Co-funded by the European Union

POLICY BRIEF

Antimicrobial Resistance: From Science to Policy

A One Health Imperative for Europe and Beyond

Based on the ONE-Bridge in Health Conference — Day 2 Proceedings
June 2026

Executive Summary

Antimicrobial resistance (AMR) is one of the most pressing public health crises of the 21st century, threatening to reverse decades of medical progress. The ONE-Bridge in Health Conference Day 2 brought together leading scientists, clinicians, veterinarians, environmental researchers, and policymakers to examine AMR through a comprehensive One Health lens — spanning human medicine, animal health, and environmental science.

This policy brief distils the key scientific findings and translates them into actionable recommendations across four interconnected domains: EU policy and governance, clinical settings, environmental surveillance, and the food-animal production chain. The evidence presented underscores that no single sector can solve this crisis alone — a coordinated, cross-sectoral response is the only viable path forward.

35,000+	700,000+	10M	€3
Annual deaths in EU from AMR	Global deaths/year (current)	Projected annual deaths by 2050	Economic return per €1 invested in prevention

1. The Challenge: A Growing Threat Across All Sectors

1.1 The Scale of the Crisis

The conference opened with a stark reminder: AMR is accelerating. Today, one in five bacterial infections is caused by a pathogen already resistant to antibiotics. The EU and European Economic Area (EEA) bear significant human and economic costs, yet evidence confirms that every euro invested in prevention yields approximately €3 in economic benefits.

The 2022 Lancet analysis on the global burden of bacterial AMR, which examined data from 1990 to 2021 with forecasts to 2050, painted a sobering picture: current trajectories suggest AMR will surpass cancer as a leading cause of death if left unaddressed. Southern and Eastern Europe — including Greece — face disproportionately high resistance rates and mortality burdens.

1.2 Clinical Settings Under Pressure

ONE- Bridge project is supported by co-funding from the European Union's EU4Health programme under Grant Agreement Nr 101233407.

Greece exemplifies the severe challenge facing healthcare systems in southern Europe. Clinical data presented at the conference revealed:

- Healthcare-associated infection (HAI) prevalence nearly double the EU median (20% vs. ~7%)
- The composite AMR index for Greece reached 68%, compared to 22% EU median
- Carbapenem-resistant Klebsiella pneumoniae found in 64% of K. pneumoniae isolates from HAIs
- Pseudomonas aeruginosa carbapenem resistance at 65%; Acinetobacter baumannii at 95%
- A shifting molecular epidemiology: ST11 clones (NDM-producers) displacing ST258 (KPC-producers), driven by selection pressure from beta-lactam use

These resistance profiles severely restrict empirical therapy options. In practice, clinicians are increasingly forced to use last-resort antibiotics for bloodstream infections, and in some cases face isolates with no available treatment. The attributable 30-day mortality from MBL-producing Enterobacterales bacteraemia exceeded 35% in comparable Mediterranean settings.

1.3 The Environmental Dimension

AMR does not stay within clinical walls. It is a living pollutant that circulates through humans, animals, water, soil, and food systems. Research presented from Dresden, Cyprus (Larnaca), and Crete demonstrated that:

- Antibiotic resistance genes (ARGs) and resistant bacteria are consistently detected in wastewater influent and, to a lesser extent, in treated effluent
- The solid fraction of wastewater carries the highest ARG loads, and sludge reused in agriculture may represent a key dispersal route
- Microbial diversity acts as a natural barrier: diverse communities — particularly in stable soil environments — host significantly fewer ARGs and resist colonisation by resistant bacteria
- Environmental stressors (heavy metals, chemical pollutants, even protozoan predation) can amplify plasmid-mediated horizontal gene transfer, accelerating resistance spread even without direct antibiotic pressure
- Antibiotic transformation products (metabolites and degradation products) retain biological activity and can select for resistance in wastewater microbial communities — a largely overlooked pathway

An important finding from the Larnaca (Cyprus) two-year surveillance study: location, not season, was the dominant driver of AMR patterns; airport wastewater showed among the highest ARG concentrations, highlighting travel as a vector for resistance dissemination. Wastewater surveillance demonstrated the capacity to anticipate clinical AMR trends by days to weeks, positioning it as a viable early-warning tool.

1.4 The Veterinary and Agricultural Link

Antimicrobials are used extensively in food-producing animals, and the link between veterinary use and human resistance is well-established. Conference presentations highlighted:

- Salmonella serovars in egg products — including S. Infantis (40%), S. Thompson (30%), and S. Typhimurium (20%) — with one multidrug-resistant S. Thompson strain showing resistance to ampicillin, tetracycline, and cefotaxime (suggesting ESBL/plasmid-mediated mechanisms)
- MRSA in pigs remains a significant reservoir, with extensive prophylactic antimicrobial use identified as a key risk factor

ONE- Bridge project is supported by co-funding from the European Union's EU4Health programme under Grant Agreement Nr 101233407.

- Manure application introduces ARGs, resistant bacteria (including Clostridium and Enterococcus), and mobile genetic elements (integrons, plasmids) into agricultural soils, with some persisting for 25+ days
- An often-overlooked organism, Mycobacterium avium subsp. paratuberculosis (MAP), circulates freely across animals, environment, food, and water — possessing broad intrinsic AMR mechanisms and appearing in pasteurised milk and retail products

2. The EU Policy Framework: Progress and Gaps

2.1 Current Actions

The European Commission has developed a robust policy architecture for AMR:

1. The 2023 Council Recommendation on AMR provides a comprehensive One Health framework with binding targets for member states, covering consumption, resistant bloodstream infections, and animal antimicrobial sales (targeting a 50% reduction).
2. The EU JA-AMR 2 (JANBAI 2) joint action (2024-2027) — a 10-country, €62M initiative — provides direct support to member states through policy officer networks, national action plan roadmaps, stewardship and IPC training, one health surveillance infrastructure, and communications.
3. An Inter-Agency AMR Working Group now coordinates the ECDC, EFSA, EEA, EMA, and ECHA — enabling cross-sectoral data sharing and awareness activities.
4. The new Urban Wastewater Treatment Directive mandates AMR monitoring in wastewater for all EU member states, creating the infrastructure for population-level surveillance.
5. The One Health AMR Partnership — a 10-year, €253M research and innovation initiative involving 53 organisations from 30 countries — launched its first joint transnational call in November 2024.

2.2 Where the EU Falls Short

ALERT	*EU progress towards 2030 AMR targets is insufficient. Antibiotic consumption is increasing overall. Progress in reducing the proportion of Watch-group antibiotics remains limited. Carbapenem-resistant bloodstream infections are rising in multiple member states, including Greece.*

Key systemic gaps identified at the conference include:

- Fragmented surveillance: clinical, veterinary, and environmental data remain siloed; integrated One Health dashboards connecting all three sectors do not yet exist at scale
- Inadequate financing for national action plan implementation, particularly in LMICs and in countries with underdeveloped diagnostic infrastructure
- The antibiotic R&D pipeline remains insufficient: fewer than 10 new antibiotic classes have been developed since the 1980s; pharma investment incentives remain misaligned
- Antibiotic transformation products are absent from environmental risk assessments and regulatory frameworks despite demonstrated selection potential
- Whole-genome sequencing is not yet routine outside university hospitals, limiting the capacity to detect and respond to emerging high-risk clones
- National action plans in many countries are developed but inadequately funded for implementation

ONE- Bridge project is supported by co-funding from the European Union's EU4Health programme under Grant Agreement Nr 101233407.

3. The Global Dimension

AMR does not respect borders. The UN High-Level Meeting on AMR (September 2024) adopted a political declaration with commitments across seven areas, including a target to mobilise $100M to support at least 60 countries in developing functional national action plans. The Quadripartite (WHO, FAO, UNEP, WOAH) is updating the Global Action Plan on AMR and establishing an Independent Panel on Evidence for Action against AMR.

High-Level AMR Ministerial Conferences, now formalised as biennial events, will continue to translate political declarations into concrete national commitments. The next ministerial conference is scheduled for June 2026 in Nigeria. The AMR Multi-Stakeholder Partnership Platform — now exceeding 250 members from research, civil society, government, private sector, and financial institutions — provides a global architecture for coordinated action.

For Europe, the global dimension is acutely relevant: resistance genes travel through international trade, tourism, food chains, and migration. Airport wastewater surveillance data from the Larnaca study showed among the highest ARG burdens in the entire urban network, consistent with the epidemiological role of international travel in AMR dispersal.

4. Policy Recommendations

4.1 Governance & One Health Integration

6. **REC 1:** Operationalise integrated One Health AMR surveillance

Mandate interoperable data reporting across human, veterinary, and environmental sectors. Develop a unified EU AMR dashboard (as envisioned under JANBAI 2 Work Package 8) that provides real-time, multi-sector resistance intelligence to decision-makers and clinicians. Establish common data standards to enable cross-country comparisons.

7. **REC 2:** Strengthen and fund national action plans

Ensure every EU member state has a fully costed, legally anchored national action plan aligned with One Health principles. Provide dedicated EU financing mechanisms for implementation, particularly for countries with high AMR burden and limited health system capacity. Link EU structural funds eligibility to NAP implementation milestones.

8. **REC 3:** Embed wastewater surveillance as a routine public health tool

Build on the wastewater surveillance infrastructure developed during COVID-19 to establish systematic AMR monitoring under the Urban Wastewater Treatment Directive. Develop harmonised SOPs across member states — including standardised target gene panels, extraction methods, and normalisation protocols — to enable meaningful cross-country comparisons. Invest in moving wastewater surveillance from a research tool to a predictive public health instrument.

4.2 Clinical Settings & Stewardship

9. **REC 4:** Accelerate antimicrobial stewardship programmes in all acute care hospitals

Require active diagnostic-driven stewardship in every hospital as a condition of healthcare quality accreditation. Promote rapid molecular diagnostics for pathogen and resistance gene identification

ONE- Bridge project is supported by co-funding from the European Union's EU4Health programme under Grant Agreement Nr 101233407.

(targeting 43+ markers within 1 hour) to enable timely de-escalation from broad-spectrum empirical therapy. Prioritise their deployment in high-burden settings such as Greece and other southern/eastern European countries.

10. **REC 5:** Expand genomic surveillance of high-risk clones

Scale up whole-genome sequencing in clinical microbiology beyond university hospitals to track the emergence and spread of carbapenem-resistant high-risk lineages (e.g., K. pneumoniae ST11, ST258; P. aeruginosa ST308, ST773). Integrate WGS data into national and EU-level surveillance to detect hospital transmission events and inter-country spread in near real-time.

11. **REC 6:** Support new antibiotic development through sustainable market models

Expand subscription-based reimbursement models (the 'Netflix model' pioneered in the UK) across EU member states to decouple antibiotic revenue from volume of use. Combine pull incentives (market entry rewards) with push incentives (grants, public-private partnerships) to revitalise the antibiotic pipeline. Prioritise funding for new mechanisms of action targeting WHO Priority Pathogens.

4.3 Environmental & Wastewater Management

12. **REC 7:** Protect microbial diversity as an ecosystem service against AMR

Incorporate environmental microbiome health into AMR risk frameworks. Emerging evidence demonstrates that high microbial diversity in soils and water bodies suppresses ARG dissemination. Policies should prevent co-release of chemical stressors (heavy metals, biocides, pesticides) alongside antibiotic-resistant bacteria, as combined stressors erode this natural barrier effect. Strengthen environmental monitoring for pollutants known to co-select for AMR.

13. **REC 8:** Regulate antibiotic transformation products

Update environmental risk assessment frameworks to include antibiotic metabolites and degradation products. Research presented at the conference demonstrates that transformation products can select for AMR in wastewater communities at comparable or even higher levels than parent compounds, yet they are largely absent from current regulatory frameworks. Mandate their inclusion in wastewater discharge assessments and pharmaceutical environmental risk assessments.

14. **REC 9:** Advance integrated surveillance methodology for wastewater AMR

Fund multi-centre studies to harmonise wastewater AMR monitoring methods, addressing key technical gaps: sample volume requirements, extraction kit selection, solid vs. liquid fraction analysis, and seasonal variability. Develop risk-based modelling frameworks to translate wastewater ARG data into actionable public health thresholds and intervention triggers.

4.4 Veterinary & Agricultural Sector

15. **REC 10:** Enforce strict restrictions on prophylactic antimicrobial use in livestock

Limit prophylactic antimicrobial use to cases with clearly defined clinical need, as recommended in the EU Veterinary Medicines Regulation. Restrict group antibiotic treatment to situations with veterinary-assessed epidemiological justification. Prioritise phasing out critically important antimicrobials (3rd/4th-generation cephalosporins, fluoroquinolones) from routine veterinary use.

16. **REC 11:** Implement and enforce biosecurity and good agricultural practice standards

ONE- Bridge project is supported by co-funding from the European Union's EU4Health programme under Grant Agreement Nr 101233407.

Invest in farm-level training for veterinarians and farmers on One Health and AMR, building on the model developed under Greece's national AMR pilot project. Require compliance with animal health and welfare rules, vaccination programmes, and hygiene standards as conditions for farm operation. Reduce stocking density to limit prophylactic use. Establish educational programmes targeting young animal husbandry professionals.

17. **REC 12:** Strengthen Salmonella monitoring in egg and egg product supply chains

Expand routine serotyping and whole-genome sequencing of Salmonella isolates from egg products, including pasteurised formats, to detect multidrug-resistant strains (including MDR S. Thompson with ESBL potential) early. Trace MDR strains through production and processing chains to identify contamination sources and prevent outbreaks.

5. Conclusion

The ONE-Bridge in Health Conference Day 2 delivered a clear, evidence-based message: AMR is an existential public health threat that requires sustained, cross-sectoral, internationally coordinated action. The science presented — spanning clinical microbiology, environmental ecology, veterinary medicine, and molecular epidemiology — demonstrates both the severity of the problem and the existence of viable solutions.

KEY MESSAGE	*Investing in prevention is not optional — it is economically rational. Every euro invested in AMR prevention generates approximately €3 in economic benefits. The cost of inaction far exceeds the cost of action. Europe has both the policy framework and the scientific capacity to lead. What is needed now is political will, coordinated financing, and integrated implementation.*

The path forward requires moving from fragmented responses to a true One Health system: where clinical data informs environmental surveillance, where veterinary policies align with human health goals, and where no sector acts in isolation. As demonstrated repeatedly across the conference, when Europe acts together on One Health, it delivers results.

Sources

This policy brief is based exclusively on presentations and discussions at the ONE-Bridge in Health Conference — Day 2, including presentations by the European Commission (DG SANTE), EU JAMRAI 2, researchers from the Universities of Dresden (TU Dresden), Crete, Cyprus, Queensland/Exeter, Thessaly, Patras, and Athens Agricultural University, as well as clinical microbiologists from Greek university hospitals and international AMR policy experts. All statistics and findings are drawn directly from the conference proceedings.

ONE- Bridge project is supported by co-funding from the European Union's EU4Health programme under Grant Agreement Nr 101233407.