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Report on Antimicrobial Resistance (AMR)

Executive Summary

Antimicrobial resistance (AMR) is a major global threat of increasing concern to human and animal health with implications for both food safety and food security and the economic well-being of millions of farming households around the world. Access to effective antimicrobials and their appropriate and prudent use has a role in productive and sustainable agriculture and aquaculture, and that their misuse contributes to the rising rates of antimicrobial resistance that negatively impacts the advances made in medicine, public health, veterinary care, food and agriculture production systems and food safety. The greatest burden from AMR is projected to occur in Africa and Asia where weak health systems, weak infrastructure, limited technical capacity, and higher prevalence of infectious diseases exist and where legislation, regulatory surveillance and monitoring systems on the use of antimicrobials are inadequate. At the 41st Session of the FAO Conference, member countries adopted resolution 6/2019 reaffirming the global commitment to addressing the growing threat of AMR in all countries through a coordinated, multisectoral One Health approach. In this context, FAO works closely with its international partners in a tripartite initiative with the World Health Organization (WHO) and the World Organisation for Animal Health (OIE), as well as with other partners (private sector, academia, civil society, financial institutions). It recognizes that a collaborative approach between different sectors, and both political and economic entities and disciplines, is essential in order to address AMR effectively. To support the implementation of FAO resolution 6/2019, the FAO Action Plan on Antimicrobial Resistance (2016-2020) assists member countries to develop and implement multisector National Action Plans to combat AMR. The FAO Animal Health Team in Asia is strategically addressing this global issue in the region through collaboration with partner organizations and governments to reduce the threat of AMR and ensure the availability and continued effective use of antimicrobials in agriculture production and food systems.

Suggested action by the Regional Conference

- Recognize the importance of addressing the growing global threat of AMR through a coordinated, multisectoral, One Health approach;

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- acknowledge that access to effective antimicrobials and their appropriate and prudent use has a role in productive and sustainable agriculture and aquaculture and that their misuse contributes to the rising rates of AMR;
- support FAO Conference resolution 6/2019 and the FAO Action Plan on Antimicrobial Resistance (2016-2020), including in the development and implementation of integrated National Action Plans on AMR;
- identify gaps and support FAO's activities to raise awareness on AMR, develop regulations and policies to promote antimicrobial stewardship, improve AMR and antimicrobial use (AMU) surveillance, and develop and promote good animal husbandry and agriculture practices;
- provide guidance on enhancing AMR resource mobilization and project implementation and interagency cooperation.

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Introduction

1. Antimicrobials are natural or synthetic substances that kill or inhibit the growth of micro-organisms without harming the host. They are most commonly used to prevent or treat diseases and infections due to micro-organisms, such as bacteria (antibacterial), fungi (antifungal), viruses (antiviral), parasites (antiparasitic or anthelmintic) and protozoa (antiprotozoal). They contribute to food security, food safety and animal welfare, and in turn, to the protection of livelihoods and the sustainability of animal and crop production. However, over time, bacteria and other micro-organisms can develop resistance to antimicrobials. Antimicrobial resistance (AMR) refers to micro-organisms, bacteria, fungi, viruses and parasites, that have acquired resistance to antimicrobials. While this phenomenon can occur naturally through microbial adaptation to the environment, it is accelerated by the misuse and overuse of antimicrobials (e.g. as growth promoters), and can negatively affect the health of humans, animals and plants as well as the environment.
2. Addressing AMR for a global, coordinated and multisectoral response combined at the national level with concerted actions that span the policy and regulatory spheres, preventive actions and engagement with producers and other food value chain actors. Resistant bacteria in humans, animals or the environment may spread from one micro-organism to another, and from one country to another. Resistant micro-organisms or the genes responsible for resistance do not recognize geographic or human/animal borders.
3. The Political Declaration of the High-Level Meeting of the UN General Assembly on Antimicrobial Resistance in 2016, (resolution A/RES/71/3) recognized AMR as a global priority health issue, only the fourth time a global health issue was addressed by the United Nations' Governing Body.
4. Recognizing the importance of addressing AMR in all countries through a coordinated One Health approach, FAO, in close collaboration with the World Health Organization, the World Organisation for Animal Health (OIE) and the UN Environment Programme, is working to mitigate AMR, especially in the food and agriculture sectors. It is assisting member countries in developing their National Action Plans and implementing innovative public awareness and surveillance approaches in livestock production, aquaculture and crop farming. FAO in Asia is strategically addressing this global issue in the region to reduce the threat of AMR and ensure the availability and continued effective use of antimicrobials in agriculture and in the promotion of sustainable safe food systems.

Costs of AMR

5. The emergence and spread of AMR is now recognized as one of the major global threats posing a risk to human and animal health, sustainable agriculture, food safety and the environment. In 2016, it was estimated that unless action is taken, the annual burden of human deaths from AMR could reach USD 10 million by 2050.¹ Simulations by the World Bank found that in the optimistic case of low AMR impacts, annual global gross domestic product (GDP) would likely fall by 1.1 percent by 2050, relative to a base-case scenario with no AMR effects.² The GDP shortfall would exceed USD 1 trillion

¹ O'Neill, J. 2016. Tackling drug-resistant infections globally: final report and recommendations. The review on antimicrobial resistance. Available at: [http://amr-review.org/sites/default/files/160525_Final percent20paper with percent20cover.pdf](http://amr-review.org/sites/default/files/160525_Final%20paper%20cover.pdf)

² Adeyi, Olusoji O.; Baris, Enis; Jonas, Olga B.; Irwin, Alec; Berthe, Franck Cesar Jean; Le Gall, Francois G.; Marquez, Patricio V.; Nikolic, Irina Aleksandra; Plante, Caroline Aurelie; Schneidman, Miriam; Shriber, Donald Edward; Thiebaud, Alessia. 2017. *Drug-resistant infections: a threat to our economic future (Vol. 2): final report (English)*. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/323311493396993758/final-report>

annually after 2030. In the high AMR-impact scenario, the world would lose 3.8 percent of its annual GDP by 2050, with an annual shortfall of USD 3.4 trillion by 2030. Moreover, it was estimated that low-income countries would experience larger drops in economic growth than wealthy countries, resulting in further increases in economic inequality. The differential impacts on GDP result from higher infectious disease prevalence and greater dependence on labour incomes in countries with lower per capita income. The greatest impact of this foreseen burden is projected to occur in Africa and Asia (O'Neill, 2014; World Bank Group, 2017) where vulnerabilities stem from multiple factors including weak health systems, weak infrastructure, limited technical capacity, higher prevalence of infectious diseases, and proliferation of substandard antibiotics and diagnostics. The risk appears particularly high in countries where legislation, regulatory surveillance and monitoring systems on the use of antimicrobials and the prevention and control of AMR, are weak or inadequate (FAO, 2016). Despite progress made in recent years in some countries, some challenges remain such as:

- a. Limited data on antimicrobial use (AMU) and on the burden of AMR in livestock and aquaculture.
- b. The absence of long-term funding commitments.
- c. The problem of enforcing regulations and/or monitoring AMU in agriculture and aquaculture in some countries.

6. Asia is a hotspot for the emergence and spread of AMR because of the growing population and greater disposable income, both of which are driving an unprecedented rise in demand for animal-source foods. The growth of aquaculture, pig and poultry sectors places huge pressure on livestock and fish producers (who rely heavily on antimicrobials) to satisfy both a growing domestic demand and exports.

7. There has been a developing controversy surrounding the use of antibiotics as growth promoters for food animals. These drugs are used at low doses in animal feeds and are considered to improve the quality of the product, with a lower percentage of fat and higher protein content in the meat. However, use of any antibiotic is associated with the selection of resistance in pathogenic bacteria, and it has been argued that the use of antibiotic growth-promoters imposes selection pressure for bacteria that are resistant to antibiotics that may be used in clinical or veterinary practice, thus compromising the continued use of antimicrobial chemotherapy. FAO has been at the forefront in discussions about phasing out growth promoters, in close collaboration with the private sector and governments.

The Global Action Plan on AMR

8. The Global Action Plan on Antimicrobial Resistance (GAP-AMR) was developed by the World Health Organization (WHO) in collaboration with FAO and the World Organisation for Animal Health (OIE) and was subsequently adopted at the 68th World Health Assembly in May 2015, further endorsed at the 83rd World Assembly of the OIE Delegates in May 2015 and the 39th Session of the FAO Conference in June 2015. It has since spurred and catalysed progress in addressing AMR globally. It calls on the human and animal health sectors of all member countries to improve awareness and understanding of AMR, strengthen knowledge and evidence through surveillance and research, reduce the need for antimicrobials by reducing the incidence of infection through enhanced biosecurity at the farm level, and prevent disease through vaccination and improved animal husbandry practices to optimize the use of antimicrobial medicines in human and animal health. The development of the economic case for sustainable investment must take into account the needs of all countries and increase investment in new medicines, diagnostic tools, vaccines and other interventions.

The FAO Action Plan on AMR (2016-2020)

9. The 41st Session of the FAO Conference (June 2019) adopted resolution 6/2019 reaffirming the global commitment to addressing the growing global threat of AMR. This further supports resolution 4/2015, adopted at the 39th Session of the FAO Conference (June 2015) which recognized that AMR

poses an increasingly serious threat to global public health and sustainable food production, and that an effective response should involve all sectors of government and society.

10. To support the implementation of resolutions 6/2019 and 4/2015, the FAO Action Plan on AMR (2016-2020) addresses AMR in four major focus areas:

- a. Improve awareness on AMR and related threats.
- b. Develop capacity for surveillance and monitoring of AMR and AMU in food and agriculture.
- c. Strengthen governance related to AMR and AMU in food and agriculture.
- d. Promote good practices in food and agricultural systems and the prudent use of antimicrobials.

11. This Action Plan supports the GAP-AMR in highlighting the necessity of adopting a One Health³ approach, with the involvement of public health and veterinary authorities, the food and agriculture sectors, financial planners, environmental specialists and consumers. The objective is to assist FAO Members to develop and implement multisector National Action Plans to combat AMR. In Asia, the implementation of this global FAO Action Plan rests on the different sections of the FAO Regional Office for Asia and the Pacific (FAO RAP). This involves teams from Nutrition and Food Safety, Fisheries, Plant Production and Protection and Animal Production and Health, which includes the regular programme activities as well as the extrabudgetary sources that support FAO's Emergency Centre for Transboundary Animal Diseases (ECTAD). Guided by the FAO Action Plan, and supported by various funding partners, key initiatives have been taken by FAO across the Asia and the Pacific region (see Box 1 for funding sources for AMR initiatives in Asia).

Box 1 Funding sources for AMR initiatives in Asia

The United States Agency for International Development (USAID) supports **OSRO/RAS/502/USA** (*“Addressing Antimicrobial Usage in Asia’s Livestock, Aquaculture and Crop Production Systems”*) which started in 2015 and will conclude by the end of 2019. This is a regional AMR project, with a few select countries where proof of concept of some regional interventions are initially tested. In addition to this project specific to AMR, other USAID projects such as OSRO/RAS/402/USA and OSRO/RAS/505/USA also supported some related initiatives.

The Fleming Fund is a global project on AMR funded by the Government of the United Kingdom of Great Britain and Northern Ireland (GCP/GLO/710/UK, *“Engaging the food and agriculture sectors in sub-Saharan Africa and South and Southeast Asia”*). This has a limited regional component, which primarily serves to coordinate the initiatives in Asia. Most of the funding goes directly to its

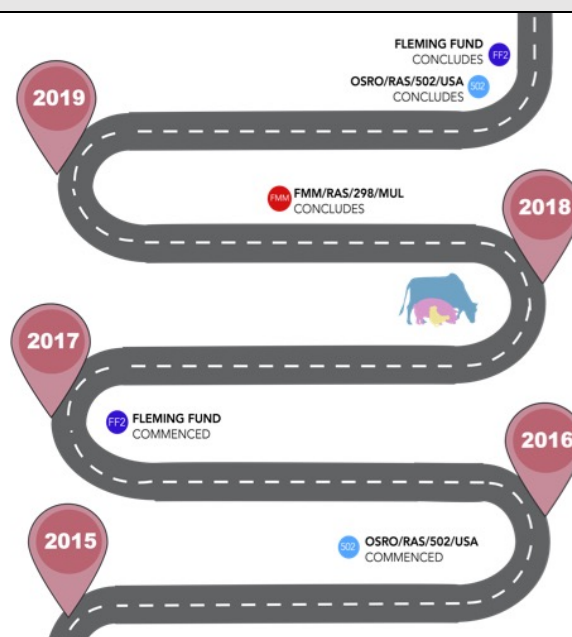


Fig 1. AMR Projects at the FAO Regional Office for Asia and the Pacific (2015-2019)

³ One Health is an integrated approach to prevent and mitigate health threats at the animal-human-plant-ecosystem interfaces to achieve public health, food and nutrition security, sustainable ecosystems and fair trade facilitation. One Health seeks to design and implement programmes, policies, legislation and research in which multiple sectors communicate and coordinate to achieve better public health outcomes.

five pilot countries that handle the implementation on the ground: Bangladesh, Cambodia, the Lao People's Democratic Republic, the Philippines and Viet Nam. Phase 2 has been extended until September 2020, and Phase 3 is currently being developed.

Another FAO Project that operated in the region but was managed at the global level was **FMM/RAS/298/MUL (“Strengthening capacities, policies and national action plans on prudent and responsible use of antimicrobials in fisheries”)** (aquatic animal health and aquaculture component). This project was specific to AMR mitigation in aquaculture, and it closed in early 2018.

Tripartite collaboration

12. FAO, OIE and WHO have been working closely under the tripartite collaboration mechanism for several decades. At the regional level, there is also close collaboration across the Regional Offices of the three international organizations: FAO RAP, OIE Regional Representation for Asia and the Pacific and Subregional Representation for Southeast Asia, WHO Southeast Asia Regional Office and WHO Western Pacific Regional Office.

13. In May 2018, a tripartite Memorandum of Understanding (MoU) was signed to formalize and strengthen cooperation. FAO, OIE and WHO recognize that addressing health risks at the animal-human-environment interface requires strong partnerships among players who may have different priorities and resource levels. Besides zoonotic diseases and food safety issues, AMR is a priority for the three organizations at global, regional and national levels. In order to assure the inclusion of the environment sectors while addressing AMR, closer collaboration with the United Nations Environment Programme (UNEP) has been established.

The United Nations’ resolution on AMR

In September 2016, during a high-level meeting convened by the President of the UNGA during the 71st General Debate, United Nations’ Member States adopted a political declaration on AMR. If no action is taken, AMR will negatively affect the achievement of the Sustainable Development Goals. The ad hoc Interagency Coordination Group (IACG) on Antimicrobial Resistance was convened by the United Nations Secretary-General in March 2017, which included several United Nations’ and intergovernmental agencies and global specialists. FAO, OIE and WHO formed part of the IACG and, in June 2019, established a Joint Tripartite Secretariat on AMR and a Multipartner Trust Fund to support global, regional and country action.

14. The environmental sector has to date not been sufficiently involved, although antimicrobial residues and antimicrobial resistant bacteria are found in surface water, soil, animal and human waste streams and foods of plant origin. Surveillance and further testing are needed for comprehensive risk assessments and to

monitor progress in reducing environmental contamination. Filling critical research gaps will enable the development of new treatment technologies and mitigation strategies to limit environmental contamination by antimicrobial residues and antimicrobial resistant organisms. There is increasing recognition that protecting the environment is the responsibility of a wide and diverse group of stakeholders.

15. In April 2019, FAO, OIE and WHO jointly organized the Eighth Asia Pacific workshop on multisectoral collaboration at the animal-human-ecosystems interface in Bangkok, Thailand. The event was attended by 142 participants including representatives from national governments of 28 countries

in the Asia and the Pacific region, regional organizations, academic institutions, experts and development partners working on human health, animal health and wildlife issues.⁴

Regional activities on AMR

16. Tapping into available resources in the region, FAO has taken a programmatic approach. During 2019, FAO's work in Asia took stock of the progress made in all relevant initiatives to date. The work of FAO's regional and country offices has led to the development and application of various tools, guidance documents, interventions and platforms to assess and address specific areas of need regarding awareness, surveillance, governance and good practices. While this effort clearly underscored the successes of the FAO AMR team in the region, it also highlighted that much remains to be done to ensure that the shared global vision on AMR mitigation is reinforced and secured in the region in line with the four focus areas defined in the FAO AMR action plan:

Focus area 1: Awareness-raising

17. FAO's regional and country activities centered on developing key communication materials, conducting education and training, implementing communication and advocacy campaigns, conducting social media campaigns and monitoring evaluation research. FAO's work on animal health throughout Asia played an active part in supporting the annual celebration of World Antibiotic Awareness Week (WAAW) in November 2019.⁵ WAAW is a global campaign to promote prudent use of antimicrobials, such as antibiotics, and raise global awareness of AMR or antibiotic resistance. The WAAW Campaign in 2018 carried the slogan "Handle antibiotics with care." At the FAO Regional Office for Asia and the Pacific in Bangkok, FAO marked the start of WAAW with its tripartite partners, UNEP and representatives from the Government of the Kingdom of Thailand, universities and the private sector to share the latest developments about the regional campaign and the latest AMR publications. Countries welcomed technical guidance and trainings at the community level, personalized motivational testimonial videos, and FAO's contributions to regional and national continuing professional education meetings and conferences.

Focus area 2: Surveillance

18. More than half of FAO's AMR activities in Asia contribute to this focus area. It is notable that FAO's efforts in the region have successfully contributed to catalysing the initiation and/or improvement of AMR surveillance in food and agriculture in Bangladesh, Cambodia, India, Indonesia, the Lao People's Democratic Republic, the Philippines and Viet Nam. Some of these activities have been adapted and will now be operationally funded by the country's government or continued by other broader initiatives. Other activities supported better understanding of AMU in food and agriculture through mapping, studies, research and sharing knowledge and information. FAO has also substantially contributed to enhancing laboratory capacity on AMR and residue monitoring through development of the FAO Assessment Tool for Laboratories and AMR Surveillance Systems (ATLASS). The tool enables assessment and definition of targets to improve national AMR surveillance systems in the food and agriculture sectors. It is composed of two modules: the surveillance module and the laboratory module. The tool was first piloted in 2016, and from 2016 to 2018, 19 countries hosted FAO-ATLASS assessment missions. FAO is also building a worldwide community of assessors to serve as a technical resource to support harmonized regional and global surveillance efforts, improvement of laboratories and capacities, understanding of laboratory needs for improved AMR/residue detection and trend monitoring, and capacity-strengthening of national staff.

19. FAO Regional and Country Offices are progressively improving AMR surveillance in food and agriculture in Asia through initiatives aimed to develop tools and materials in support of AMR/AMU monitoring and surveillance and to promote One Health and partnerships. Regional AMR surveillance guidelines are being finalized for healthy animals, diseased animals and aquatic species based on standards/guidelines developed by various reference organizations and advisory bodies, including the

⁴ <http://www.fao.org/3/ca6059en/ca6059en.pdf>

⁵ <http://www.fao.org/asiapacific/events/detail-events/en/c/1523/>

Clinical and Laboratory Standards Institute, Codex and OIE. One country (Bangladesh) has developed an AMU guideline for poultry and humans and is simultaneously developing an electronic version of these guidelines (using a mobile application called Spectrum) to be used by veterinarians and medical practitioners trained to use AMU guidelines and prudent principles. The functionality (i.e. data interface development) of this app will allow linkages of diagnoses and clinical data (antibiogram)⁶ and is also being considered for its utility in collecting farm-level AMU.

20. In November 2019, FAO designated the Department of Veterinary Public Health, Faculty of Veterinary Science, Chulalongkorn University in Thailand the first ever AMR Reference Centre in the Asia-Pacific region and the second to be designated as such globally, and will further contribute significantly to multisectoral efforts to address AMR.

Focus area 3: Governance

21. Eleven FAO country offices actively contributed to developing AMR governance in the respective countries by providing support for improved policy- and decision-making. An AMU/AMR Technical Advisory Group for Southeast Asia enables access to regional and international advice related to AMU and AMR. Joint mapping of FAO-OIE initiatives ensures complementarity of antimicrobial-related projects/activities in the animal health sector within the region. The FAO-OIE Network of Reference and Collaborating Centers on AMR promotes access to higher-level, broader technical resources. FAO has further developed and published an AMR policy review and framework. FAO country teams continuously engage diverse groups, including researchers, policy-makers and industry stakeholders (e.g. veterinarians, producers, pharmaceutical industries), through knowledge-exchange fora and workshops to collaboratively identify the needs and priorities of the country in mitigating the food safety and public health risks associated with AMR.

22. Legal reviews, based on FAO's guidance document for national legal consultants, have helped identify gaps and recommendations to strengthen legislation to curb inappropriate use of antimicrobials and AMR, particularly in Bangladesh, Lao People's Democratic Republic, the Philippines and Viet Nam.

23. Ongoing collaborative work focuses on implementing national action plans and multisectoral action plans or finalizing and preparing them for government endorsement. Expansion of One Health AMR initiatives by fisheries, plants and the environment sectors are forthcoming.

Focus area 4: Good practices

24. The FAO Animal Health Team in Asia responds to technical guidance requests from countries regarding good practices in food and agriculture production, and these contribute extensively to promoting biosecurity, good animal husbandry practices and other measures that support prudent use of antimicrobials throughout the food chain. Knowledge, Attitude and Practices studies are developed under the guidance of FAO in target countries to enhance on-farm biosecurity, good production practices and prudent AMU. National programmes on good animal husbandry practices need to be explored as platforms for the potential inclusion of prudent AMU and good production practices for farm-level AMU data collection. At FAO, the development of disease management guidelines for poultry and swine and farm-level assessment tools are planned for 2020.

Conclusion

25. The FAO Animal Health Team in Asia will continue its regional programmatic approach to address AMR in food and agriculture, taking the evolving regional context into consideration and ensuring that other sectors and disciplines (e.g. crop, environment, economic and social development) contribute to expanding a One Health approach and become actively engaged in mitigating the risks and effects of AMR. The outbreaks of African Swine Fever (ASF) in countries in Asia (e.g. Cambodia, China, the Lao People's Democratic Republic and Viet Nam) have huge consequences

⁶ Antibiogram is defined as the profile of the antimicrobial resistance and susceptibility of a particular micro-organism.

for animal production in the region and also require more biosecured animal husbandry practices which impact AMU and AMR. The development of alternatives to antimicrobials is also a rapidly advancing area; however, further scientific evidence is needed. Promoting a One Health approach and collaborating closely with the Tripartite Initiative (FAO/WHO/OIE) and partners, the next phase of FAO's work in the Asia and the Pacific region will integrate lessons learned and will leverage tools and mechanisms to support governments, producers, traders and other stakeholders to move towards the responsible use of antimicrobials in food and agriculture in order to reduce AMR.