



AMR containment: snapshot of global efforts

Pan-Africa Workshop on Effective Implementation of National Action Plan on Antimicrobial Resistance

January 22-24, 2020

Lusaka, Zambia

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Centre for Science and Environment, New Delhi, India

- **A public interest research and advocacy organisation based in New Delhi, India**
 - It researches into, lobbies for and communicates the urgency of development that is both sustainable and equitable
 - Helped shape policies and build public awareness to bring change for over three decades
 - Is recognized for its role in capacitating public institutions and regulatory agencies
 - Plays an important role of think tank that articulates the perspectives and policies of the global south



Modalities adopted

Research and advocacy

Clean Air and Sustainable Mobility
Climate Change
Environment Education
Food Safety and Toxins
Renewable Energy
Sustainable Water Management and Sanitation
Sustainable Industrialization
Sustainable Buildings and Habitat

Pollution monitoring

- **Pollution Monitoring Laboratory (PML)** generates evidence through monitoring environment pollution and food contamination
- **Independent information in public domain for ecological security**

Communication for awareness

Down To Earth:

- English fortnightly on environment and development issues since 28 years
- Hindi (national language) monthly editions

India Environmental Portal :

- One stop shop for open access information on environment

Education and Training

- Building capacities across stakeholders from India and the developing world
- About **20 thousand trained in 10 years (~25% International)**
- **Dedicated residential training centre at Nimli, Rajasthan**



Anil Agarwal Environment Training Institute

Nimli Village in Rajasthan (~100 kms from Delhi)



- A **learning, innovation and training centre**, designed to find appropriate and affordable solutions to some of the most pressing environmental problems of developing countries; About **50 week-long trainings conducted in a year**
- **Water positive, energy efficient, zero-waste campus**



Lab studies conducted

FOOD

2003: Pesticide residues in bottled water

2003 & 2006: Pesticides in soft drinks

2009: Transfats in edible oil

2010: Antibiotics in honey

2011: Caffeine in energy drinks

2012: Nutritional analysis of junk food

2014: Antibiotic residues in chicken meat

2016: Potassium bromate/iodate in bread

2018: Genetically modified processed foods in India

2019: Salt, total fat, trans fat and carbohydrates in junk food

CONSUMER PRODUCTS

2009: Lead in paints

2010: Pthalates in toys

2014: Heavy metals in cosmetics

ENVIRONMENT

2001: Endosulphan poisoning

2005: Pesticides in the blood of Punjab cotton farmers

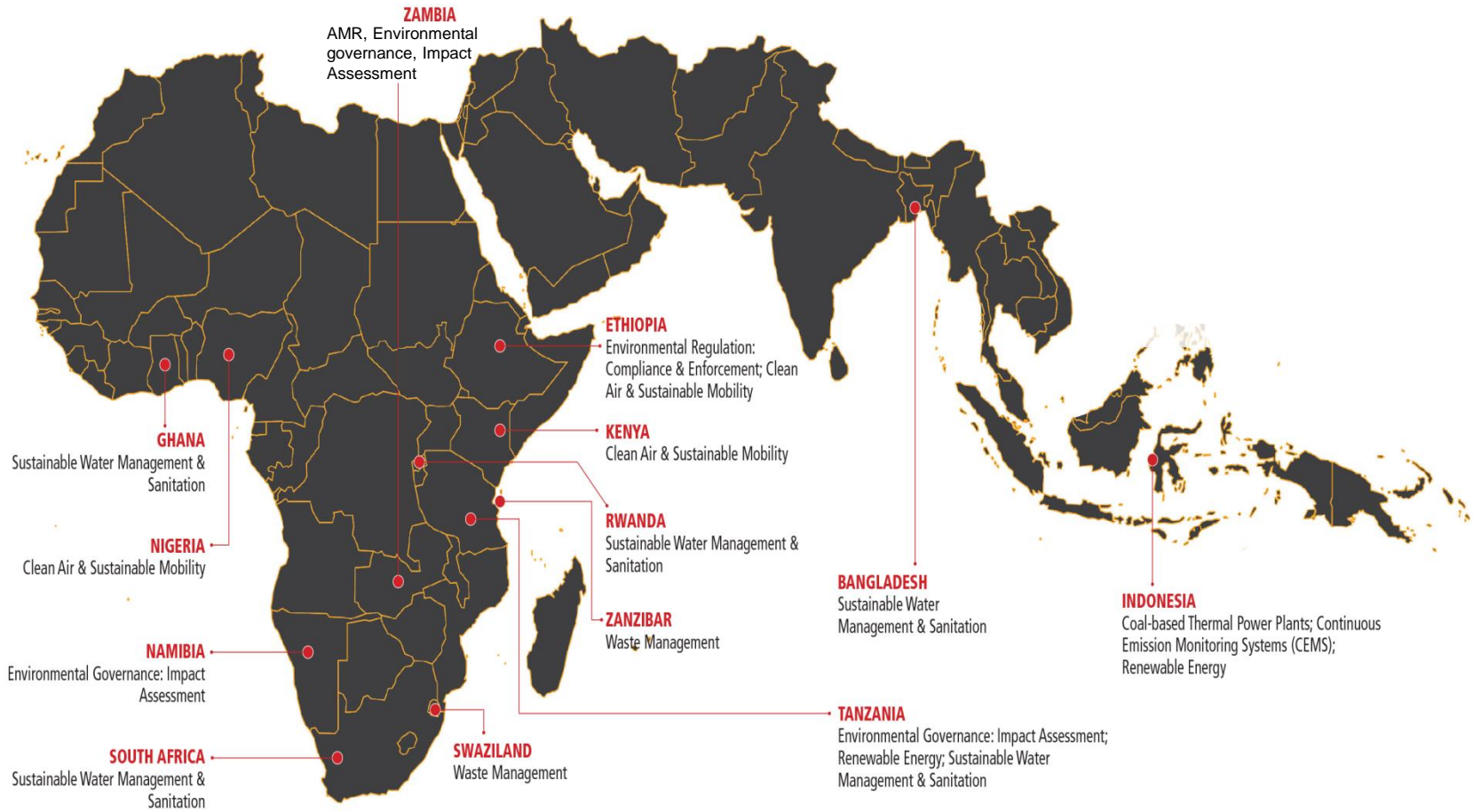
2009: Ground water contamination in and around UCIL, Bhopal

2012: Mercury poisoning in Sonbhadra, UP

2017: Antibiotic resistance in poultry environment



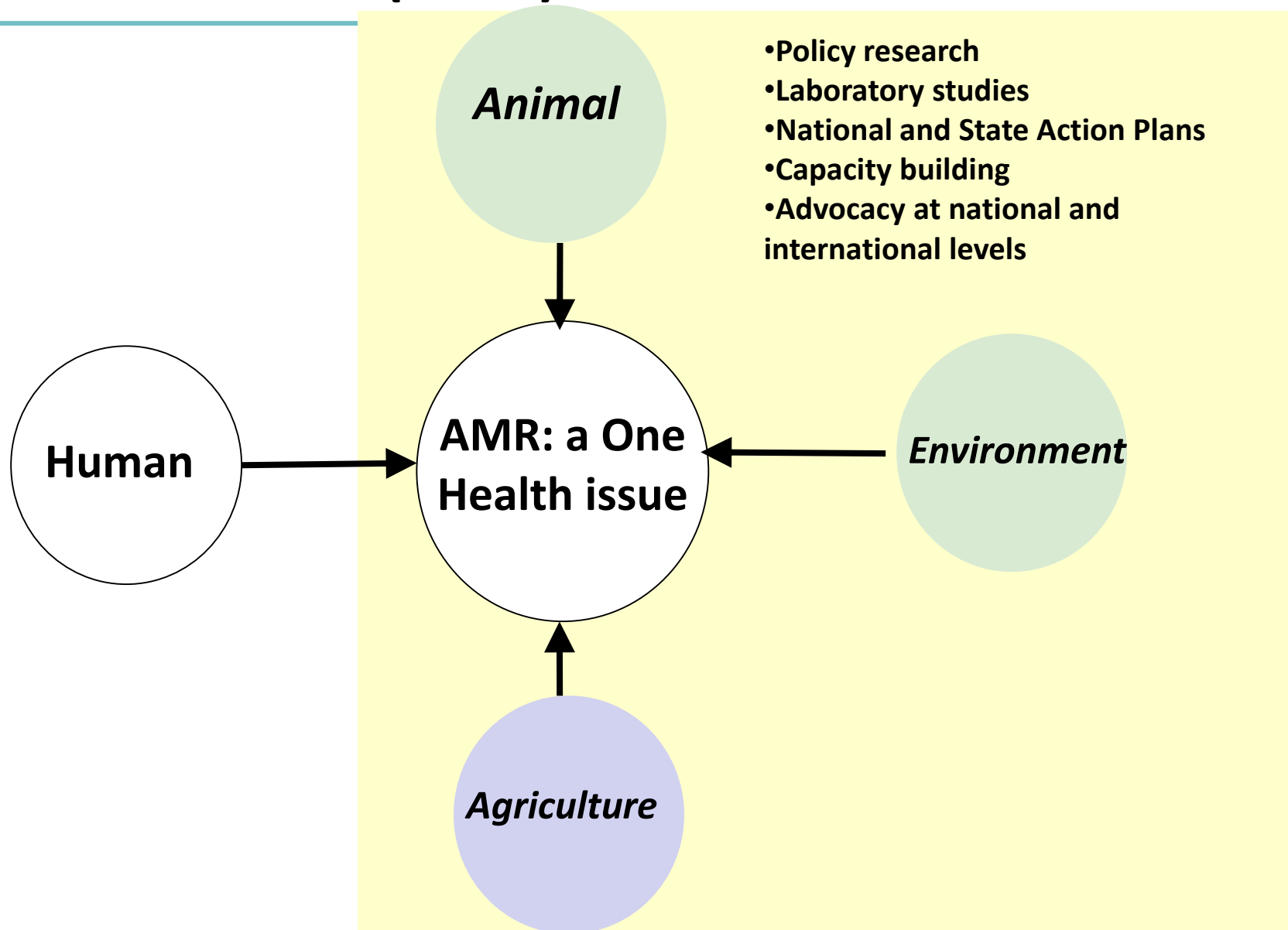
CSE's engagement in Africa and South-Asia



CSE programmes presently work in 13 countries in Africa and Asia



CSE's focus areas w.r.t Antimicrobial Resistance (AMR)





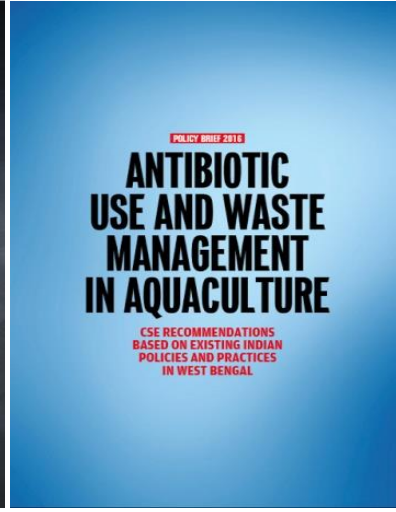
AMR related reports: India



2010



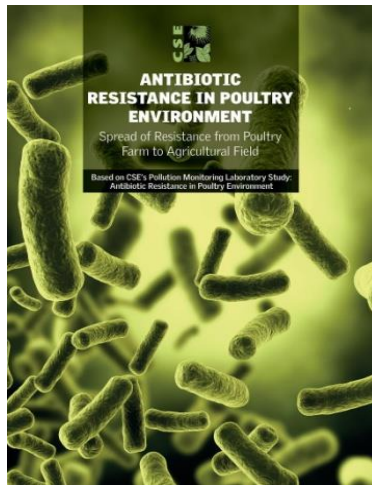
2014



2016



2017



2017



2017



2017-19



2019



2019



AMR related reports: global

NATIONAL ACTION PLANS ON ANTIMICROBIAL RESISTANCE: NEED FOR GREATER FOCUS ON ENVIRONMENTAL SPREAD

Antimicrobial resistance (AMR) arises when microorganisms such as bacteria become resistant to drugs that would normally kill them or stop their growth. AMR is globally recognized as an emerging public-health threat as antibiotic use is becoming increasingly ineffective against disease-causing bacteria. AMR is linked with greater spread of infectious diseases, difficulty in treating common infections, uncertainty in success of high-risk therapeutic procedures, longer hospital stays, and more expensive treatments. If not contained, AMR is expected to cause significant impacts on the health of humans, animals and the environment.

Resilient systems of antibiotics in humans, AMR (antibiotic resistance in particular) in bacteria to antibiotics and spread by nature and spread of antibiotics to various both terrestrial and aquatic animals for food. Initiatives are needed to lead to more effective programs such as: promote prevention and disease prevention, specifically in intensive food production systems. Other than food and direct contact, transmission is a key route for spread of AMR. Waste from livestock and aquaculture farms is considered an important route for spread of antibiotics and resistant bacteria into the larger environment. Other routes for environmental spread include waste from pharmaceutical industry and healthcare settings.

Global Action Plan on AMR

There has been an increase in the awareness across the world to address the threat from using AMR. In 2015, the World Health Organization (WHO) adopted the "Global Action Plan on Antimicrobial Resistance". The Plan calls for a coordinated, multi-sectoral approach under the strategic objective and undertakes the need to limit emergence and spread of AMR through antibiotic use in humans, animals, and the agriculture sector. GAP emphasizes the need for an effective One Health approach through cross-sectoral coordination among multiple stakeholders. Recognizing the need for national awareness, GAP calls for member states to develop a National Action Plan by mid-2017. WHO is engaged in a dialogue with the Food and Agriculture Organization of the United Nations (FAO) and the World Organization for Animal Health (OIE) to support implementation of the WHO-led GAP. The key strategic objectives outlined in GAP are:

- Improve awareness and understanding of antimicrobial resistance through effective communication, education and training
- Strengthen the knowledge and evidence base through surveillance and research
- Reduce the incidence of infections through effective sanitation, hygiene and infection prevention measures
- Optimize the use of antimicrobials in humans and animals health
- Develop the evidence base for sustainable treatment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions.

Additionally, in September 2016, the FAO released its "Action Plan on Antimicrobial Resistance 2016-2030" aimed at supporting the food and agricultural sector in implementing GAP. The Plan identifies four focus areas: namely, awareness, evidence, governance and practice. It supports WHO-led GAP in highlighting the necessity of adopting a "One Health" approach.

Need for greater global guidance in containing the environmental spread of AMR

AMR has been recognized as a "One Health" issue encompassing humans, animals, agriculture and the environment. While this tripartite has reflected on the importance of containing AMR spread, the environmental aspect demands much greater attention and attention in terms of how countries are to move ahead specifically in view of growing evidence of environmental spread, time, the nature and quality of the issue demands an active involvement of a global environmental organization, preferably of the United Nations.

1. http://www.who.int/antimicrobials/global_action_plan.pdf
 2. <http://www.fao.org/antimicrobials/>

2016

STRATEGIC AND OPERATIONAL GUIDANCE ON ANIMAL AND ENVIRONMENTAL ASPECTS

NATIONAL ACTION PLANS ON ANTIMICROBIAL RESISTANCE FOR DEVELOPING COUNTRIES

JANUARY 2017

2016-17

PRIORITIZED ACTIVITIES OF ZAMBIA'S MULTI-SECTORAL NATIONAL ACTION PLAN ON ANTIMICROBIAL RESISTANCE

August 2019

2019

BASELINE INFORMATION FOR INTEGRATED ANTIMICROBIAL RESISTANCE SURVEILLANCE IN ZAMBIA

January 2020

2020

ZAMBIA'S INTEGRATED ANTIMICROBIAL RESISTANCE SURVEILLANCE FRAMEWORK

January 2020

2020

ROADMAP TO PHASE OUT NON-THERAPEUTIC ANTIBIOTIC USE AND CRITICALLY IMPORTANT ANTIBIOTICS IN FOOD-ANIMALS IN ZAMBIA

January 2020

2020



CSE's engagement with Ministry of Health Zambia

- **January, 2018**
 - CSE invites Ministry of Health, Zambia to participate in Africa-Asia Workshop on Implementation of NAP-AMR
- **March-May, 2018**
 - CSE offers to collaborate with Ministry of Health, Zambia to support the implementation of Zambia's Multi-sectoral NAP-AMR. Offer agreed upon
- **October, 2018**
 - MoU between ZNPHI-CSE signed
- **August, 2018 - January 2020**
 - ZNPHI-CSE co-organize four workshops aimed at helping the implementation of Zambia's MAP-AMR



Major global efforts to contain AMR

Global guidance



Global Action Plan on AMR, 2015



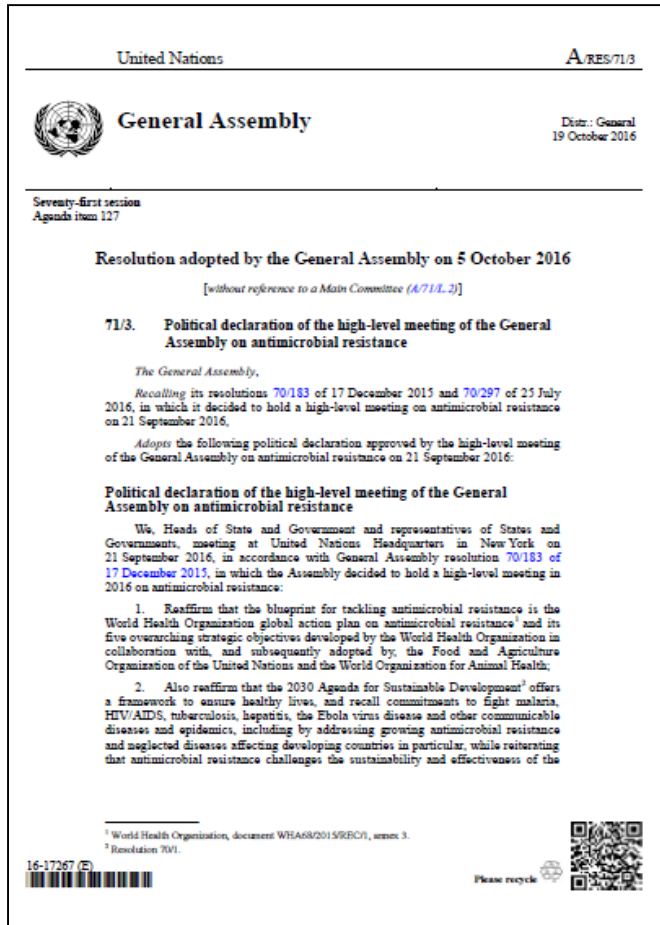
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- **Endorsed** at the **68th World Health Assembly** in 2015
- Outlines **five strategic objectives** to address AMR
 - Awareness and understanding
 - Surveillance and research
 - Infection prevention through sanitation, hygiene
 - Optimized use of antimicrobials
 - Economic case for sustainable investment
- Called for countries to develop their own **National Action Plans on AMR**

- **Beginning of global momentum on NAPs**
- **Greater focus on human and animal aspect of AMR as compared to the environment sector**



United Nations high-level meeting on AMR, 2016

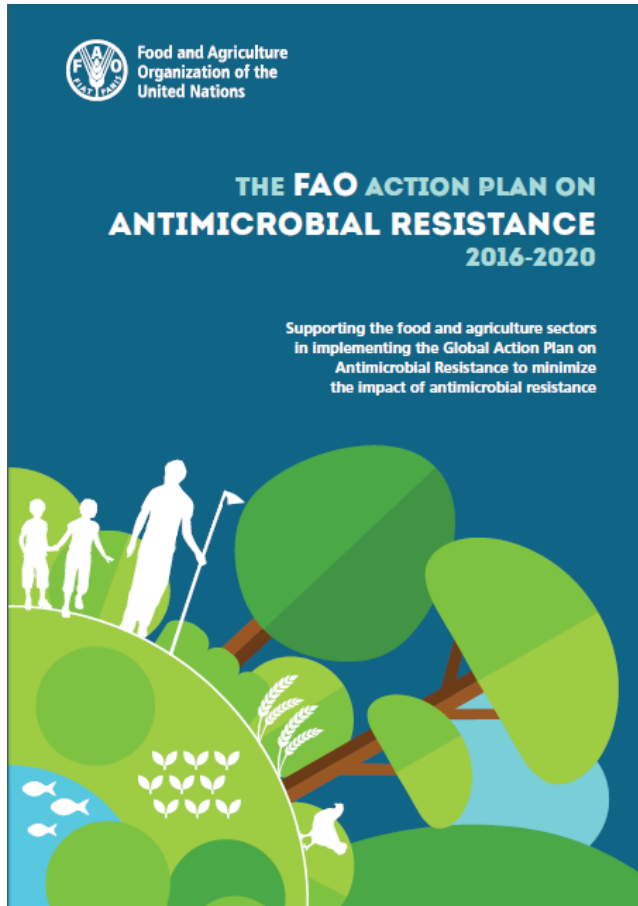


- AMR only health topic to be discussed **fourth time in the history** of United Nations General Assembly (HIV, NCDs and Ebola were others)
- **Political Declaration of the High-Level Meeting of the General Assembly on AMR adopted**
- **Interagency Coordination Group (IACG) on AMR** conceived to provide practical guidance for sustained effective global action to address AMR

[Link to document](#)

AMR issue receives global attention and highest level of political commitment

The FAO Action Plan on AMR, 2016



[Link to document](#)

- **Resolution on AMR** at 39th Session of the FAO Conference in June 2015
- FAO Action Plan to support **food and agriculture sectors** in implementing GAP-AMR (Nov 2016)
- **Four key focus areas**
 - Generate **awareness** on AMR and related threats
 - Develop **capacity** for surveillance and monitoring of AMR and antimicrobial use in food and agriculture
 - Strengthen **governance** related to AMR and antimicrobial use in food and agriculture
 - Promote **good practices** in food and agriculture systems and the **prudent use** of antimicrobials



The OIE Strategy on AMR and the prudent use of antimicrobials, 2016

The OIE Strategy on Antimicrobial Resistance and the Prudent Use of Antimicrobials

November 2016



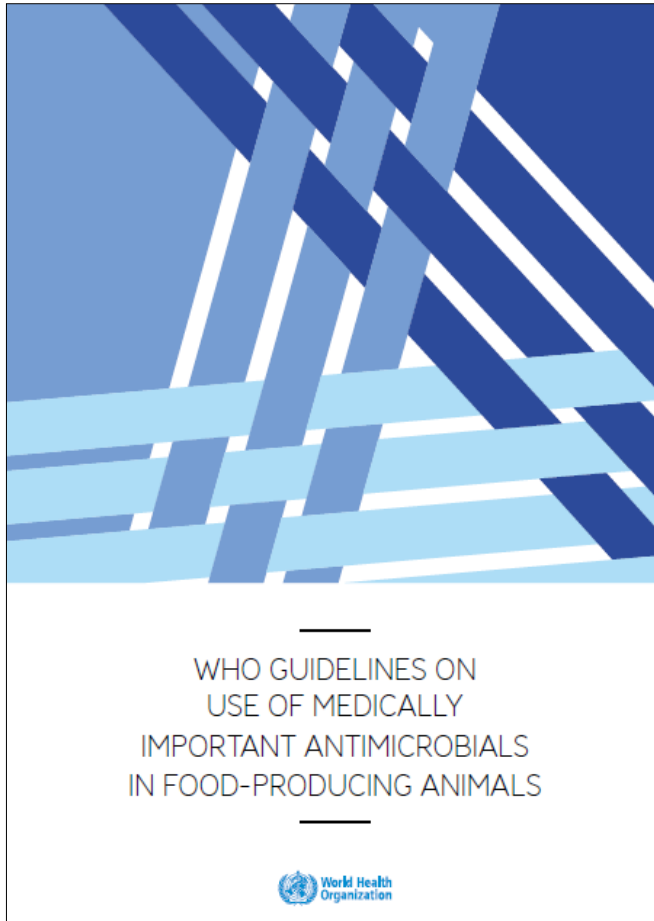
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- The 84th General Assembly of the World Organization for Animal Health (OIE) 's adopted a **Resolution** that mandates OIE to compile AMR activities into a strategy
- **Four key objectives**
 - Improve **awareness** and understanding
 - Strengthen knowledge through **surveillance** and research
 - Support good **governance** and **capacity** building
 - Encourage implementation of **international standards**

OIE's **Terrestrial Code** and **Aquatic Code** provides standards for improvement of animal and aquatic health worldwide, including AMR



WHO guidelines on use of medically important antimicrobials in food-producing animals, 2017



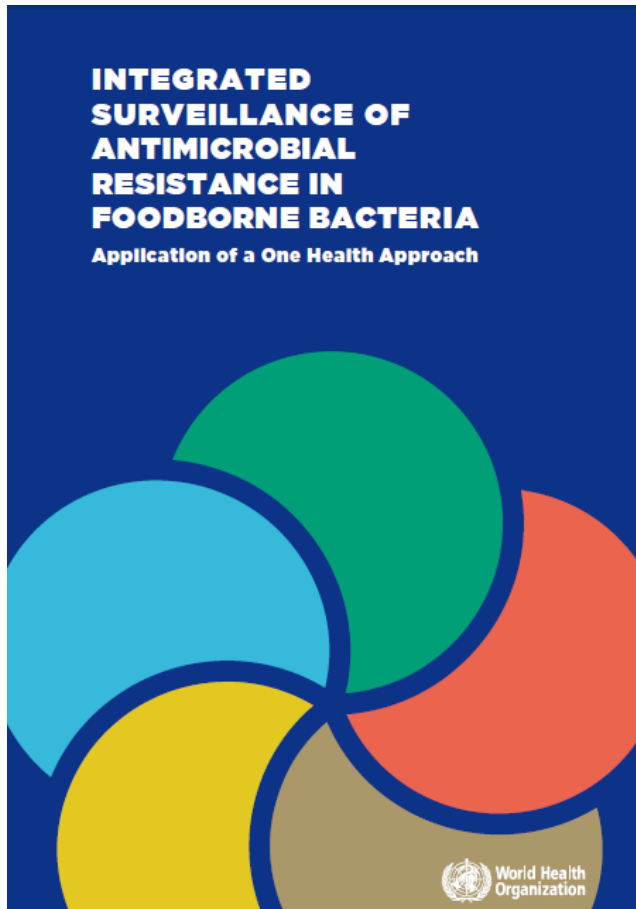
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- Aimed at **preserving the effectiveness of medically important antimicrobials (MIAs)**, particularly **critically important antimicrobials (CIAs) in human medicine** and antimicrobials for veterinary medicine
- **Key recommendations:**
 - Overall reduction in use of all classes of MIAs
 - Complete restriction of use of all classes of MIAs for growth promotion and prophylaxis
 - Complete restriction of use of all classes of MIAs for prevention of infectious diseases (not yet clinically diagnosed)
 - CIAs should not be used to control dissemination of a clinically diagnosed infectious disease identified within a group
 - Highest priority critically important antimicrobials should not be used for treatment

Note: Medically important antimicrobials are those antimicrobials used in human medicine



Integrated surveillance of antimicrobial resistance in foodborne bacteria, 2017



- Aims to assist in the **establishment and development of integrated surveillance programmes of AMR in foodborne bacteria**
- Focus on **AMR and antimicrobial use in relevant food chain sectors**
- **Integrated surveillance of AMR in foodborne bacteria**
 - Sample sources, target bacteria, sampling design, testing methods etc.
- **Surveillance of antimicrobial use**
 - Surveillance in humans and animals

[Link to document](#)



WHO model list of essential medicines (20th List, 2017)

WHO Model List of Essential Medicines

20th List
(March 2017)

Status of this document

This is a reprint of the text on the WHO Medicines website

<http://www.who.int/medicines/publications/essentialmedicines/en/>

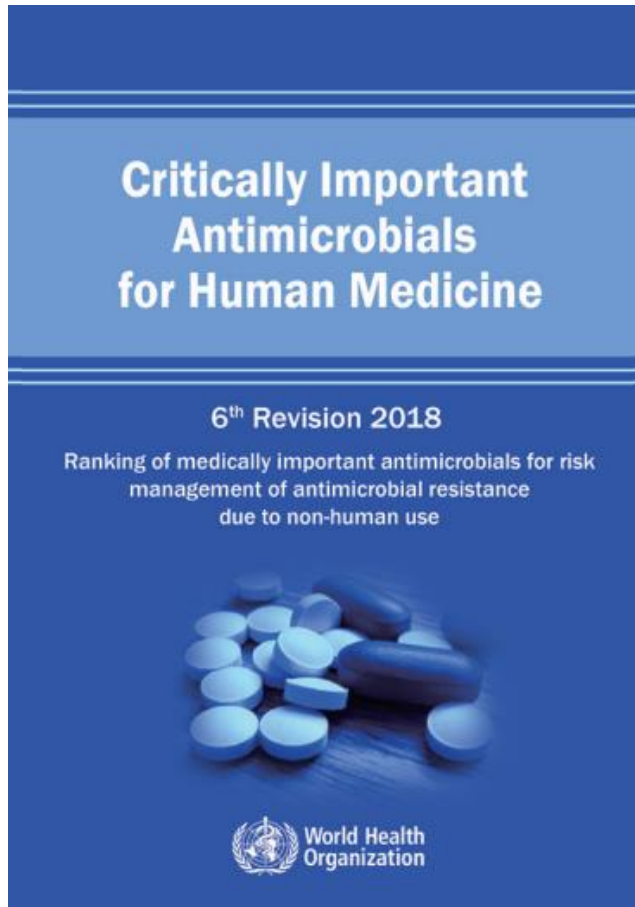
[Link to document](http://www.who.int/medicines/publications/essentialmedicines/en/)

- **AWaRe Classification** of antibiotics:
 - **ACCESS** group: those **available at all times as treatments** for a wide range of common infections, for e.g., Betalactams etc.
 - **WATCH** group: those which are recommended as **first- or second-choice treatments** for a small number of infections, for e.g., Quinolones, Macrolides, Carbapenems etc.
 - **RESERVE** group: those which should be considered **last-resort options**, and used only in most severe circumstances when other alternatives have failed, for e.g., 4th, 5th gen Cephalosporins, Polymixins etc.

AWaRe categorization in view of rising AMR burden



WHO list of critically important antimicrobials for human medicine (6th revision, 2018)

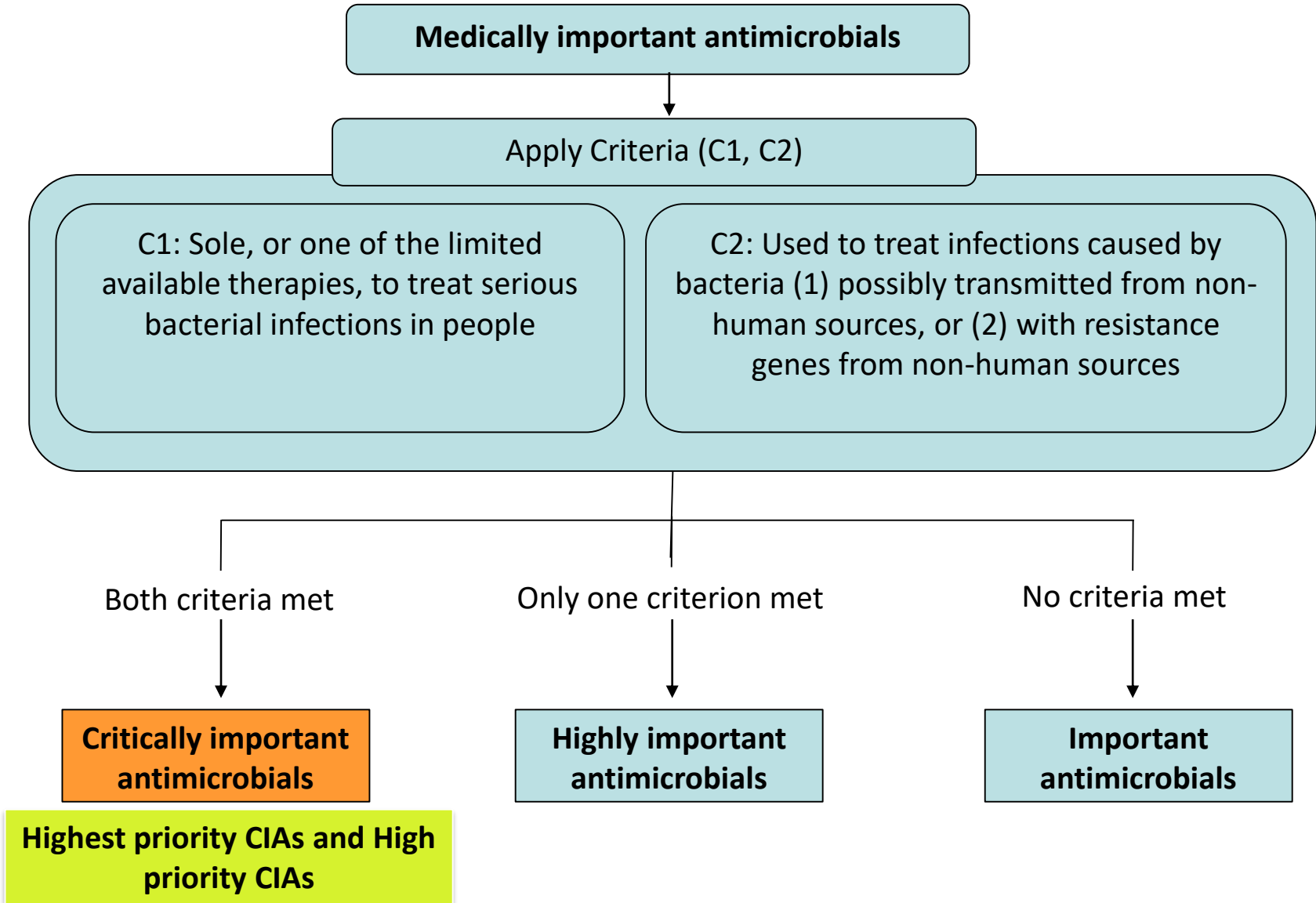


- Ranks antimicrobials as per their relative importance in human medicine
- First developed in 2005. The **WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR)** reviews and updates the list every two years
- Antimicrobials categorized as:
 - **Critically important** (e.g., Cephalosporins, Glycopeptides, Macrolides and ketolides, Polymyxins, Quinolones, aminoglycosides, carbapenems, penicillins)
 - **Highly important**
 - **Important**

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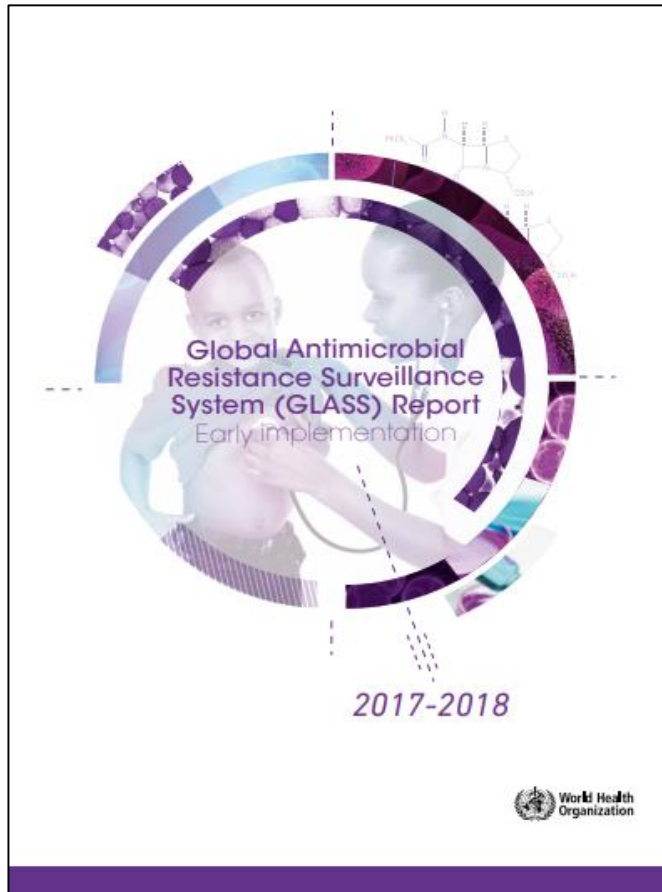


WHO list of critically important antimicrobials for human medicine: categorization





Global Antimicrobial Resistance Surveillance System (GLASS)



[Link to document](#)

- A platform for **collection, integrated analysis and sharing** of standardized and validated data on AMR
- Initial focus
 - **human priority bacterial pathogens**
 - To progressively incorporate other systems (food, environment, antimicrobial use)
- During early implementation phase (2015–2019), GLASS will provide countries with:
 - surveillance and laboratory guidance
 - support to develop effective AMR surveillance systems

As on February 2019, 73 countries were enrolled in GLASS



Inter-Agency Coordination Group on Antimicrobial Resistance report to UN Secretary General, 2019



[Link to document](#)

A. ACCELERATE PROGRESS IN COUNTRIES

A1, A2, A3

B. INNOVATE TO SECURE THE FUTURE

B1, B2, B3

C. COLLABORATE FOR MORE EFFECTIVE ACTION

C1, C2

D. INVEST FOR A SUSTAINABLE RESPONSE

D1, D2

E. STRENGTHEN ACCOUNTABILITY AND GLOBAL GOVERNANCE

E1, E2, E3, E4

Highlights:

- Accelerate the development and implementation of One Health National AMR Action Plans (A2)
- Phase out use of antimicrobials for growth promotion in animals, starting with HPCIA (A3)
- Need for waste management and greater focus on AMR in the environment



OIE list of antimicrobials of veterinary importance, 2019

Oie WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

Criteria used for categorisation
List of antimicrobial agents

OIE LIST OF ANTIMICROBIAL AGENTS OF VETERINARY IMPORTANCE
(July 2019)

The OIE¹ International Committee unanimously adopted the List of Antimicrobial Agents of Veterinary Importance at its 75th General Session in May 2007 ([Resolution No. XXVIII](#)).

Background

Antimicrobial agents are essential drugs for human and animal health and welfare. Antimicrobial resistance is a global public and animal health concern that is influenced by both human and non-human antimicrobial usage. The human, animal and plant sectors have a shared responsibility to prevent or minimise antimicrobial resistance selection pressures on both human and non-human pathogens.

The FAO²/OIE/WHO³ Expert Workshop on Non-Human Antimicrobial Usage and Antimicrobial Resistance held in Geneva, Switzerland, in December 2003 (Scientific Assessment) and in Oslo, Norway, in March 2004 (Management Options) recommended that the OIE should develop a list of critically important antimicrobial agents in veterinary medicine and that WHO should also develop such a list of critically important antimicrobial agents in human medicine.

Conclusion No. 5 of the Oslo Workshop is as follows:

5. The concept of "critically important" classes of antimicrobials for humans should be pursued by WHO. The Workshop concluded that antimicrobials that are critically important in veterinary medicine should be identified, to complement the identification of such antimicrobials used in human medicine. Criteria for identification of these antimicrobials of critical importance in animals should be established and listed by OIE. The overlap of critical lists for human and veterinary medicine can provide further information, allowing an appropriate balance to be struck between animal health needs and public health considerations.

Responding to this recommendation, the OIE decided to address this task through its existing *ad hoc* Group on antimicrobial resistance. The terms of reference, aim of the list and methodology were discussed by the *ad hoc* Group since November 2004 and were subsequently endorsed by the Biological Standards Commission in its January 2005 meeting and adopted by the International Committee in May 2005. Thus, the work was officially undertaken by the OIE.

Scope

The OIE List of Antimicrobial Agents of Veterinary Importance:

- Addresses antimicrobial agents authorised for use in food-producing animals
- Does not include antimicrobial classes/sub-classes only used in human medicine
- Does not include antimicrobial agents only used as growth-promoters
- Covers primarily anti-bacterials and other important antimicrobials agents used in veterinary medicine

1 OIE: World Organisation for Animal Health
2 FAO: Food and Agriculture Organization of the United Nations
3 WHO: World Health Organization

- Key recommendations:
 - Responsible and prudent use of antimicrobial agents does not include their use for growth promotion in the absence of risk analysis
 - HPCIA: **highest priorities** for such phase out
 - **Colistin**, antibiotics under **fluoroquinolones**, and **3rd & 4th generation cephalosporins**:
 - Not be used for preventive treatment (by feed or water) in the absence of clinical sign of a disease
 - Not be used as a first line treatment unless justified
 - Use as second line treatment to be based on bacteriological tests
 - Use as growth promoters to be **urgently prohibited**

[Link to document](#)



Regional AMR Monitoring and Surveillance Guidelines (FAO, 2019)



- Guidelines on **regional AMR monitoring** and surveillance (Southeast Asia)
- Focus on **surveillance in healthy animals** reaching consumers, and on **protection of public health**
- Provides guidance on design of AMR monitoring and surveillance, with emphasis on **epidemiology** and **laboratory methods, AMR data management**
- Aims at regional harmonization and a standardized approach to ensure comparability

[Link to document](#)

The guideline encourages countries to initiate AMR surveillance regardless of their capacity



Guidance from CODEX ALIMENTARIUS

- The **CODEX ALIMENTARIUS** is a collection of standards, guidelines and codes of practice (CoP) adopted by the Codex Alimentarius Commission, to ensure food is safe and can be traded
- **AMR related texts in Codex**
 - Code of Practice to Minimize and Contain Antimicrobial Resistance (2005)
 - Guidelines for Risk Analysis of Foodborne Antimicrobial Resistance (2011)
 - Maximum Residue Limits and Risk Management Recommendations for residues of veterinary drugs in foods ; 9 of these belong to 4 classes of CIAs
- **Ad hoc Codex Intergovernmental Task Force on Antimicrobial Resistance (TFAMR)** working to revise the CoP and develop Guidance on Integrated Surveillance of AMR

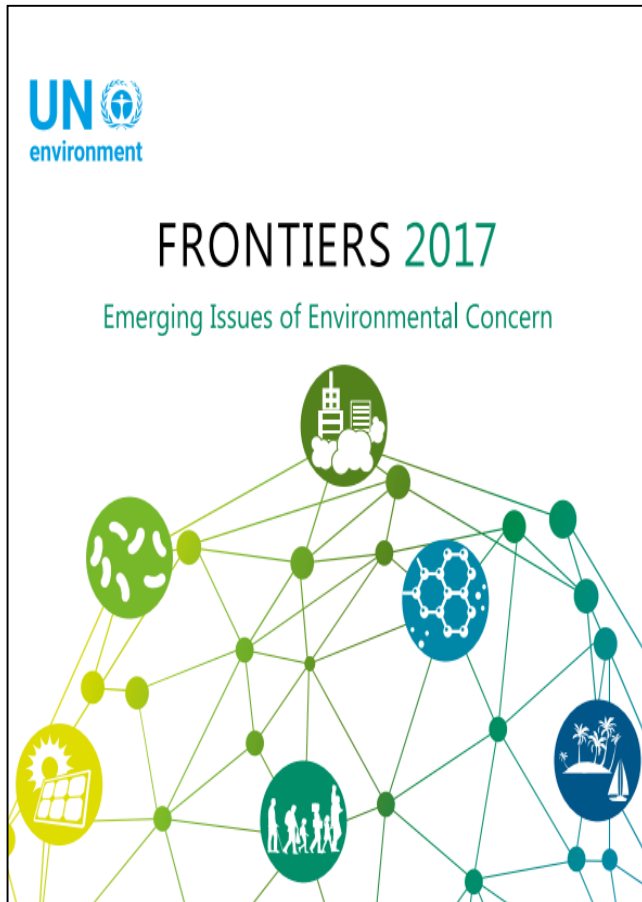


Major global efforts to contain AMR

Reports



Frontiers 2017: Emerging issues of environmental concern

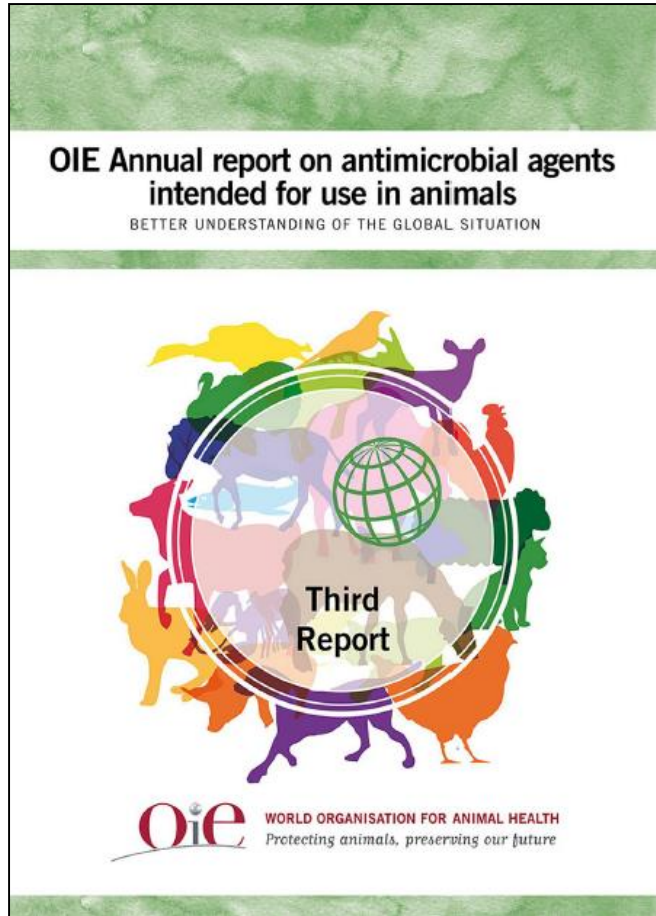


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- Covers **six key emerging issues**; AMR one of them
 - **Antimicrobial Resistance: Investigating the environmental dimension**
 - AMR recognized as an environmental concern
 - Identifies contributors, mechanisms of AMR
 - Highlights the need for considering the environmental exposure to antimicrobials in order to curb AMR
- **Environmental aspect gaining global traction**
- **WHO-FAO-OIE Tripartite involves UNEP; expands to Tripartite Plus**



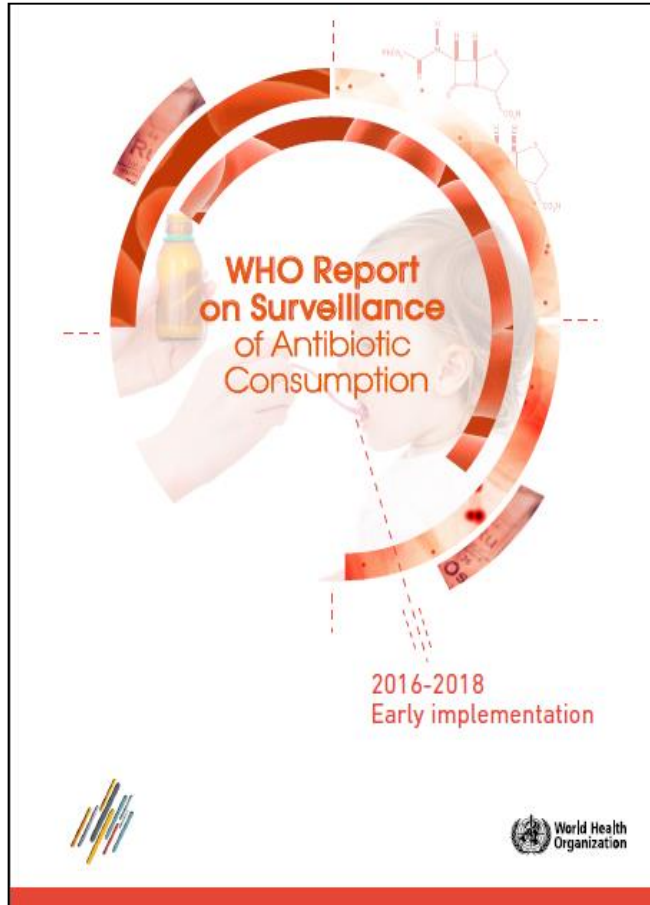
OIE annual report on antimicrobial agents intended for use in animals, 2018



[Link to document](#)

- Data submitted by **155 Countries**
- **110** countries (71%) **did not use** any antimicrobial growth promoters (AGPs) in animals as of 2017, either with or without legislation or regulations
- **Lack of regulatory framework, and lack of tools and human resources** identified as major barriers in reporting quantitative data on antimicrobial use
- **African scenario**
 - 54 Member countries from Africa; 44 responded
 - 10/44 reported AGP use; 7/10 provided list of AGPs used. Tetracyclines most common
 - Lowest tonnage of antimicrobial agents intended for use in animals among all OIE regions
 - Tetracyclines: largest proportion of all reported antimicrobial classes

WHO report on surveillance of antibiotic consumption, 2018

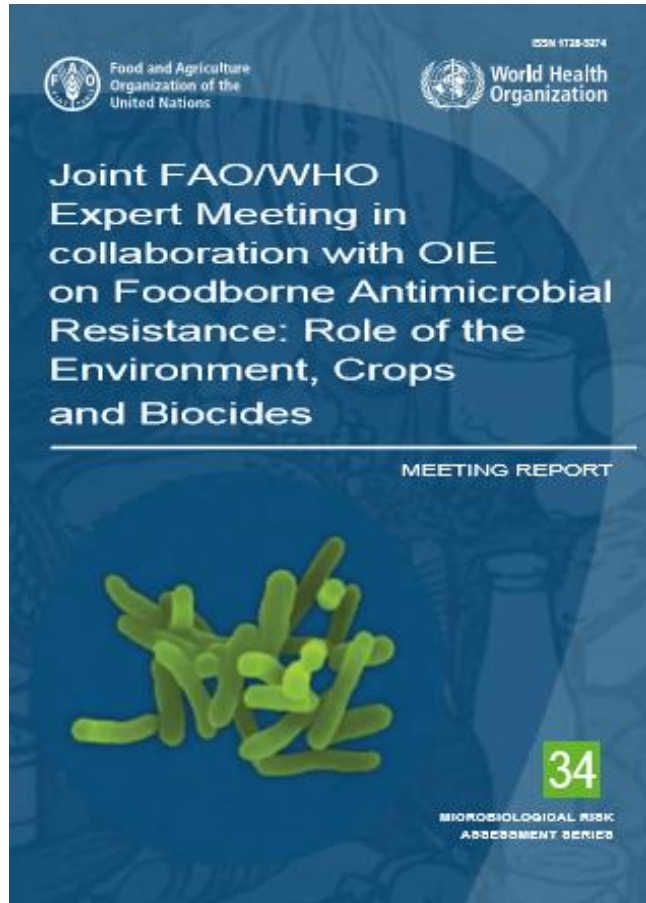


[Link to document](#)

- 2015 data on **consumption of systemic antibiotics in humans from 65 countries** and areas
- Some key observations:
 - Bulk of data from European region (46/65)
 - Wide intra- and interregional variation
 - Amoxicillin and amoxicillin/ clavulanic acid most frequently consumed (ACCESS)
 - Great diversity in consumption of WATCH antibiotics
 - RESERVE group antibiotics accounted for <2% of total antibiotic consumption in most HIC; not reported by most LIC and middle-income countries (MIC)
- **African Scenario**
 - **Burkina Faso, Burundi, Côte d’Ivoire, Tanzania (4/65)**
 - Beta-lactam antibacterials, penicillins —most commonly used
 - ACCESS group antibiotics most commonly used followed by WATCH group. No RESERVE group identified



Report on joint FAO/WHO expert meeting in collaboration with OIE on foodborne AMR: role of the environment, crops and biocides-meeting report (FAO and WHO, 2019)



[Link to document](#)

- Recognizes that **foods of plant origin may serve as vehicles of AMR**
- Identifies needs in food-production environment to reduce antimicrobial use
 - **Biosecurity and waste management**
 - Improved methods for **infection prevention and control**
 - Adherence to **best management practices**
- **Surveillance of AMR and antimicrobial use**
 - Plant and aquatic animal food products and their production environments should be integrated into existing AMU and resistance surveillance programmes



Major global efforts to contain AMR

Other initiatives



Country level AMR surveillance initiatives

Programme	Country	Human	Animal	Food products
Danish Integrated Antimicrobial Resistance Monitoring and Research Programme (DANMAP)	Denmark	●	●	●
Norwegian Surveillance System for Antimicrobial Drug Resistance (NORM/NORM-VET)	Norway	●	●	●
Swedish Veterinary Antimicrobial Resistance Monitoring (SVARM)	Sweden		●	●
Swedish Antibiotic Utilization and Resistance in Human Medicine (SWEDRES)	Sweden	●		
European Antimicrobial Resistance Surveillance Network (EARS-Net)	Europe	●		
European Surveillance of Antimicrobial Consumption Network (ESAC-Net)	Europe	●		
Monitoring and analysis of food-borne diseases in Europe (EFSA)	Europe	●	●	●
The Finnish Veterinary Antimicrobial Resistance Monitoring and Consumption of Antimicrobial Agents report (FINRES-VET)	Finland		●	●



Country level AMR surveillance initiatives

Programme	Country	Human	Animal	Food products
Monitoring of Antimicrobial Resistance and Antibiotic Usage in Animals in the Netherlands (MARAN)	Netherlands		●	●
National Antimicrobial Resistance Monitoring System (NARMS)	United States	●	●	●
Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS)	Canada	●	●	●
L'Observatoire National de l'Épidémiologie de la Résistance Bactérienne aux Antibiotiques (ONERBA)	France	●	●	
The Japanese Veterinary Antimicrobial Resistance Monitoring System (JVARM)	Japan		●	
Japanese Nosocomial Infections Surveillance (JANIS)	Japan	●		
Colombian Integrated Program for Antimicrobial Resistance Surveillance (COIPARS)	Colombia	●	●	●



Thank you

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WHO list of critically important antimicrobials for human medicine (6th revision, 2018)

Critically Important Antimicrobials	Highest Priority Critically Important Antimicrobials (HPCIA)	Cephalosporins (3 rd ,4 th ,5 th generation), Glycopeptides, Macrolides and ketolides, Polymyxins, Quinolones
	High Priority Critically Important Antimicrobials	Aminoglycosides, Ansamycins, Carbapenems and other penems , Glycylcyclines, Lipopeptides , Monobactams, Oxazolidinones, Penicillins (antipseudomonal), Penicillins (aminopenicillins), Penicillins (aminopenicillins with β -lactamase inhibitors), Phosphonic acid derivatives, Drugs used solely to treat tuberculosis or other mycobacterial diseases
Highly Important Antimicrobials		Amphenicols, Cephalosporins (1 st and 2 nd generation) and cephamecins, Lincosamides, Penicillins (amidinopenicillins), Penicillins (anti-staphylococcal), Penicillins (narrow spectrum), Pseudomonicacids, Riminofenazines, Steroid antibacterials, Streptogramins, Sulfonamides, Dihydrofolatereductase inhibitors and combinations, Sulfones, Tetracyclines
Important Antimicrobials		Aminocyclitols ,Cyclic polypeptides, Nitrofurans derivatives and Nitroimidazoles, Pleuromutilins