Food and Agriculture Organization of the United Nations

Harvesting Sustainable Development and Health Together: Agrifood and One Health Against Antimicrobial Resistance

Francesca Latronico, DVM, PhD

AMR Laboratory and Research Activity Coordinator
Animal Production and Health Division – FAO Headquarters

Outline

- Why to address Antimicrobial Resistance (AMR)
- FAO’s work on AMR and the Global Initiative to reduce the need for antimicrobials in farms (RENOFARM)
- Quadripartite Collaboration and the One Health Priority Research Agenda for AMR (AMR-OHPRA)
- Summary/Conclusions

Why is important to control Antimicrobial Resistance (AMR)?

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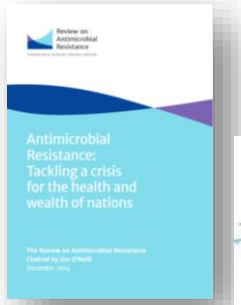
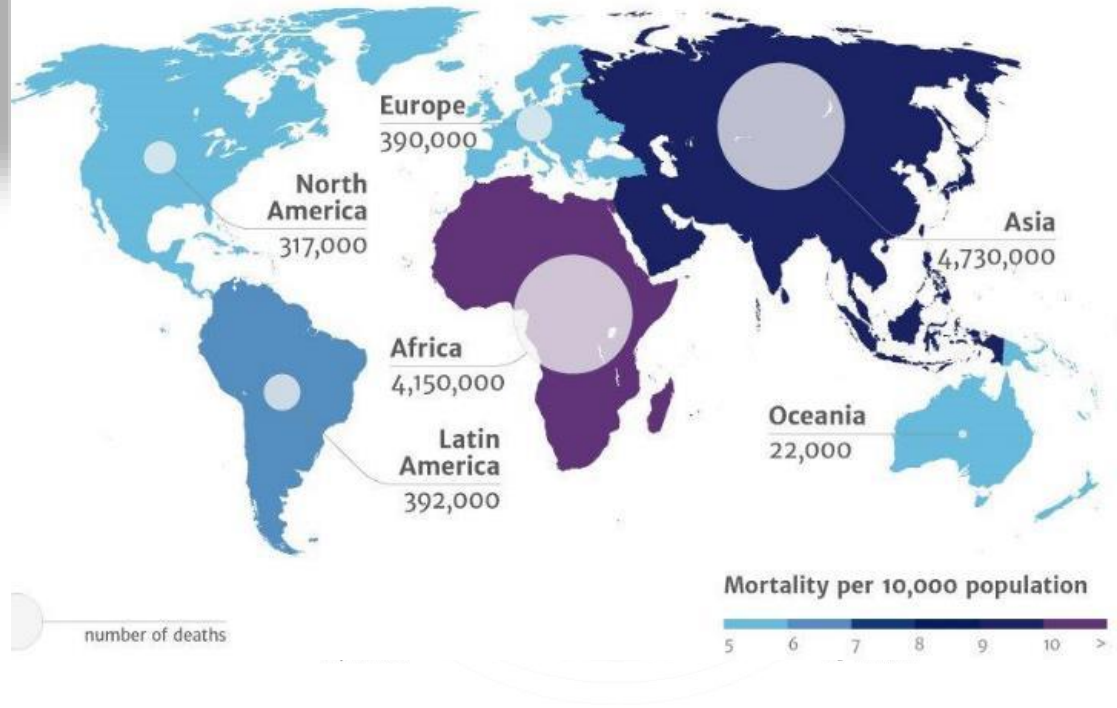
AMR is a global health, development and economic concern



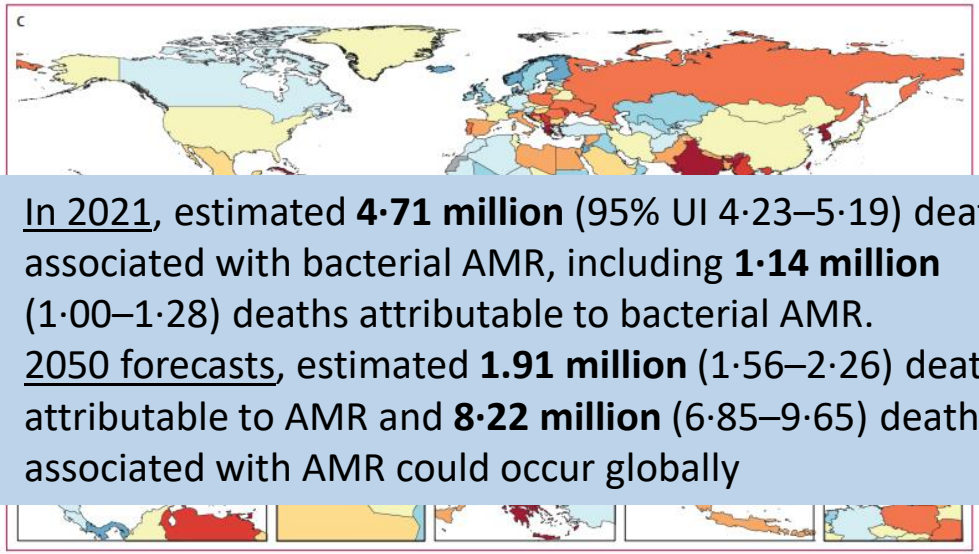
Human deaths attributable to AMR every year by 2050



Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050

*GBD 2021 Antimicrobial Resistance Collaborators**

Human death rates per 100 000 attributable to AMR, all ages, 2050



- In 2021, estimated **4·71 million** (95% UI 4·23–5·19) deaths associated with bacterial AMR, including **1·14 million** (1·00–1·28) deaths attributable to bacterial AMR.
- 2050 forecasts, estimated **1.91 million** (1·56–2·26) deaths attributable to AMR and **8·22 million** (6·85–9·65) deaths associated with AMR could occur globally

AMR is a global health, development and economic concern

If no action is taken, AMR is expected to impose much greater health expenditures

- up to US$ 412 billion annually up to 2035 to treat resistant bacterial infections
- Increased morbidity and mortality, and lower workforce participation productivity losses US$ 443 billion/year
- average loss of 1.8 years of life expectancy globally by 2035 (in some Low and Middle-Income Countries up to 2.5 years)

A package of AMR interventions* across sectors would prevent massive health and mortality burden due to AMR and lead to significant returns on the investments made

- expected AMR global initiative package cost an average of US$ 46 billions/year and brings a return between US$7-$13 for every US$1 spent by 2050

*Source – Data from the study on the economic case for AMR investment requested by the **AMR Global Leaders Group (GLG)***

Key facts in food and agriculture

- Antimicrobials have been **used in agriculture** for decades; over **70% of antibiotics** worldwide is used in agriculture **(terrestrial animal production, aquaculture, plant production)**

- If current trends continue, global livestock antibiotic use is **projected to rise by 29.5%, reaching 143,481 tons by 2040**

- Coordinated global efforts, such as a **50% reduction in antibiotic use intensity (AMUI)** and optimization of livestock biomass, have the potential to reduce global antibiotic use by **56.8%, bringing it down to 61,989 tons by 2040**.

Article | Open access | Published: 01 April 2025

The future of antibiotic use in livestock

Alejandro Acosta, Wondmagegn Tirkaso, Francesco Nicolli, Thomas P. Van Boeckel, Giuseppina Cinardi & Junxia Song

Nature Communications **16**, Article number: 2469 (2025) | Cite this article

*** Source: Acosta et al. 2025, Nature Communication; and FAO report on the economic burden of AMR (to be published)*

Highlights on FAO's work on AMR

Food and Agriculture Organization of the United Nations

- UN lead technical agency specialized in food and agriculture
- 194 Member Countries
- Headquarters (Rome, Italy)
- Five Regional Offices, 11 Sub-regional Offices and Liaison Offices
- 93 Representations (in-country FAO Representative)

Mandate

- *Lead international efforts to **defeat hunger***
- *To achieve **food security for all** and make sure that people have regular access to **enough high-quality food** to lead active, healthy lives.*
- *Support countries to **improve agriculture, forestry and fisheries** practices and **ensure good nutrition***
- *Improve food security, **livelihoods, sustainable agriculture, and natural resources management***

FAO Action Plan on Antimicrobial Resistance (AMR) 2021-2025

Food and agriculture sectors, dependent livelihoods and economies are made resilient to the impacts of AMR

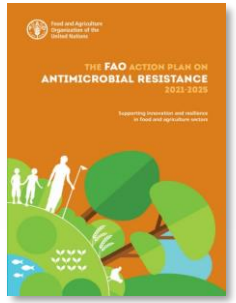
*Strengthening **governance** and allocating **resources** to accelerate and sustain progress*

*Increasing stakeholder **awareness** and **engagement** to foster change*

Promoting ***responsible use*** to keep antimicrobials working

*Strengthening **surveillance** and **research** to support evidence-based decisions*

*Enabling **good practices** to prevent infections and control the spread of resistant microbes*



FAO tools for capacity building

Field interventions

Access to resources and technical networks

Data management and information systems

Progress of FAO's work on AMR in Agrifood systems through a One Health approach

- FAO Action Plan directly supporting more than 70 countries

01

- FAO Assessment Tool for Laboratories and AMR Surveillance Systems - > 60 countries, > 300 laboratories

02

- 10 FAO AMR Reference Centres

03

04

- Progressive Management Pathway for AMR has assisted 40 countries in strengthening food and agriculture components in AMR National Action Plans (NAPs)

05

- Strengthening legislation One Health Legislative Assessment Tool for AMR - 30 countries

06

- Supporting NAPs implementation at country and global level – AMR Multi-partner Trust Fund - 16 country projects and 4 global programmes

Reduce the Need for Antimicrobials on Farms for Sustainable Agrifood System Transformation (RENOFARM)

- FAO's **10-year global flagship initiative (2023-2032) to sustainably reduce the need for antimicrobials in farms**.
- To achieve global target to ***'meaningfully reduce the quantity of antimicrobials used globally in agrifood systems from current levels by 2030'.***

⇒ ***5 Gs: Good Production Practices, Good Health Services, Good Alternatives, Good Incentives and Good Connections***

⇒ ***5 Action Accelerators****: Education and Awareness, Youth Engagement, Public-Private Partnership, Behavioral and Social Intervention, Research-Innovation and New Technologies*

International FAO AMR Monitoring (InFARM) System

Global information system that assists countries in collecting, collating, analyzing, visualizing, and effectively utilizing their AMR monitoring and surveillance data primarily from livestock, fisheries, and aquaculture, along with their associated food products, and AMU in plant/crop

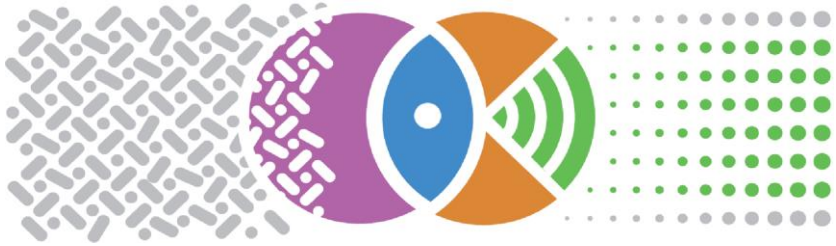
It includes an **IT platform** designed to host and present **AMR data** generated from:

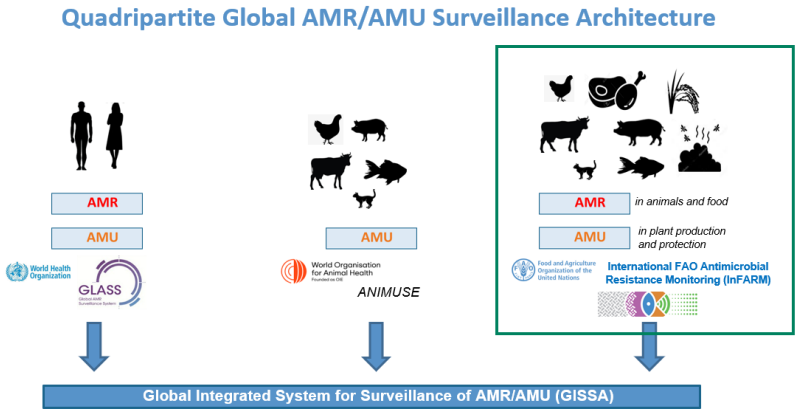
- **priority bacterial species of public health significance**, including zoonotic and foodborne pathogens and commensal indicator bacteria from animals and food sources; and
- **bacterial pathogens causing impacts in animal health and productivity**.

Implementation follows **International standards** (Codex Alimentarius, WOAH Terrestrial and Aquatic codes)

Agrifood sectors' piece in the **Global Integrated System for AMR/AMU Surveillance**

Data call open for countries to enrol and submit AMR data – 1st call in 2024, 2nd call in summer/autumn 2025





More info – see here

AMR and AMU in the plant sector

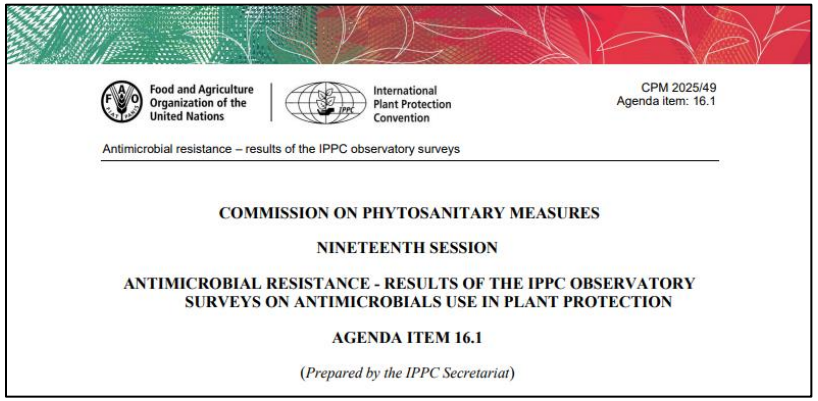
- *Bacterial pathogens cause losses up to USD 5 billion*
- ***Major data gap** regarding the amounts of antibiotics applied on plants*
- *It has been suggested that the use of **antibiotics** in plant protection might be **more widespread** than previously thought*
- *Lack of awareness and knowledge on the topic*

McManus 2014

Current initiatives and activities

- **Awareness** raising and communications
- **Technical briefs on antibiotics** used in plant health and **potential available alternatives**
- **Evidence generation and data collection**: InFARM - AMU data collection questionnaire for **quantitative** and **qualitative** data
  - Quantitative data: the amounts (tonne/year) of active ingredient
  - Examples of qualitative data:

    - Application practices: methods (spraying, injection, seed treatment, other) or place of application (greenhouse, garden, fields, other)
    - Type of plants (fruit, cereal, vegetable, ornamental plants, other)
    - Bacterial disease treated
    - …



Quadripartite Collaboration and One Health Priority Research Agenda for AMR (AMR-OHPRA)

Quadripartite Collaboration: Quadripartite Joint Secretariat on AMR

Food and Agriculture Organization of the United Nations

UN environment programme

World Health Organization

World Organisation for Animal Health
Founded as OIE

Global Leaders Group on AMR

AMR Multi Partner Trust Fund (MPTF-AMR)

Multi Stakeholder Partnership Platform

www.qjsamr.org

AMR Multi-Stakeholder Partnership Platform

Established by the Quadripartite and hosted at FAO to promote a **shared vision for AMR**; **information-sharing** and **networking** and **support concrete actions** to advance progress on AMR.

Promotes a One Health approach to AMR, multi-stakeholder governance and private-public partnerships (> 200 members)

Five Clusters (1. governments, UN entities and specialized agencies, global and regional intergovernmental organizations, 2. international and regional financial institutions, and philanthropic donors; 3. civil society organizations and networks; **4. academic and research institutions** 5. private sector entities).

Action Groups proposed by members are the Platform driving force

More information - here

One Health Priority Research Agenda for AMR (AMR-OHPRA)

- ✓ **Global exercise** supported by Quadripartite (FAO/UNEP/WHO/WOAH) with the involvement of the wider scientific community focused on **AMR** at the **interfaces among One Health sectors**
- ✓ Guidance for the development of **national and regional research strategies and innovation programmes** (UN General Assembly Political Declaration on AMR-2024, commitment n.93)

AIM

- **Identify and prioritize research areas** at the interface between One Health sectors that will inform and provide **evidence** to policy and practices for countries
- **Catalyze interest** among researchers and donors on One Health AMR
- **Provide direction for investment** in One Health AMR research with focus on Low and Middle-Income Countries

Out of scope

- Research & Development of new antibiotics/antimicrobials and vaccines
- Diagnostic development
- Research related to only one sector

AMR Quadripartite website: www.qjsamr.org

Dynamic Dashboard

INVESTMENTS IN AMR R&D

GLOBAL AMR R&D HUB

Last updated: 26.05.2025

Parameter

Number of Projects | **Total Investments**

Currency

USD | **EUR**

Status

Active | **Closed**

Reset filter

*by year = incomplete years

Funders
276

Number of Projects
17059

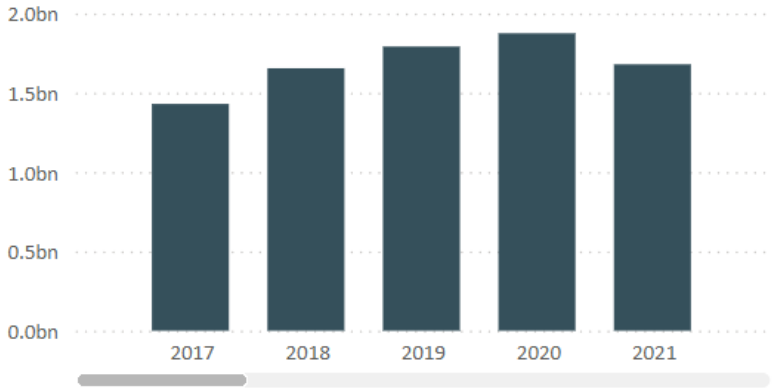
Total Investment
EUR 14.00bn

Research Organisations (RO)
3460

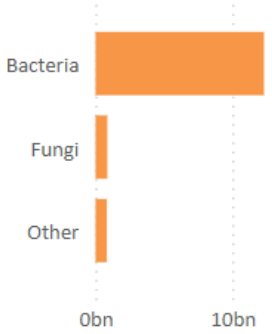
Countries of RO
101

One Health Sectors
4

by Year (Total Investments in EUR)



by Infectious Agent (Total Investments in EUR)

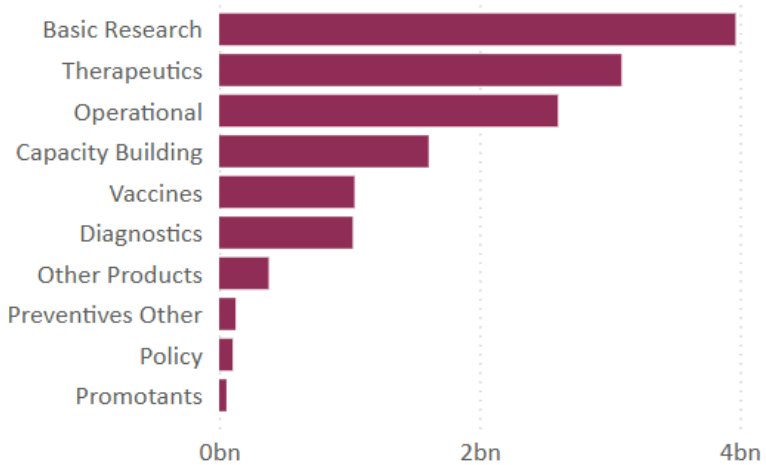


by One Health Sectors (Total Investments in EUR)

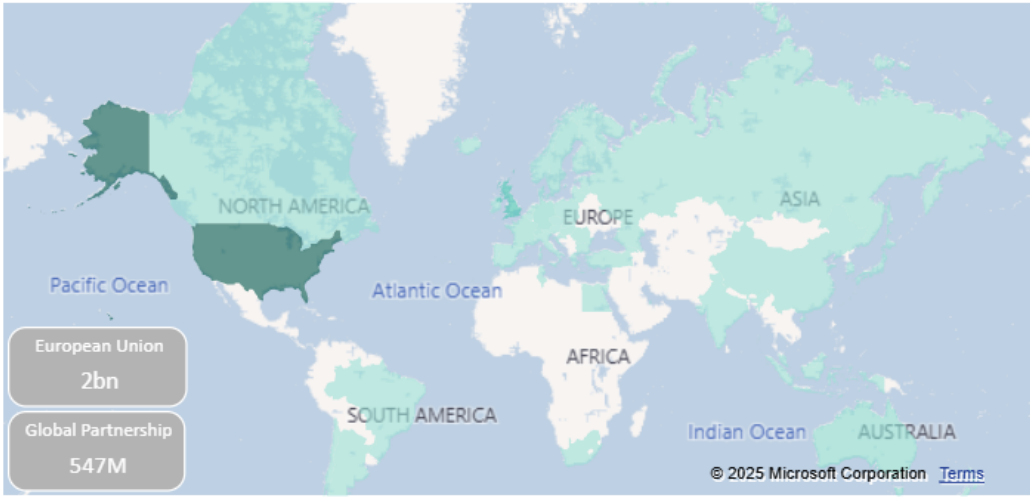
Move cursor over the colored shapes to show values

Animal:	1,438.3M
Environment:	707.1M
Human:	12,640.0M
Plant:	295.3M
Not Specified:	328.7M
Cross-Sector:	926.2M

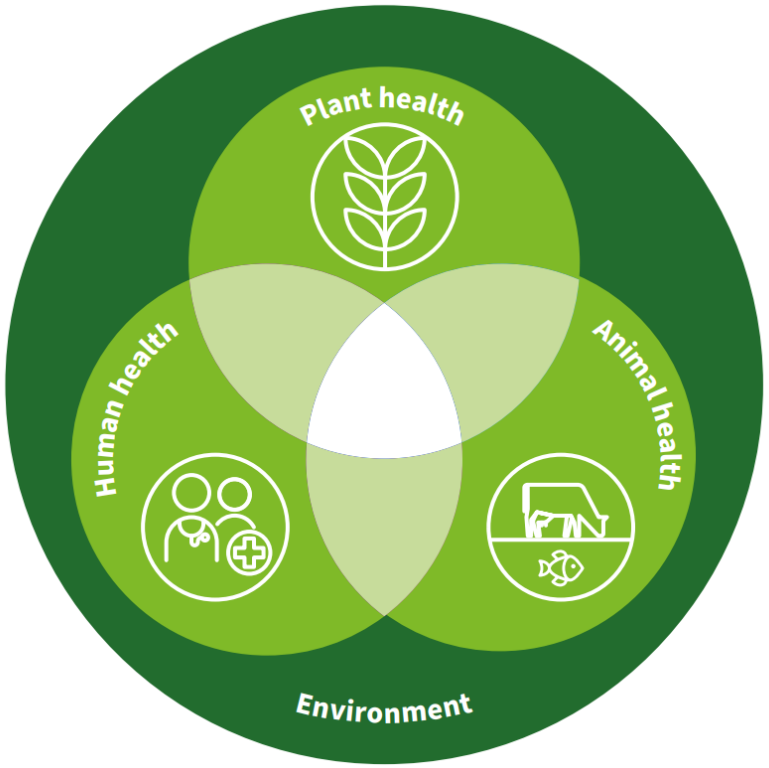
by Research Area (Total Investments in EUR)



by Location of Funder (Total Investments in EUR)



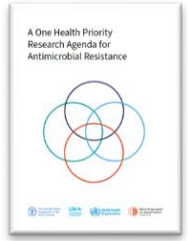
AMR-OHPRA Methodology – specific pillars



- Transmission
- Integrated Surveillance
- Interventions
- Behavioural insights and change
- Economics and policy

Gender, Vulnerable Populations, Sustainability

Process and timeline for developing the AMR-OHPRA



1620 participants

89 experts

Academic scoping review	Global survey (open, online)	Grey literature review and survey analysis	Delphi panel (3 rounds)	Expert discussion of results	Report publication and advocacy of One Health AMR research priorities
Jan 2020–Dec 2021	July–Sep 2021	Feb–Mar 2022	May–Aug 2022	Oct 2022	2023

Determine research areas

Literature review (academic/grey)

Global Open call survey

Expert Inputs

→

Prioritization by experts

Delphi Process to identify critical research areas

→

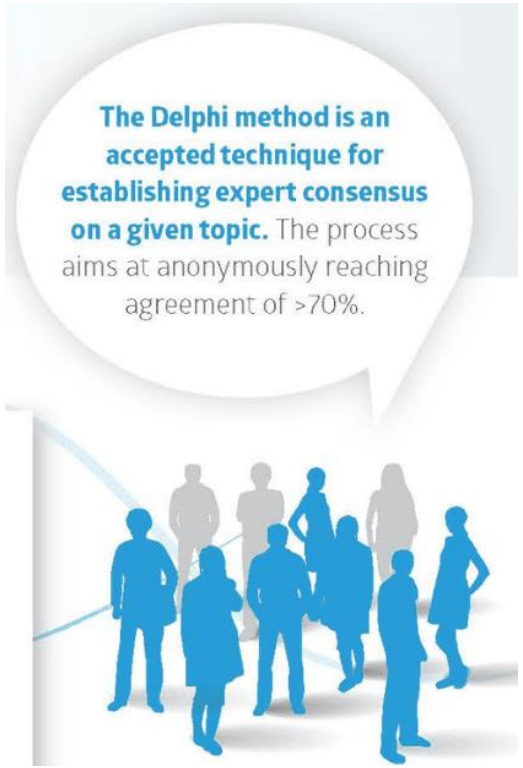
Report *(Eng, Fr, Es)*

Launch - June 2023

Dissemination and specific technical webinars 2023-25

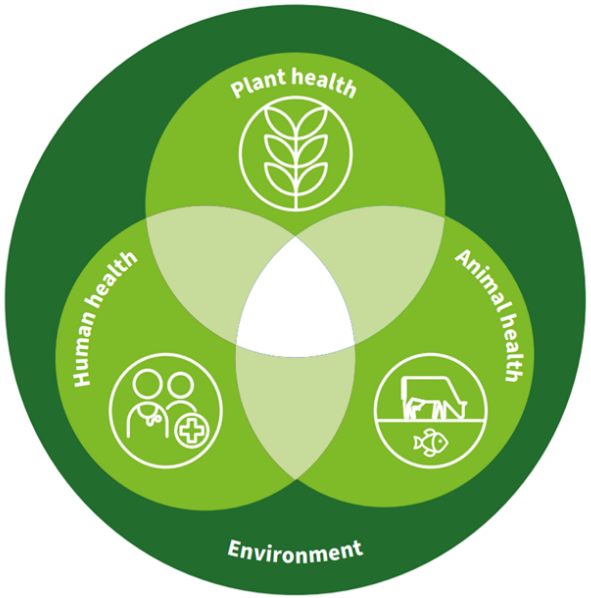
Prioritization - Delphi Method (3 rounds)

- **154 Research Questions** across pillars were generated integrating literature review and global open call results for the Delphi process
- **89 experts** on One Health and/or AMR and/or AMR-relevant scientific pillar with global representation and gender balance



AMR-OHPRA Results

- A total of **62 research priority research areas** (10-15 per specific pillar) were identified across the **five pillars**
- **Top 10 Overall Priority Research Areas**



Transmission	13
Integrated Surveillance	11
Interventions	13
Behavioural insights and change	15
Economics and policy	10

Gender, Vulnerable Populations, Sustainability

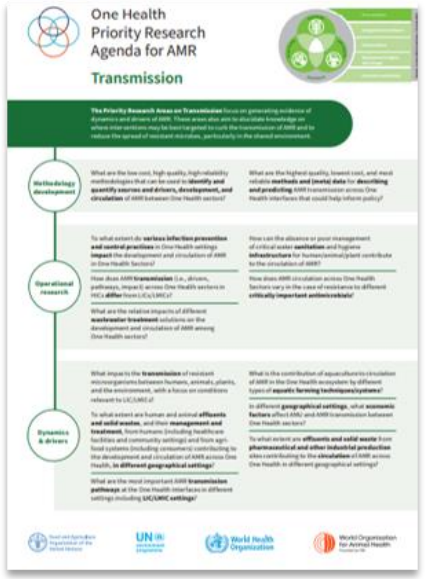
AMR Quadripartite website/Technical work: www.gjsamr.org

Priority Research Areas – Transmission

Research areas divided in 3 categories:

- Methodology Development (2)
- Operational Research (5)
- Dynamics and Drivers (6)

Priority Research Areas – Transmission



Dynamics and Drivers

*- Contribution of human and animal **effluents and solid wastes**, and their **management and treatment**, to AMR development and circulation in **different geographical settings***

*- Most important AMR **transmission pathways** at the One Health interface in different settings, including LICs/LMICs*

*- Contribution of **aquaculture** including different aquatic farming techniques/systems*

*- Contribution of **effluents and solid waste from pharmaceutical and other industrial production** sites to AMR circulation across One Health in different geographical settings*

(…)

Summary and Conclusions

Summary / Conclusions

- AMR is one of the most important global health, development and economic concern worldwide
  => if no action is taken, the **losses** in lives, livelihood and economies will be **significant**

- Emergence of AMR can happen in each sector and spread to the others => **One Health approach**

- Antimicrobials are largely used in the food and agriculture sectors (i.e. food-producing animals)
  => it is important to **sustain value chain productions** and **reduce AM need in farms** improving animal health and welfare, promoting good husbandry practices, innovation and R&D, alternatives to antimicrobial use

- There are still research areas at One Health interfaces that need to be addressed
  => National and regional **research strategies and innovation programmes** targeting AMR should include **One Health AMR research components**

UN General Assembly High-Level Meeting on AMR / Political Declaration (26 Sep 2024)

A crucial opportunity to upscale our joint efforts and progress in addressing AMR

No single country or sector can respond to AMR alone!

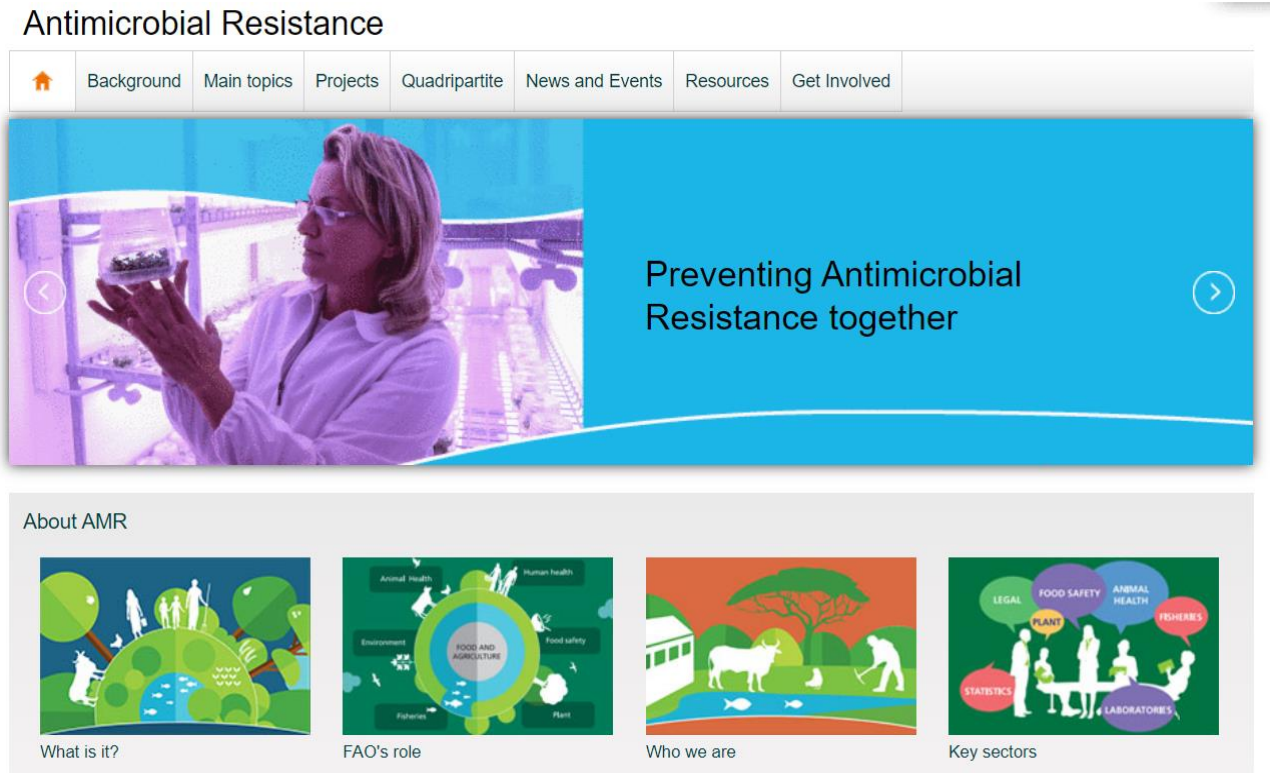
Thank you!

Protecting people, animals, and the environment every day

Contact details: Francesca.Latronico@fao.org

Drawings: FAO/Chiara Caproni

Useful links and resources



FAO **Antimicrobial Resistance webpage**,

see https://www.fao.org/antimicrobial-resistance/en/ for publications, news and initiatives

-**FAO Action Plan on AMR 2021-2025**
https://www.fao.org/documents/card/en/c/cb5545en

-**RENOFARM** https://www.fao.org/antimicrobial-resistance/background/fao-role/renofarm/en/

-**InFARM** https://www.fao.org/antimicrobial-resistance/resources/database/infarm/en/

- **One Health Knowledge Nexus**, Communities of Practice on RENOFARM, AMR laboratory, Acaricide Resistance, and many more…