5N1). A pilot project has been launched in identified hotspots for joint outbreak investigation and response to avian influenza A(H5N1) and a research study has been initiated for determining seroprevalence against avian influenza A(H5N1) in high-risk populations.

Dr Zijian Feng from the China Centre for Disease Control and Prevention, and Dr Zhang Yito from the China Animal Health and Epidemiology Center, provided an overview of government emergency responses to human infection with avian influenza A(H7N9). They described the virological, epidemiological and clinical features of human cases with novel avian influenza A(H7N9) in the People’s Republic of China. Avian influenza A(H7N9) viruses isolated from human cases shared high homology with the viruses isolated from poultry in live poultry markets. Avian influenza A(H7N9) appeared to be of low pathogenicity to poultry and human infection was indicative of ongoing infection in live bird markets. There was a total of 137 cases with 44 deaths in China. It was evident that 69% of human cases were due to exposure to poultry in LBM. A serological study was done in 1544 poultry workers from four provinces to assess the magnitude of human infection and it was found that all tested
negative to avian influenza A(H7N9) specific antibody. The significant risk factors identified by the case–control studies were direct exposure to poultry and existence of underlying chronic illness among those who were exposed to live poultry or who visited LBMs. It was found that 70% of human cases were exposed to poultry and there was a limited human-to-human transmission in four family clusters.

Comparative analysis of human cases due to avian influenza A(H7N9) and A(H5N1) showed that median age of A(H7N9) patients was 62 years, whereas it was 26 years among A(H5N1) patients. Interestingly, 72% A(H7N9) of patients were from urban areas whereas it was not significant among rural dwellers. The emergency response taken by public health animal health authorities included activation of multisector prevention and control mechanism, rapid notification and announcement, joint risk assessment, information sharing, surveillance, rapid laboratory diagnosis and field research to support policy decisions. Closure of LBMs was the single most effective measure, which reduced human infection by 97–99%. There was better coordination with FAO, OIE and WHO to ensure transparency in outbreak reporting and collaboration with high-risk countries. Details were given of the government response to outbreaks through ongoing surveillance, supervision and restrictions on poultry movement, LBM management and revival of the poultry industry, and stabilization of poultry production and market supply.

Discussion

Participants raised a number of questions related to evolution of avian influenza A(H7N9), sampling strategy for detection of A(H7N9) in LBMs and strategy for control of spread of infection to neighbouring provinces. FAO highlighted that coordination was important in deciding to close LBMs, and there was spread through secondary routes or leakage when LBMs were closed. It was explained how China would manage traders to prevent secondary leakage to the neighbouring provinces. Banning poultry movement to neighbouring provinces was a big challenge, and the Government was promoting awareness to change consumers’ habits. It was necessary to consider a compensation policy to enforce bans on live poultry movement and secondary leakages.

Regarding the avian influenza A(H5N1) situation in Cambodia, participants were interested to know the functional aspects of event-based
surveillance and any public health intervention to prevent human exposure to A(H5N1). Event-based surveillance was established in 2003, and a joint outbreak investigation protocol was developed. Although human cases due to A(H5N1) were reported in large numbers as compared to previous years, fewer patients died because of improved health care seeking behaviour, alertness among clinicians and better risk communication. It was mentioned that Cambodia could not work towards providing compensation to farmers and enforce closure of LBM due to the lack of policy, concrete action plans and resources for implementation in hotspot areas.

Regarding the presentation of avian influenza A(H5N1) in Indonesia and Nepal, participants were interested to know about risk mapping of avian influenza A(H5N1) in Nepal. Nepal explained that poultry distribution, poultry movement and past incidence were the key criteria for risk mapping. In response to the existence of avian influenza A(H5N1) in wild birds in Indonesia, migratory birds were studied in 2007. There was a query on surveillance, prevention and control activities in autonomous islands of Indonesia. Indonesia elaborated on the ongoing participatory disease surveillance and response (PDSR) and early warning and alert response system (EWARS) and collaborative activities between human health and animal health sectors at the provincial level. Dr Elizabeth Mumford reiterated the need to develop standard operating procedures for joint outbreak investigation of avian influenza and suggested tripartite initiatives to prepare joint standard operating procedure guidelines, which may come up as one of the recommendations of the workshop.

**7. Panel discussion on finding gaps and challenges among countries**

The panel discussion on identifying the gaps and challenges for developing coordination mechanisms was moderated by Dr Subhash Morzaria from FAO with six panel members from the Member States.

Dr Sinurtina Sihombing from the Directorate of Vector Borne Diseases Control, Indonesia, shared experiences of challenges in HPAI surveillance, prevention and control, following the first report in poultry in 2003. HPAI rapidly spread to 15 of the total 33 provinces in 2005. So far, Indonesia has reported 195 human cases including 163 deaths. She highlighted the success factors, such as development of the National Zoonosis Commission
in 2011, better data sharing, strengthening laboratory diagnostic capacity at subnational level and sustainability of PDSR, which was possible through technical support from WHO, FAO and OIE and international partnerships. She also identified the challenges for coordination, such as decentralization of government services, limited budget, the huge geographical area to cover and insufficient veterinary professionals at the subnational level.

Dr Wirongrong Hoonsuwan from the Department of Livestock Development, Thailand, highlighted the strengths of the existing coordination mechanism in Thailand. The National Intersectoral Committee is chaired by the Vice Prime Minister and there is a mechanism for good information sharing between public health and animal health sectors. She also elaborated the challenges, such as the need for advocacy for better coordination at provincial and district levels, inadequate information sharing with the private sector and the overlapping of activities between various agencies.

Dr Rajendra Bambal from the Department of Animal Husbandry, Dairying and Fisheries, India, shared the success of animal health legislation for animal disease notification, a mechanism for information sharing at higher level, involvement of international organizations, a joint monitoring group and joint investigation with the involvement of animal health, human health, wildlife and other stakeholders. He also described the progress of the national brucellosis control programme and the Field Epidemiology Training Programme at the National Centre for Disease Control. He highlighted the challenges in conducting regular meetings between different sectors, coordination of various agencies for surveillance and response to public health emergencies at state and district levels, sustainability of training and collaboration with the wildlife sector.

Dr Kazuko Fukushima from the Health Service Bureau, Japan, shared the success of the national-level collaboration through frequent communication and exchange of information, development of a national framework for avian influenza and rabies and investment in epidemiological and biological research for zoonoses. She also highlighted the challenges at local level, such as the lack of a One Health approach, difficulties in communication between sectors and the different strategies for different sectors.

Dr Rizza Araceli Salinas from the Department of Environment and Natural Resources, the Philippines, shared the success of having a
Philippines Inter-Agency Committee on Zoonoses signed by the president of the Philippines in 2011 and drafting joint rules and regulations using the One Health approach. She also highlighted the gaps, such as difficulties in organizing meetings between technical advisory groups for planning and implementation, lack of national funding to implement agreed and planned activities, an inadequate veterinary workforce for the wildlife sector, and difficulties in obtaining training and access to information at the local level.

Dr Dolgorkhand Adiyadorj from the National Center for Zoonotic Diseases, Mongolia, shared success stories in strengthening intersectoral collaboration, such as quarterly and annual meetings of major stakeholders, establishment of an animal–human health committee, feedback and an information-sharing system, and implementation of active surveillance of exotic diseases such as CCHF through a pilot project on the border with China and joint investigation of anthrax outbreaks. She acknowledged the World Bank project for risk assessment of zoonoses and the Field Epidemiology Training Programme on rabies and echinococcosis.

The moderator highlighted the importance and usefulness of sharing countries’ experiences on multisectoral coordination and collaboration through this kind of platform in order to overcome the challenges identified by panellists. He expressed deep appreciation of the successful multisectoral coordination in China for the emergency response to avian influenza A(H7N9) outbreaks as the model coordination mechanism for all emerging diseases. He also stressed the need for multisectoral collaboration on long-term endemic diseases.

Viet Nam also shared the success of engaging high-ranking officials in national steering committees and utilizing opportunities for online conferences in response to outbreaks of emerging and endemic diseases. The importance of monitoring activities at LBMIs and the collaboration with the Ministry of Trade in controlling illegal poultry movements was also highlighted. However, Viet Nam is facing challenges in engaging the local authorities and communities in its One Health mission as they are not aware of the One Health approach.

Pakistan also shared its experiences in developing coordination mechanisms and contingency plans. However, there are many challenges to promoting the One Health approach, such as no legal provision for One Health, a lack of political commitment as well as cooperation at the administrative level, challenges for joint risk assessment and information
sharing and insufficient human resources. In addition, there was no specific funding mechanism at the government or donor level to support and sustain a One Health approach for zoonoses prevention and control.

WHO, FAO and OIE also shared the success of good communication among the three organizations, such as joint risk assessment and training, and development of joint project proposals for collaborative activities, that is the EU-funded HPED project, USAID-funded IDENTIFY and avian influenza A(H7N9) Project. OIE also elaborated on the achievable activities of One Health frameworks for countries in terms of knowledge, individual culture, policy, epidemiology and different funding status of the individual countries. The importance of advocacy for political commitment, One Health approach for EIDs and rabies and interpersonal relations in communication between tripartite groups was also highlighted by partner organizations. Dr Frank Konings from WHO highlighted challenges, including engaging the wildlife sector in zoonoses prevention and control activities, different priorities of different sectors, different administrative structures in different countries and difficulty in policy coordination.

The chairman commented that tripartite groups have to keep engaging the national authorities to promote One Health coordination and awareness. He also highlighted that the success stories and good practice in operationalization of One Health may be used to convince the national authorities. He gave an example of best practice in the FAO initiative for avian influenza, where FAO had already worked with different ministries at country level and different divisions and units under the FAO. He also stressed the need to advocate the One Health approach at national and subnational levels, which will require funding support from governments and international partners.

On behalf of partner institutions, Massey University shared the success stories of the One Health epidemiology capacity-building mechanism under World Bank–EU funding support, endorsement of One Health hub organizational framework in South Asia, collaborative investigation projects, joint training of animal and human health sectors, communication tools and mechanisms for social media. The challenges for extended communication between different sectors, political commitments and government funding of the projects were also emphasized. Dr John Allen from the Australian Animal Health Laboratory, Australia described how the focus helps activities, such as the rabies and animal health strategy in South-East Asia to support future operationalization of One Health.
Professor Kida from Hokkaido University appreciated the tripartite group activity in creating a platform for sharing countries’ experiences in establishing multisectoral collaboration and promotion of One Health, and suggested continuing such activities for zoonoses prevention and control at regional and country levels in the future. The Harbin Veterinary Research Institute of China shared information about the support and models of training on One Health courses, such as Master’s degrees and distance education. The Institute also provides confirmatory and reference laboratory services for zoonoses and supports agricultural research projects in the spirit of One Health.

USAID highlighted opportunities for operationalization of One Health in the wake of avian influenza and pandemic influenza outbreaks and shared the comparative advantages in promoting One Health approaches in surveillance, outbreak investigation and programme management that provided remarkable results and may be applicable for other emerging diseases. The United States Department of Agriculture also identified specific funding for more activities supported by the US Centers for Disease Control and expressed possible funding support for monitoring One Health activities in future. The chairman also highlighted that rabies control and subsequent elimination campaigns in ASEAN and SAARC countries may serve as a model for operationalization of One Health; the rabies elimination mission is gaining momentum as there is common interest of different sectors, such as human health, animal health and local authority.

8. **Breakout sessions: group work for multisectoral collaboration for LBM management**

This session was moderated by Dr Norikazu Isoda from the WHO Regional Office for the Western Pacific. Participants shared their experiences and lessons learned in managing LBMs in order to suggest risk assessment, surveillance and risk reduction measures for better management of LBMs through coordination and collaboration between animal and human health sectors. A briefing was given to participants and facilitators about the objectives and scope of the group work. Dr Norikazu Isoda highlighted the crucial role of LBMs in amplification and dissemination of avian influenza viruses and the high risk of these locations for potential transmission of zoonotic influenza to humans. He also elaborated the criteria for closure of LBMs and involvement of multisectoral authorities in decision-making.
implementation, monitoring and evaluation of LBM activities. He also described joint outbreak investigation, surveillance and joint risk reduction for LBMs, and the establishment of healthy village and market campaigns through application of biosecurity measures at various stages as a longer-term strategy.

There were three groups working on the following tasks, focused on LBMs: (i) joint risk assessment, (ii) surveillance and monitoring, and (iii) options for risk reduction measures. The group composition was as follows, considering country experience and representation of different sectors:

- **Group 1**: Bhutan, People’s Republic of China, Mongolia, Nepal, Pakistan and the Philippines;
- **Group 2**: Cambodia, India, Japan, Lao People’s Democratic Republic, Myanmar, Sri Lanka, Viet Nam;
- **Group 3**: Bangladesh, Indonesia, Malaysia, Maldives, Thailand and Timor-Leste.

**Group 1** revisited the multisectoral coordination mechanism existing in various countries and assessed whether the joint risk assessment could be implemented. The group discussed effective ways to implement the risk assessment intervention in LBMs. The group identified factors, such as the policy agreement, legal/regulatory agencies and experts, establishment of technical committee, authority for decision-making, information-sharing mechanisms and standard operating procedures development.

Key stakeholders to be included in the working group for risk assessment of LBMs were identified, such as health, agriculture, livestock, trade, local governments, wildlife and environment, universities, private sector, transport, customs and media. The group also suggested that there should be a joint committee of public health and animal health sectors, formalized at local and central levels, with the participation of technical experts and policy-makers representing different sectors.

The group suggested that the joint risk assessment working group should come out with a clear recommendation to be considered by decision-makers so that appropriate action could be taken at both central and local government levels. The group also suggested that key actions should be based on the outcome of the risk assessment with clear criteria.
and instructions, such as closure of LBMs, disinfection and duration of closure. Other requirements, such as standard operating procedures for proper disinfection and cleaning, surveillance of market and filling information gaps, were also suggested.

**Group 2** discussed the technical requirements for surveillance of LBMs, such as protocols, sample collection, laboratory capacity and training of field staff. The requirement of financial support to implement and sustain active and passive surveillance was also highlighted.

The group identified animal health and human health sectors as the key partners for execution of LBM surveillance. The overall structure of active surveillance was suggested to generate evidence-based information through assessment of avian influenza virus load, virus circulation in market areas and spread of avian influenza viruses at different stages (farm, wholesale, retail), so that timely and appropriate responses could be recommended for policy decisions.

The group suggested that surveillance should include human health and animal health components. The first should include event-based surveillance and ILI/SARI surveillance and the second should include virological and serological surveillance, such as environmental sampling and use of sentinel animals. The group also recommended that information sharing between animal health and public health sectors should be on a daily basis and sharing information of confirmed animal or human cases of avian influenza should be mandatory during outbreaks. Routine surveillance data should be shared to sustain LBM surveillance activities under normal conditions.

**Group 3** revisited the interventions during and after the outbreaks in terms of efficacy of risk reduction, requirements for implementation and sustainability of risk reduction measures at LBMs.

The group suggested that disinfection of infected farms, poultry movement control, active surveillance and hygiene improvement should be done during avian influenza outbreaks by the animal health sector whereas ILI/SARI surveillance of farm workers, transporters and LBM workers should be done by the human health sector. It is important that both sectors should jointly develop communication plans and awareness activities during outbreaks.
The group recommended active surveillance, biosecurity measures at LBM s, weekly closure of LBM s for hygiene checks and disinfection, regular medical check-ups for LBM workers and raising public awareness as key interventions to be executed during the post-outbreak period. The group also identified long-term risk reduction measures, such as rest days, species segregation, prohibition of certain animal species and hygiene improvement to be executed in a cost-effective way to sustain healthy food market practice in LBM s.

9. **Parallel sessions for wildlife, socioeconomic dimensions of zoonoses, and communication**

*Wildlife*

The session was moderated by Dr James Gardner Murray from the OIE.

Dr Supaporn Wacharapluesadee from the WHO Collaboration Centre for Research and Training on Viral Zoonoses, Chulalongkorn University, Thailand, presented the possible dangerous zoonotic pathogens in bats and risks of potential human exposure to bat-borne pathogens. She described bats as a reservoir of zoonotic pathogens such as lyssavirus, Nipah virus, Hendra virus, Ebola virus, severe acute respiratory syndrome coronavirus and histoplasmosis. She then described the results of zoonotic pathogen assessment of bat guano and risk assessment of potential exposure among guano workers and community members. She also highlighted the requirement for systematic surveillance and education of the local community, where humans live in close contact with bat guano or animals infected by bats.

Dr Jia Honglin from the OIE Reference Laboratory for Avian Influenza, Harbin Veterinary Research Institute gave an overview of zoonoses and zoonotic pathogens originating from wildlife in China. Rabies and brucellosis are major zoonotic diseases of public health concern. Dog bite is responsible for 95% of human rabies cases reported in China. Chinese ferret-badger (*Melogale moschata*) bite is a new source of rabies infection in Hangzhou and Huzhou cities. He shared survey results of rabies in yellow mongoose (*Herpestes javanicus*), ferret-badgers and various types of bats in China. He emphasized the need for practical measures such as law
enforcement for dog rabies control, development of oral bait rabies vaccine for stray dogs and investment in rabies research. He described brucellosis as an emerging disease problem in the last 10 years and shared results of a serosurvey of brucellosis in wild animals. He then elaborated the distribution of animal brucellosis in China and stated that there is a plan to integrate brucellosis into regular monitoring systems, and introduce compulsory immunization of livestock against brucellosis beginning 2015.

Dr Honglin also described mosquito-borne Japanese encephalitis, tick-borne encephalitis and CCHF in China. He also highlighted that more than 300,000 samples were collected in 20 provinces of China between 2000 and 2009 for identification of arboviral infections. New mosquito-borne EIDs have been identified affecting the human population, such as Tahyna virus in northwestern China and tick-borne severe fever with thrombocytopenia syndrome in northeastern China. Implementation of a stamping-out policy for zoonoses elimination may not be feasible at present considering the large populations of animals and development of the livestock industry; zoonoses control through mass vaccination might be a better choice. It is the right time to discuss and evaluate the One Health concept and to establish multisectoral collaboration for zoonoses prevention and control at national and local levels.

Dr James Gardner Murray expressed his opinion that stamping out wildlife animals in the name of zoonoses prevention and control would not be an ideal approach for One Health implementation as there may be public mistrust in One Health due to animal welfare concerns. The wildlife group also discussed the increasing risk and high impact of zoonoses in wildlife and identified alternative strategies for wildlife disease control rather than stamping out, such as development of appropriate vaccine and delivery systems, development of wildlife medicines and manpower, operational research, risk communication and political support. The group also recommended advocacy and awareness of wildlife conservation at policy and community levels to prevent wild animals coming into close contact with humans and domestic animals.

**Socioeconomic dimensions of zoonoses**

Dr Wantanee Kalpravidh and Dr Eric Brum from FAO facilitated the session. They presented the epidemiological and economic principles of rabies control, and the basic reproductive rate ($R_0$), i.e. the expected
number of secondary infections resulting from point source infection in a susceptible population over the course of its infectious period. They also described the limitation of dog culling and identified the ways to reduce rabies $R_0$ by effective dog vaccination and sustaining herd immunity. They also described the cost–benefit analysis for rabies control and urged investment in dog vaccination as it is cost-effective and sustainable towards rabies elimination. They also facilitated a role-playing game in which participants were divided into human health and animal health groups and tasked with working together in a "One Health" fashion to convince the Minister of Finance to provide increased funding to support systematic mass dog vaccination. It was concluded that rabies elimination may serve as a model for operationalization of One Health, as the human health and animal health sectors have to work together.

Professor Kohei Makita from Rakuno Gakuen University, Japan, presented justification for application of socioeconomic analysis in relation to zoonoses. He identified several socioeconomic factors related to food safety in the value chain from farmer, via trader and household, to the consumption level.

Based on the concepts of rabies and food safety, the group assessed the countries’ understanding of socioeconomic dimensions and the status of the application of this discipline for zoonoses prevention and control. The group agreed that socioeconomic dimensions of zoonoses must be considered so that policy-makers and the general public understand cost-effective ways of controlling zoonoses at the human–animal interface, and that controlling the disease at source will be cost-effective, sustainable and logical. There is a need for expertise to link epidemiological data with socioeconomic analysis to propose appropriate, socially acceptable and cost-effective intervention tools to policy-makers. Capacity-building is required to carry out socioeconomic analysis of zoonoses as it is still a new concept. The group recommended simple and meaningful messages to advocate to policy-makers and donors in order to support case-studies and capacity-building for socioeconomic analysis of zoonoses in countries of the Asia-Pacific region.

**Communication**

Dr Prakash Ghimire, WHO Country Office Nepal, moderated the session. He explained definitions, methods, tools and channels for communication
with policy-makers, public and social media. He stressed that communication is linked to the social, economic and political environment in a broader dimension. He focused on the four communication skills and how to communicate effectively using such skills in different situations and contexts.

He also described communication strategies, such as One Health: Seeing around corners: a regional communication strategy framework against infectious diseases in Asia and the Pacific 2011–2016 and Communication for Behavioural Impact (COMBI): A toolkit for behavioural and social communication in outbreak response, for the prevention and control of emerging diseases including zoonoses. He highlighted communication tools, such as WHO outbreak communication planning guides, COMBI toolkit and WHO field guide for effective media communication during public health emergencies.

The group discussed the guiding principles for communication, such as greater community participation, development of a One Health curriculum for communication, enhancing capacity of technical professionals to communicate during outbreaks and emergencies and establishing the regional network of coaches/mentors and community-based communication networks. The group also discussed the seven COMBI steps and shared their country’s experiences; for example, in identifying behaviour objectives and conducting rapid situation analysis.

The group suggested that it is necessary to refine the behavioural and communication objectives, to design a communication strategy and to prepare an implementation plan considering the local situation and context. There was consensus that implementation plans, including monitoring and evaluation, should continue when an outbreak is over. The impact assessment of risk communication and documentation of lessons learned should be considered, as it will contribute to better planning in future communication. The group also recommended a simple and common message in a timely manner to communicate with the public and policy-makers during disease outbreaks and emergencies.
10. **Session 6: Application of the One Health approach**

Day three sessions were chaired by Mr Ibrahim Zuhuree from the SAARC Secretariat and co-chaired by Dr Ken Cokanasiga from the Secretariat of the Pacific Community. Dr Prakash Ghimire from WHO Country Office Nepal recapped the day two sessions and Dr Gyanendra Gongal from WHO Regional Office for South-East Asia, Dr Katinka de Balogh from FAO and Dr Peetambar Kushwaha from the Global Alliance for Livestock and Veterinary Medicine (GALVmed) presented updates on the prevention and control of neglected zoonoses.

**Neglected zoonoses**

Dr Gyanendra Gongal provided background on neglected tropical diseases (NTDs) and described the common features of NTDs, such as low visibility, links to poverty, stigma and discrimination, impacts on morbidity and mortality, and neglect in research. Six out of 17 priority NTDs are zoonoses. He highlighted risk factors, challenges and opportunities for prevention and control of neglected zoonoses prevalent in countries of the Asia-Pacific region. He also described the burden of neglected zoonoses and its impact on economies. WHO has developed strategic approaches for the prevention and control of NTDs, such as case management, transmission control and preventive chemotherapy or prophylactic vaccination. The roadmap for NTDs urges all partners to work together in cost-effective, flexible and innovative ways, considering the country-specific situations. WHO hosted the interagency meeting on planning the prevention and control of neglected zoonotic diseases held in July 2011 in Geneva, Switzerland, which was attended by FAO, OIE and international experts.

He provided situation analysis of echinococcosis/hydatidosis, taeniasis/cysticercosis, cutaneous leishmaniasis, schistosomiasis and foodborne trematodes in the Asia-Pacific region and addressed essential interventions, such as strategy development, policy actions and research needs. He also elaborated WHO’s initiative for disease mapping, multidisciplinary action and mass drug administration designed to prevent and control foodborne trematodes in Asian countries.
Dr Katiinka de Balogh described the three main FAO approaches to zoonotic diseases, neglected/endemic zoonoses, emerging zoonoses and foodborne zoonoses. She explained that the problem of neglected zoonoses is closely linked to poverty, ignorance, lack of services in rural areas and lack of disease burden data. She also established linkage of NTDs to livelihood, wildlife and livestock production. She shared outcomes of the High-level technical meeting to address health risks at the human–animal–ecosystem interfaces, held in Mexico City, Mexico in November 2011, and the elements of effective cross-sectoral collaboration to address NTDs.

Dr Peetambar Kushwaha introduced the scope and objectives of GALVmed and explained the international partnership for animal health product development and adoption. GALVmed is a non-profit making international organization which has pro-poor focus to improve quality of life of livestock, sustainable development and food security through vaccine development and technology transfer. The organization is involved in vaccine development and clinical trials for prevention and control of hydatidosis, cysticercosis and Newcastle disease. The presentation focused on the cysticercosis problem in Asia and the scope for vaccination of pigs against cysticercosis in South Asia.

The chair and co-chair discussed the way forward to address endemic neglected zoonoses and participants described actions, such as stimulating dialogues and reporting, assessing the disease impact and burden, raising awareness and advocacy, defining viable strategies and mobilizing resources. The participants also suggested the integration of poverty reduction measures when designing pilot projects for neglected zoonoses.

**Application of One Health approach**

Dr Susan Corning from OIE presented the updates of the tripartite One Health approaches. She highlighted that emerging zoonotic pathogens have been at the centre stage of global health security in recent years, and this demands a holistic multidisciplinary approach and collaborative action. She addressed the way that WHO, FAO and OIE have quickly coordinated complex avenues for cooperation between authorities and agencies at national, regional and global levels. She addressed the tripartite strategic approach for multilevel coordination; providing practical external expertise, tripartite tools and activities. She also recommended additional values for One Health, such as leadership, technical expertise, engagement of
national authorities and adoption of international standards and regulations. The outcomes of the global policy and technical meetings for the prevention and control of transboundary animal diseases including zoonoses and AMR were shared. She also highlighted the need for health system strengthening, including laboratory capacities in both animal and human health sectors for zoonoses prevention and control. It is necessary to improve synergies between two sectors and the alignment with existing systems/framework, such as IHR (2005) and OIE-Performance of Veterinary Services (PVS). WHO and OIE are working together to develop a common assessment tool in line with IHR and PVS, and pilot testing will be done in the Philippines and Thailand in 2014.

Dr Wantanee Kalpravidh from FAO revisited the country questionnaires and posters focused on assessment of the operationalization of One Health at country level. It was revealed that measurable progress had been made in operationalization of One Health in many countries and success stories have been shared by participating countries. However, challenges remain, such as political commitment, ownership by governments and communities, leadership development, international partnerships, and advocacy and coordination at the subnational level.

There were a number of zoonoses prioritized by participating countries and zoonotic events were reported by most countries in 2012–2013. Avian influenza, rabies, brucellosis, anthrax and leptospirosis have been identified by most countries as priority zoonoses. HPAI A(H5N1) was the most common zoonotic disease of economic importance reported by Bangladesh, Bhutan, Cambodia, Indonesia, Myanmar, Nepal and Viet Nam; whereas rabies was considered the zoonotic disease of most public health importance in Lao People’s Democratic Republic, Mongolia, Myanmar and Viet Nam.

Regarding the prioritization of zoonoses, 32% of countries stated that the pattern of priority zoonoses is changing. Avian influenza A(H7N9) was of low pathogenicity to poultry, but it became a priority disease in China in 2013 as human infection was reported.

Regarding the national One Health mechanism, 84% of participating countries claimed that they have a national One Health mechanism and 75% of them claimed legal recognition of the One Health mechanism. The One Health team meets regularly in most countries, but only 69% countries claimed that they also receive funding support for One Health activity.
Regarding operationalization of One Health, a majority of countries reported that One Health coordination was useful in preparedness, collaboration and sharing information, which contributed to improvement of mutual understanding and trust and to development of joint activities for zoonoses prevention and control. Practical examples and challenges were also identified.

Regarding key supporting elements for One Health coordination and collaboration, it was emphasized that the following elements are prerequisites for establishment of a functional coordination mechanism: strong political will and commitment, trust among partners, common objectives, recognition of shared benefits, identification and involvement of stakeholders and an effective health system. However, good governance, the legal framework, guidance on implementation of cross-sectoral collaboration and pool funding may be supporting elements. Regarding the key operational elements, most countries indicated that there should be routine communication and common interest for joint planning, coordination and collaboration for disease control activities. However, joint risk assessment and joint simulation exercises were not practiced due to complexities and lack of technical expertise and funding.

In addition, eight key gaps and challenges were identified, as follows: lack of clear intra- and intersectoral coordination mechanisms; no clear operationalization of One Health at the local level; lack of legislation and high-level commitment to support One Health; different priorities among partners; lack of financial support, human resources and time; and, poor involvement of the wildlife and environment sectors.

Panel discussion on vision for One Health

The panel discussion on One Health at the regional level was moderated by Dr Subhash Morzaria from FAO. Representatives from donor and partner organization participated in the discussions.

Ms Joanna Mckenzie from Massey University, New Zealand, highlighted the role of the World Bank/EU/Massey University Project in advocating and promoting One Health through a Master’s course, creation of a One Health hub and implementation of the collaborative investigation project in SAARC countries. She stressed that a specific plan of action will be required for each country for capacity-building and operationalizing
One Health. She gave details of the One Health symposium organized in Delhi, India, by Massey University and expressed interest in working together with FAO, OIE and WHO to strengthen One Health activities at regional and country levels.

Dr Sudarat Damrongwatanpokin from USAID Bangkok clarified that the USAID project was collaborating with One Health activities in the Asia-Pacific region. She highlighted that most countries have mainly focused on avian influenza (H5N1) since 2005, in both animal and human health sectors. She stressed the need for capacity-building in laboratory skills and education for future development, and highlighted the One Health University network and pilot projects for One Health curriculum development in South-East Asia and Africa. There will be a One Health conference in 2014 to bring together academics, government organizations, nongovernmental organizations and other stakeholders to discuss collaboration for One Health. She also acknowledged that EID strategies were developed in many counties and anticipated that they would maximize benefit with limited funding. She also noted the requirements of commitment by governments and advocacy to convince policy-makers in governments.

Dr Joanna Tuckwell from the World Society for the Protection of Animals (WSPA) appreciated the collaboration among partners, including WHO, FAO and OIE. WSPA acknowledged the tripartite group for their invitation to the meeting and identifying the partnership activities to support the SAARC rabies elimination initiative and wildlife programme of the Government of Viet Nam.

Dr John Allen from the Australian Animal Health Laboratory emphasized activities at the grassroots level for One Health. He highlighted the joint educational courses, harmonization of diagnostic facilities and sharing of laboratory results between the wildlife sector, livestock sector and human health sector as a part of One Health.

On behalf of the tripartite group, Dr Subhash Morzaria from FAO acknowledged the donors, partners and participants for identifying gaps and constraints in implementing the One Health approach and for sharing the vision for future planning. He also welcomed the interests, initiatives and suggestions of partner organizations for operationalization of One Health at regional and country levels, for further strengthening collaboration and coordination at the human–animal–ecosystem interfaces.
11. **Session 7: Way forward, conclusion and recommendations**

Considering that:

The year 2013 was significant because of the emergence of novel infectious diseases such as avian influenza (H7N9) and MERS-CoV and increasing outbreaks of HPAI (H5N1).

Given the fact that the origin of most existing as well as emerging zoonotic diseases is wildlife and domestic animals, it is necessary to enhance collaboration across the human health, animal health and wildlife sectors for the control and prevention of zoonoses.

FAO, OIE and WHO have established a functional coordination mechanism at the regional level to support prevention and control of zoonoses that was useful, for example, for better coordination during avian influenza (H7N9) outbreaks. The three organizations are working together to implement a number of initiatives designed to strengthen countries’ capacities for risk reduction, surveillance and response to zoonotic events using existing systems and strategies such as the WHO APSED and FAO/OIE GF-TADs.

Measurable progress has been made towards operationalization of One Health in several countries, as per recommendations of the Third Regional Workshop on Multi-Sectoral Collaboration on Zoonoses Prevention and Control: Leading the Way on One Health held in Bali, Indonesia, from 26 to 28 November 2012. Success stories and good practices were shared by participating countries through poster presentation and panel discussion.

Multidisciplinary inputs, such as socioeconomics, communication, ecology and wildlife dimensions, are essential in addressing zoonoses as part of the One Health approach.

There is increasing epidemiological evidence that LBMs play an important part in maintaining, amplifying and disseminating influenza A viruses, such as HPAI H5N1 and the novel H7N9, and as sources of potential exposure of humans to avian influenza viruses.
Rabies is a priority zoonotic disease in most participating countries and there is a need for a regionally coordinated rabies elimination programme. Rabies elimination may serve as a model for operationalization of One Health in rabies-endemic countries of the Asia-Pacific region.

Many endemic zoonotic diseases affecting poor, marginalized and rural populations have been neglected and many partner organizations are coming together with innovative approaches to control endemic and neglected zoonoses.

Increasing levels of AMR are having, and will continue to have, a severe impact on human health. Therefore, there is a need for greater attention to the prudent use of antimicrobial agents in both humans and animals.

The workshop recommends that countries and regional and international organizations:

- strengthen and consolidate ongoing national efforts to develop functional and sustainable national mechanisms for routine cross-sectoral collaboration on health issues at the human-animal-ecosystems interface based on existing country-level institutions and mechanisms;
- further enhance national and subnational mechanisms for information sharing, analyses where appropriate, communication, joint risk assessment and response;
- give greater consideration to the implementation of One Health initiatives at national and local levels by seeking political support and fostering partnerships with a wide range of stakeholders;
- consider socioeconomic impacts of zoonoses including cost-benefit analysis of prevention and control measures to better inform policy-makers and target resources;
- enhance surveillance of influenza A virus at LBM for early detection and implementation of the risk mitigation measures to significantly reduce exposure to avian influenza viruses;
- prioritize risk reduction interventions for avian influenza infection both in animals and humans at LBM and to develop
joint implementation strategies based on the animal–human–ecosystems interface;

- develop and/or implement a comprehensive national strategy for rabies elimination based on mass dog vaccination and dog population management through international partnerships;

- advocate for and support development of multisectoral national action plans for the prevention of AMR in humans and animals in line with international standards and guidelines;

- support countries in developing and operationalizing common or aligned communication guidelines and approaches considering existing strategies for the prevention and control of zoonoses;

- support countries to develop standard tools and guidance for conducting joint risk assessment, outbreak investigation and risk communication for zoonotic events at the human–animal–ecosystems interface;

- promote active involvement of wildlife authorities and experts in One Health activities.

It was agreed that the next workshop would be organized by FAO in collaboration with OIE and WHO, focusing upon evaluation of the effectiveness/efficiencies of the previous workshops, lessons learned and developing a future regional action plan.

Participants expressed sincere thanks to the organizers for hosting the event, and bringing together multidisciplinary groups, academics and partners to discuss multisectoral collaboration and partnership for the prevention and control of zoonoses. They acknowledged that the workshop was technically rich, sessions were well structured and of common interest and concern, and scientific presentations were enlightening. Participants noted that the meeting highlighted the various issues, and provided take-home messages and excellent analysis of the regional situation through country participation in poster presentations and panel discussion. In addition, the resource materials provided on flash drives and the visibility of donor support were fully appreciated.
Annex 1

Agenda

- Opening
- Global and regional overview of zoonoses
- Sharing of country experiences and best practices for prevention and control of zoonoses
- Multisectoral coordination and cooperation at the human–animal–ecosystem interfaces
- Socioeconomic dimension of zoonoses, wildlife and communication
- Progress in operationalization of One Health at regional and country levels pertaining to zoonoses prevention and control
- Poster session – progress in operationalizing One Health at country level pertaining to zoonoses prevention and control
- Panel discussion on zoonotic influenza, Middle East respiratory syndrome coronavirus (MERS-COV) and rabies
- Discussion on advancing multisectoral collaboration at regional and country levels
- Summary recommendations and way forward
- Closing
Annex 2

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In recent years, progress has been made to further enhance collaboration between human health, animal health and relevant sectors such as wildlife, environment to share the best practices and innovative ideas to address zoonotic and other emerging and re-emerging diseases at the human, animal and ecosystem interfaces. The Asia-Pacific Workshop on Multisectoral collaboration for the prevention and control of zoonoses was organized by WHO in collaboration with FAO and OIE in Kathmandu, Nepal from 27 to 29 November, 2013. A total of 114 participants from 19 countries, representing the animal and human health, wildlife and environment sectors, academic institutions, donors and partners attended the workshop.

This year 2013 was significant with the emergence of avian influenza (H7N9) and Middle East respiratory syndrome coronavirus and escalating the outbreaks of avian influenza A(H5N1) in a number of Asian countries. Zoonotic influenza, rabies and antimicrobial resistance were priority issues discussed for multisectoral collaboration. Participants were actively involved in group discussions on live bird market management for surveillance, prevention and control of avian influenza. The workshop recommended partners and countries to strengthen and consolidate ongoing national efforts for cross-sectoral collaboration and to further enhance national and subnational mechanisms for information sharing, communication, joint risk assessment and response for zoonoses prevention and control. The workshop also recommended to develop and/or implement a comprehensive national strategy for rabies elimination and to advocate and support multi-sectoral national action plans for the prevention of antimicrobial resistance development.

Asia–Pacific workshop on multisectoral collaboration for the prevention and control of zoonoses

Report of the meeting
27–29 November 2013
Kathmandu, Nepal