

One Health in Mongolia

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Abstract The Asia Pacific Strategy for Emerging Diseases (APSED) requires collaboration, consensus, and partnership across all the different actors and sectors involved in different aspects of emerging disease. Guided by APSED, Mongolia has established a functional coordination mechanism between the animal and human health sectors. Surveillance, information exchange and risk assessment, risk reduction, and coordinated response capacity and collaborative research have been identified as the four pillars of the zoonoses framework. Intersectoral collaboration has been clearly shown to be a crucial tool in the prevention and control of emerging zoonotic diseases. A “One Health” strategy has been implemented under the concept of ‘Healthy animal-Healthy food-Healthy people’. An intersectoral coordination

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mechanism established between the veterinary and public health sectors has expanded its function to incorporate more work on food safety, emergency management, and effects of climate change on zoonotic diseases. Its membership includes the human health sector, the veterinary sector, the national emergency management agency, the environment sector, emergency management and inspection authorities, and the World Health Organization (WHO). The main outputs of the coordination mechanism have been strengthened surveillance and response activities and laboratory capacities. The coordination mechanism has also strengthened the surveillance and response capacity of neglected zoonotic diseases, such as brucellosis, anthrax, and tick-borne diseases. Through regular meetings and brainstorming sessions, both sectors have developed joint operational plans, a long-term risk reduction plan 2011–2015, initiated a prioritization exercise and risk assessment for 29 zoonotic diseases, and reviewed and revised standards, procedures, and communication strategies. In 2011, a list of experts on major zoonoses were identified from different sectors and formed into a taskforce to identify the focal points for rabies, brucellosis, and vector-borne diseases. As a result, disease control strategies are now linked to scientific research and epidemiological expertise.

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1 Background

1.1 Country Profile

Mongolia is a landlocked country in East and Central Asia, situated between and bordering China and Russia, and with a population of 2.7 million as of 2011. The country has the lowest population density in the world, one person per 1.57 km². Mining and agriculture, and are the two main sectors of the Mongolian economy. For centuries, the Mongolians have been engaged in animal husbandry, raising horses, sheep, goats, cattle, and camels. Agriculture, primarily herding, is the traditional basis of the Mongolian economy, contributing about 20 % of GDP and providing 40 % of national employment. Livestock husbandry is the main economic pillar, vital for public good, and the significant source of export income.

Due to increasing urbanization and socioeconomic development of country in recent years, migration from rural to urban and suburban areas has been increasing. In 2010, only 36.7 % of the population resided in rural areas. Approximately, 30 % of the population is nomadic or seminomadic. Administratively, Mongolia is divided into 21 provinces, and the capital city, Ulaanbaatar.

1.2 Climate

Mongolia has an extreme continental climate with long, cold winters and short summers, during which most precipitation falls. The temperature is as low as -45 to -50°C in the winter and can reach 25° to 30°C in the summer. Global climate change is believed to have had an influence on the climate; the annual average climate temperature has risen by 1.94°C over the last 65 years, and in the last 30 years, the temperature has risen faster and the rainfall has decreased in Mongolian forest-steppe regions. Due to environmental and human impacts in the last few years many rivers, streams, and lakes have dried, pasture growth has decreased by 20–30 %, pasture plant species numbers have reduced and it has resulted in an increase in land degradation and desertification. Natural disasters such as drought, heavy snowfall, flood, snowstorms, windstorms, extreme cold and hot temperatures, and earthquakes recurrently occur throughout the year. Mongolia is very dependent on nature and climate due to its traditional nomadic lifestyle throughout four seasons of the year.

The large herder population has a greater chance of zoonotic infections. As the Mongolian economy is heavily reliant on herding and agriculture, the harsh winters and periodic droughts have adverse effects on livestock and agriculture, and also on the health status of the population.

1.3 Situation of Zoonotic Diseases

The livestock population was 36.3 millions as of 2011, down from 44.0 million at the end of 2009. Pig and poultry population are not prominent. Endemic zoonotic diseases such as brucellosis, anthrax, rabies, plague, and tick-borne diseases create important public health problems.

In recent years, endemic zoonoses have expanded and outbreaks of number of transboundary diseases have emerged in both animals and humans. Climate change and extreme weather conditions have had an adverse effect on biodiversity, distribution of animals, and microflora, which can lead to the emergence of zoonotic agents and create favorable conditions for disease outbreaks. Over 20 bacterial and viral and 18 parasitic zoonotic diseases were reported in animals. Six out of 15 diseases listed as transmissible diseases notifiable to the OIE were reported in Mongolia, and four diseases have a potential risk for further spread.

The significance of zoonoses is increasing due to improved animal husbandry practices, climate change, desertification, and developments in the mining sector. In spite of the progress achieved, anthrax, brucellosis, tick-borne diseases, and rabies still constitute a threat to human health and welfare.

2 Coordinating Mechanisms Between Animal and Human Health Sectors

The Asia Pacific Strategy on Emerging Diseases (APSED) recognizes the importance of close multisectoral cooperation for the prevention and control of zoonoses. With the support of World Health Organization (WHO), the Intersectoral Coordination Committee on Zoonoses was officially established in Mongolia in February, 2010, although many collaborative activities had already been undertaken since 2006. The Committee is chaired by either the Vice-Minister of Health or the Vice-Minister of Food and Agriculture and Light Industry, alternating between the two positions annually, and the membership includes representatives from the Ministry of Health (MoH), Veterinary and Animal Breeding Agency of Ministry of Food and Agriculture and Light Industry (MoFALI), National Emergency Management Agency (NEMA), Ministry of Nature and Environment, General Agency for Specialized Inspection, and the WHO.

The overall vision of the Coordination Committee is to have “strong human and animal health sectors, together with emergency response and national inspection agencies working in partnership toward the attainment of a healthier community”. The Coordination Committee has responsibility for developing joint policy on the prevention and control of priority zoonotic diseases; for approving action plans produced by a technical working group; for making recommendations on risk assessment, early warning and response activities during outbreaks; for reviewing and revising zoonotic diseases standard operational procedures (SOPs) and

guidelines to reflect intersectoral collaboration; for providing methodological assistance to improve the capacity of professional institutions at the national and subnational level; for coordinating cooperation among different sectors in carrying out early detection and response functions; and for monitoring and evaluating overall zoonotic disease prevention and control. The Director-General of the National Centre for Zoonotic Diseases in the MoH serves as secretariat, and is responsible for routine coordination and management.

Before the establishment of the Coordination Committee, MoH and MoFALI developed a written Memorandum of Understanding (MoU) to conduct joint surveys on zoonotic diseases in 2007–2009. Both sectors exchanged annual statistical reports and conducted joint serological surveys. The results of the survey helped define the distribution of major zoonoses which are important to both animal and human health. The surveys identified new diseases in Mongolia, such as tick-borne encephalitis, West Nile fever, Lyme disease, rickettsia, and Q fever. The joint survey promoted collaboration between two sectors. The new diseases have been added to the list of notifiable diseases to reflect current threats. However, most of the activities were aimed at gathering information about zoonotic pathogens only. Notable changes observed in the two sectors during the survey were transferred by the joint task to surveillance with ongoing and systematic collection of information in order to define the extent of disease problem, and to disseminate this information to improve public health awareness, early warning, diagnosis, prevention, and control.

The first meeting of the Intersectoral Coordination Committee took place in March 2010, and was attended by its members, the secretariat, the technical working group and evaluation team, as well as by representatives from WHO and FAO. The outcome of the meeting was discussion of the draft joint operational plan. The first activity was to map existing capacity and surveillance systems, and response and risk reduction measures in both the animal and human health sectors. Based on the results of this assessment, an operational plan of action was developed to address the gaps and to improve zoonose control strategies.

Quarterly meetings have been held and priorities set for actions and interventions. Regular meetings between veterinary and public health professionals proved to be an important activity to improve and stimulate intersectoral cooperation. During times of emergencies, both sides communicated frequently and joint technical working group meetings were conducted. A good example of this is the brainstorming joint response review meeting of veterinary and human health authorities in September 2010 following the outbreak of anthrax in animals and humans. All meetings are organized in cooperation with the WHO and other international organizations. The cost of organizing joint meetings and conferences was paid back by the harmonization of legislation, joint planning, and sharing of resources. This included sharing information and surveillance data and cooperation at the local level in outbreak response. This cooperation has been tested during real time outbreaks and the lessons learned from those exercises used to improve the rapid response measures.

The coordination committee organized the first national conference on zoonoses in June 2010. The participants were professionals from both the human and veterinary sectors at national and subnational levels. This was the first ever joint meeting between two sectors at a professional level. The meeting reviewed results of joint assessment on existing capacity and system for surveillance and response in the following areas:

- Human resources
- Response capacity
- Information and surveillance
- Laboratory
- Logistics and supplies.

After the National conference, the intersectoral coordination mechanism was formally set up at all levels in Mongolia. At the community level, social awareness, public education, and media play an important role. It has also enabled the use of better risk communication and health education strategies at the community level. Risk communication and promotion of programs directed primarily at occupational risk groups and school children were implemented with assistance from local government. At the national level, the coordination mechanism was aimed at improving information exchange, expertise sharing, mutual technical support, and harmonization of legislation. In 2011, a joint strategy for long-term risk reduction of priority zoonotic diseases for 2011–2015 was developed by the Ministries of Health and of Food and Agriculture.

3 Information Sharing, Surveillance, Risk Assessment, and Risk Reduction

3.1 Prioritization Exercise

The Intersectoral coordinating committee on zoonoses carried out a prioritization exercise and risk assessment of 29 zoonotic diseases in January 2011. These included endemic zoonoses reported in humans, zoonoses reported in animals, vector-borne diseases, and diseases at risk of being imported. A total of 16 zoonoses were identified that are important for both animal and human health sectors. The technical working group that consisted of veterinary, public health, laboratory, research institute, and academic personnel held a series of discussions and conducted detailed risk assessments. WHO's prioritization tool as well as other countries' methodologies and tools were adopted for this prioritization exercise. The priority diseases, namely, plague, avian influenza, anthrax, brucellosis, rabies, tickborne encephalitis, echinococcosis, and tularemia were defined as diseases that required a coordinated surveillance and response. Endemic diseases like brucellosis and anthrax, which have been listed by WHO as "neglected" were identified

as priority diseases by MoH and MoFA. The exercise specially defined malaria, dengue fever, glanders, toxoplasmosis, West Nile fever, Japanese encephalitis, hemorrhagic fever with renal syndrome, and cryptosporidiosis as diseases that should be targeted for collaborative research.

3.2 Sharing of Surveillance Data

The coordination committee developed SOPs for information sharing, surveillance, and response for the priority diseases such as avian and pandemic influenza, anthrax, tick-borne diseases, rabies, brucellosis, plague, and some parasitic diseases. The veterinary and health sectors routinely cross-notify and exchange information, based on the SOPs. In addition to surveillance data, both sectors should exchange outbreak information within 24 h, and laboratory data and event information (immunization, cluster of cases, livestock abortion, sudden death of animals, survey results, food-borne disease) on a monthly basis. Weekly disease information has been shared with MoH, MoFA, WHO, FAO, and other partners through an electronic newsletter since March 2010.

3.3 Brucellosis Control in Mongolia

Mongolia has one of the highest incidences of human brucellosis in the world. National brucellosis surveillance was established in the 1950, and a test-and-slaughter strategy commenced in 1960. The Government implemented a vaccination strategy from 1973 to 1983. As a result, the prevalence of animal brucellosis has decreased from 10 to 0.5 %. However, in the 1990s human brucellosis re-emerged following transition to free market economy, collapse of systems that were responsible to public health issues and lack of resources to continue surveillance accordingly. In 2000, a new vaccination strategy was introduced with the aim of eradicating the disease by 2010, but attempts to control the disease have been unsuccessful because of inconsistent strategies with respect to vaccination of livestock and the detection and elimination of infected animals from the herd.

The seroprevalence of brucellosis in humans, livestock, and dogs was investigated as a pilot project in Sukhbaatar and Zavkhan province with support from Swiss Development Agency. The results of the study by veterinary and medical epidemiologists served as a baseline for assessing and monitoring the effectiveness of a conjunctival vaccination campaign in 2010. In addition, the conjunctival vaccine campaign has assisted the development of new strategy for national brucellosis control and for livestock export.

Despite the increase in the number of registered animal brucellosis cases, the MoH did not report an increase in the number of human brucellosis. In Mongolia, the disease incidence is largely unknown because many cases are missed due to a

lack of diagnostic facilities at the subnational level. Only 2–3 % of cases of acute human brucellosis are reported, and it is estimated that less than one in 40 cases are reported indicating a significant under-reporting. Animal sector surveillance data helped the human health sector to review surveillance and laboratory practice to improve reporting. Brucellosis is identified as one of priority zoonoses for both animal and human health sector. In 2011, animal and human sector have started baseline prevalence survey. Over 200,000 serum samples from five major species of animals and 2,333 serum samples from human were collected and laboratory investigation were carried out, following OIE recommendations. A mass vaccination campaign has been implemented with the aim of controlling and eradicating animal Brucellosis by 2020. The country was divided into three sectors and 14.7 million animals were vaccinated in 2011 in 1st sector, with a future plan to vaccinate animals in remaining two sectors, and then to provide annual vaccination of newborns.

3.4 Joint Risk Assessment and Risk Reduction

In response to growing burden of anthrax in the Mongolia, a technical working group has developed a strategy for the prevention and control of human and animal anthrax. This is the first risk reduction disease strategy that has been prepared with involvement of human, animal, emergence management, inspection agency, food safety and intelligence authorities, and with international partners. The strategy has been based on global best practice and experience gained over the past 30 years of responding to outbreaks as well as sporadic cases of anthrax. A GIS-based risk map has been developed for anthrax to provide a common platform. In addition, a joint technical working group has been established with professionals from the Institute of Veterinary Medicine, the National Centre for Zoonotic Diseases, the Central Veterinary Diagnostic Laboratory to act as a professional advisory, and technical implementation body to develop methodological recommendations and policy documents for approval by relevant authorities.

In response to increasing numbers of rabies cases in wildlife, the veterinary and public health sectors have combined with local government over the past 2 years to conduct community education and awareness activities in schools, workplaces, and among the general population. On World Rabies Day 2011, the MoH organized a rabies awareness and prevention campaign and conducted training for healthcare workers, veterinarians, school doctors. The MoH also distributed brochures and posters for children, parents, and dog owners on rabies prevention, and video spots and cartoons were produced and broadcasted by media. The veterinary sector also initiated dog vaccination, and stray street dogs were destroyed in four districts.

An avian influenza surveillance program has been established in wild birds in order to provide an early warning system and to improve the existing surveillance network. The surveillance team consisted of representatives from the veterinary,

health, environment, inspection, and other related institutions, and was a good example of multisectoral cooperation.

The two human and animal sectors have developed an epidemiological atlas of zoonotic diseases in Mongolia, 2011. The atlas contains approximately 50 maps that illustrate the distribution of major or rare and neglected zoonotic diseases. Every map contains key information about the infectious agent including: ICD-10 code, epidemiology, epizootiology, climate data, vegetation, transmission, incubation period, clinical findings, therapeutic options, and key references. In addition, the atlas includes population density, livestock density, antibiotic use, immunization coverage, and other relevant factors and will be regularly updated. It will be made available online by 2012. The use of GIS tools and geo-referenced, subnational level epidemiological data allowed the production of maps that improve spatial quality of previous maps. It was shown that diseases such as brucellosis, glanders, and bovine leucosis in animals have been introduced into previously unaffected areas by cattle movement. The atlas will lay the basis for novel, evidence-based methodologies to estimate the population at risk and burden of disease, ultimately leading to more targeted interventions. The atlas has also helped to streamline field data collection.

4 Coordinated Response to Emerging Zoonoses

Joint risk assessment and investigations have been conducted after cross-notification of outbreaks of foot-and-mouth disease, Newcastle disease, human and animal anthrax, rabies, and avian influenza in wild birds.

During outbreaks of anthrax, a rapid response team consisting of veterinarians, medical epidemiologist, inspectors and emergency officers, implemented quarantine and movement restrictions, and developed risk maps using GIS. Animal vaccinations, enhanced surveillance in the food market, and health education and communication activities has led to effective outbreak response. The subclinical, gastrointestinal form of anthrax was identified for the first time by the rapid response team.

Existing rapid response infrastructure has been improved into multisectoral joint rapid response teams that operate at the district and provincial levels; rapid response teams have been trained and established in 21 provinces.

Working together has made it possible to prevent zoonotic diseases, not merely to react to them once they have occurred. Laboratory integration, surveillance activities, and recognition of the importance of risk assessment have also increased.

5 Laboratory Cooperation

Under the APSED framework, communication and cooperation of veterinary and human health laboratories have increased significantly in the last 3 years. Laboratories share information, experience, diagnostic kits, laboratory specimens and lab equipment for surveillance, response, and research activities. Health laboratories have benefited from more advanced laboratory resources of veterinary laboratories, including personnel. During an unusual outbreak of human anthrax in 2011, the veterinary laboratory assisted in validating results and undertook confirmation tests. Subnational veterinary laboratories in all 21 provinces have been equipped with PCR equipment and reagents.

The veterinary laboratory also supported laboratory diagnosis of a rabies outbreak in Uvurkhangai province and in an unusual anthrax outbreak in Khovd province. Following annual serological surveys, the analysis of the laboratory findings was carried out jointly by laboratory staff from the veterinary and health laboratories, and the methodologies used in both sectors were reviewed and experiences shared.

As a result of human and animal sector collaboration, the diagnostic capacity of human health laboratories has been improved significantly. New advanced methods and techniques for isolation, identification, and confirmation of zoonotic viral and parasitic pathogens have been introduced at the national level. A number of commercially available diagnostic kits have been introduced for diagnosis at the NRCIDNF and the number of diseases diagnosed by molecular assays has increased to 17. Serological and molecular diagnostic tools have become available for the diagnosis of tick-borne encephalitis, Lyme disease, and Rickettsia which had previously been diagnosed only by clinical presentation. However, Hantavirus, West Nile virus, Japanese encephalitis virus, Crimean Congo hemorrhagic fever virus, dengue virus, and many others cannot be diagnosed due to technical limitations, and thus the true burden and epidemiology of these diseases in Mongolia is still unknown.

In addition to the collaboration with veterinary laboratories, training in advanced countries is seen as important for increase capacity at the laboratory diagnostic level. Since 2010, over 30 professionals have been trained in laboratory biosafety in Russian Federation, Kazakhstan, People's Republic of China, Germany, and Japan. Approximately 23 % of the trained lab professionals were from provincial veterinary and medical diagnostic laboratories.

As a result of collaborative molecular biology research with foreign colleagues from various countries including Russia, China, the USA, Germany, and Japan, various techniques such as Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR), duplex polymerase chain reaction (PCR), variable number tandem repeats (VNTR), multiple loci VNTR analysis (MLVA), have been introduced to research and diagnostic laboratories for animal and human diseases, and have determined unique and specific genes of *Y.pestis*, *B.anthraxis*, rabies virus, tick-borne encephalitis virus, and some species of Rickettsia. In addition,

Hantavirus, West Nile virus, Anaplasmosis, Erlichiosis, and Toxoplasmosis were newly identified using these techniques.

Several complications still exist that constrain sharing of resources between human and animal diagnostic laboratories and the biggest challenge for the Intersectoral Coordination Committee on Zoonoses will be to change the legal and ethical environment.

Mongolia is planning to establish a laboratory network between public health, clinical, veterinary, and food laboratories in 2012–2013.

6 Risk Communication

Lessons learned from managing previous outbreaks highlighted the importance of advocacy and public education. A communication and behavior change strategy was reviewed by the Coordinating Committee meeting in 2010. It emphasizes the need for advocacy and a public education campaign targeted at high-risk groups. A proactive approach in building effective communication with media was also stressed. Endemic zoonoses such as plague, anthrax, and vector-borne diseases occur regularly due to a lack of public awareness, and there is a high infectivity rate of brucellosis among herdsmen and veterinarians. Unsafe cultural traditions are widespread among the general population, such as consumption of raw milk, undercooked sheep liver, and sour cream made from raw milk. Public health education programs need to be aimed at specific community groups, school children, and occupational groups, taking into account culture, beliefs, traditions, educational level, social status, occupation, and age. An involvement of community and local government in health education through health education in schools and in the workplace has proved to be effective. Health messages on how to prevent infection with tick-borne diseases and the production of leaflets and posters were distributed before the tick season. In addition, a monthly press conference has been initiated by the MoH to ensure important public health messages are widely disseminated; the first press conference held on March 2011 advocated a One World, One Health approach to public health.

Regular awareness programs are conducted by State Veterinary and Animal Breeding Department, Institute of Veterinary Medicine, and the MoH through TV programs, brochures, video spots, cartoons for children, and press conferences.

Training materials and courses for risk reduction measures and interventions were developed for anthrax, plague, tick-borne diseases, brucellosis, and avian influenza collaboratively by animal and human health sectors. Joint staff training activities and short training courses on mosquito biology and surveillance, risk assessment of common zoonotic diseases, data management, database design, vector-borne diseases have been conducted for medical and zoonotic epidemiologists, biologists, laboratory staff, and meteorologists.

7 Collaborative Research

Tick-borne diseases such as tick-borne encephalitis, Lyme disease, and rickettsia are a growing concern in Mongolia, as their prevalence continues to increase with expansion into new areas. Pastoral animal husbandry, climate change, desertification, development of mining sector, new tick species, and vector distribution in Mongolia combine to create an important public health problem. To mitigate these risks, a Korean International Cooperation Agency (KOICA) funded project has supported vector surveillance, climatic monitoring and community education to high-risk population. This initiative is multisectoral, and is bringing together people with different backgrounds and sectors. At the regional level, emerging diseases surveillance and response (ESR) and malaria, vector-borne and parasitic disease (MVD) units are working together.

Climate change studies are complex and require multisectoral collaboration. Building on the achievements of the intersectoral coordination mechanism, a comprehensive surveillance system for vector-borne diseases has been established. Surveillance procedures have been developed for anaplasmosis, Q fever, tickborne encephalitis, tickborne boreliosis, rickettsia, and erlichiosis. Tick distribution and species are monitored in relation with microclimate and human infections. Erlichiosis and anaplasmosis, toxoplasmosis, and Crimean Congo hemorrhagic fever infections were identified for the first time in humans, and *Anaplasmosis platys* was identified for the first time in ticks. The veterinary laboratory is undertaking genetic studies on ticks.

Correlation of infected tick density with variations in human incidence and climate determinants has helped to identify factors associated with disease transmission. Risk maps on tick prevalence, density, biotype, climate data, and vegetation has provided useful public health information for early warning. Increased risk communication and staff training has resulted in improved protective behavior of the nomadic population.

8 International Partnership

The National Center for Zoonotic Diseases has established good collaboration and partnerships with many international organizations and institutions from various countries including China, Kazakhstan, Russia, Japan, Switzerland, the USA, and Germany. Epidemiologists interested in zoonoses have been cooperating with Chinese Academy of Inspection and Quarantine since 2007 on collaborative research directed at understanding the natural foci and the conditions affecting disease incidence each side of the border of both countries. This collaborative research has also enhanced laboratory capacity, including a substantial donation of virology laboratory equipment to the NCIDNF by the Chinese Academy of Inspection and Quarantine. The laboratory will be basis for conducting cross-border

surveillance, on-the-job training of laboratory staff, and confirmation of events and diseases of public health importance.

The NCIDNF conducts collaborative research on plague and tick-borne diseases with the Bundeswehr Institute of Microbiology of Munich. Both institutions carry out annual joint field investigations and expeditions. The results from these studies have been published and presented at an international zoonoses conference held in Mongolia. Extensive research and cross border surveillance of bacterial, parasitic, and viral diseases have been conducted in collaboration with Gamalei Institute of Epidemiology and Microbiology, and natural foci of leptospirosis, cryptosporidiosis, and toxoplasmosis have been detected for the first time in Mongolia.

Studies on the molecular biology of plague, tick-borne diseases, and other emerging diseases have been undertaken by veterinary and public health specialists with colleagues from the University of Florida. An important part of the collaboration with the University of Florida is a 'One Health' training program which started in 2011, and which attracted a number of staff members from the Institute of Veterinary Medicine and the MoH. It is hoped that the course may attract the US and international students. The curriculum will include studies in environmental health, modern laboratory techniques, epidemiology, biostatistics, food safety, climate change, GIS, toxicology, and zoonotic infections research.

9 Challenges and Lessons Learned

APSED has facilitated an intersectoral coordination mechanism between human health and other sectors. However, although ongoing risk assessments are conducted during outbreaks, there has been no comprehensive cross-sectoral risk assessment for all priority zoonoses. Evidence-based decision making and response, and utilization of risk assessment findings, need to be further improved. It has also been realized that an enabling legal environment is critical for effective control of zoonoses. The annual intersectoral simulation exercise has been a useful way to review response capability, and to update and revise the coordinated response guidelines. Subnational level planning and information sharing between veterinary and health epidemiologists, however, is still weak. At the local level, the involvement of the veterinary health departments is crucial for effective monitoring of instances of zoonotic disease in wild and domestic animals. There is also need to improve both the health laboratory capacity and in epidemiological capacity in the animal sector. During the annual review meeting in 2011, the need for developing and implementing a common monitoring and evaluation framework was highlighted, and poor coordination and confusion over roles and responsibilities among veterinary, health and inspection agencies on food safety, and import and export control need to be addressed.

Financial contribution is crucial for the success of zoonoses control in the country, so that effort from MOFALI and MOH is requested to have more efficient

way to raise the fund and harmonize international donor recourse, by drawing attention of potential donors for the activity in the zoonoses field.

We believe a good foundation has been established for a coordination mechanism between the veterinary and public health sectors, and the generic capacity for zoonoses control and prevention has improved considerably. In addition, the zoonoses coordination framework has attracted more resources from international partners and allowed pooling of resources. Thus while an important process has started, there is still much to do to reduce the risk of zoonotic diseases in Mongolia.

Editorial addition

Asia Pacific Strategy for Emerging Diseases (APSED) and its role in responding to zoonotic disease threats.

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APSED was developed in 2005 as a joint initiative by the South-East Asian (SEARO) and Western Pacific Regional Offices (WPRO) of the WHO to meet the challenges of emerging diseases that pose serious threats to regional and global health security (WHO 2005). APSED provided a common strategic framework for countries and areas of the two regions to strengthen their capacity to manage and respond to emerging diseases including epidemic-prone diseases, and to develop the capability to comply with the core capacity requirements of the new International Health Regulations (2005). It had the support of all 48 regional countries (11 in SEARO and 37 in WPRO), and thus represented countries with a combined population of 3.4 billion people, more than half of the world's population.

The development of APSED was greatly influenced by several major emerging zoonotic disease events in the Asia Pacific region, and especially by the emergence of severe acute respiratory syndrome (SARS) and highly pathogenic avian influenza H5N1 (HPAI), as well as the initial outbreak and continued recurrences of Nipah virus. During the first 5 years of the Strategy, the two regions experienced a number of infectious disease threats including the establishment of HPAI as an endemic disease, the rapid global spread of pandemic influenza H1N1 2009, and a large number of other acute events with significant public health impact. Taken together, these provided important lessons in pandemic response and demonstrated the need to further strengthen public health emergency preparedness and improve monitoring and evaluation.

APSED (2005) recognized that many emerging diseases were zoonoses, and that an important component of the Strategy was the development of plans to detect, manage, and respond to infectious diseases at the human-animal interface. During the first 5 years of the Strategy, a guide was developed in collaboration with colleagues from the World Organization for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO) entitled 'Zoonotic Diseases: A Guide to Establishing Collaboration between Animal and Human Health Sectors at the Country Level' to assist countries with their planning (WHO 2008).

Thus, considerable progress was made in the two regions toward strengthening core capacities needed to prevent, detect and respond to threats posed by emerging diseases, and has provided a good foundation for expanding the scope of APSED. This led to a Biregional Consultation to explore how to take the Strategy forward for the next 5 years, resulting in the development of APSED (2010) (WHO 2011). The new Strategy has expanded to eight focus areas, including zoonoses, with a strong statement recognizing the importance of zoonotic diseases and with an undertaking to continue working in collaboration with FAO and OIE and other partners ... ‘to contribute to the concept of “One Health”’, and acknowledging that reducing the risk of transmission of zoonotic diseases requires close collaboration between and links with the food safety, environment, and wildlife sectors. It also states that the experience and lessons learned with HPAI (H5N1) provide a good foundation to consolidate and strengthen national and regional coordination mechanisms for surveillance information-sharing and coordinated responses by human and animal health sectors.

In response to the Strategy, a number of countries in the regions have developed plans to coordinate and collaborate between their human and animal sectors, and in some instances, also their environmental sectors, through a ‘One Health’ approach. Mongolia is one such example, and the description of their plans and activities clearly demonstrate how they are building a sustainable and collaborative approach toward managing zoonotic diseases, and developing the capacity to diagnose and respond to new emerging disease threats—a good example of operationalising ‘One Health’ at the national level. Other examples are given in the chapters by Dr G Gongal and Dr B Coughlan.

References

- International Health Regulations (2005) World Health Organization, second edition, 2008, Switzerland
- WHO (2005) Asia Pacific strategy for emerging diseases. World Health Organization Regional Office for South-East Asia, New Delhi, and the Regional Office for the Western Pacific, Manila
- WHO (2008) Zoonotic diseases: a guide to establishing collaboration between animal and human health sectors at the country level. World Health Organization Regional Office for South-East Asia, New Delhi, and the Regional Office for the Western Pacific, Manila
- WHO (2011). Asia Pacific strategy for emerging diseases, 2010. World Health Organization Regional Office for South East Asia, New Delhi, and the Regional Office for the Western Pacific, Manila