Webinar Report

MENA Strategies to Tackle AMR Across Human, Animal, and Environmental Health

Date: 21 November 2025
Time: 10:00 AM–11:20 AM GMT
Event Series: World Antimicrobial Awareness Week (WAAW) 2025
Organizer: AMR Knowledge Hub and Community of Practice, The Global Health Network
Language: English
Objective: To bring together researchers, health professionals, policymakers, and practitioners from across the Middle East and North Africa region to share strategies for addressing antimicrobial resistance through integrated One Health approaches

Event Leadership

Chair
Godwin Pius Ohemu, Graduate Assistant, AMR Knowledge Hub and Community of Practice, The Global Health Network, University of Oxford, United Kingdom

Welcome Remarks
Dr. Mohammed Alkhaldi, Scientific Lead and Regional Coordinator, The Global Health Network MENA Region

Closing Remarks
Maryam Wakkaf, Technical Working Group Member, The Global Health Network MENA
Godwin Pius Ohemu, Graduate Assistant, AMR Knowledge Hub and Community of Practice

Scribe
Nana Osei Bonsu, AfOx Ubuntu Fellow, The Global Health Network

Expert Panel

- Dr. Mohamed Elhadidy, Professor of Biomedical Sciences; Director, Centre for Genomics; Vice Director, Teaching Effectiveness Office, Zewail City of Science and Technology, Egypt
- Dr. Heba Mahrous, One Health Technical Officer, WHO Regional Office for the Eastern Mediterranean (EMRO)
- Dr. Shaffi Fazaludeen Koya, Medical Officer, AMR/IPC/One Health Unit, WHO EMRO
- Dr. Said F. Abukhattab, Scientific Researcher, Institute of Community and Public Health, Birzeit University, Palestine

Session Overview

Dr. Mohammed Alkhaldi opened the session by framing antimicrobial resistance as a major global threat affecting human health, animal health, food security, and environmental sustainability. He emphasized that AMR represents a fundamentally cross-sectoral challenge that cannot be addressed by any single discipline or country in isolation.

Dr. Alkhaldi underscored the critical importance of the One Health approach, which integrates expertise from public health, veterinary medicine, agriculture, environmental science, and policy to address shared risks through coordinated action. He outlined The Global Health Network MENA's mission to strengthen capacity-building initiatives, enhance research collaboration, facilitate knowledge-sharing across state and non-state stakeholders, and build sustainable networks for AMR response throughout the region.

Participation and Engagement

The webinar attracted robust participation from countries across the Middle East and North Africa region, demonstrating strong regional and international engagement with antimicrobial resistance challenges and One Health solutions.

Key Presentations

1. Empowering One Health Systems Through Genomics: Regional Strategies for Antimicrobial Resistance Control

Presenter: Dr. Mohamed Elhadidy, Professor of Biomedical Sciences; Director, Centre for Genomics, Zewail City of Science and Technology, Egypt

The Centre for Genomics: Building Regional Capacity

Dr. Elhadidy introduced the Centre for Genomics at Zewail City, explaining its leadership role in advancing national and regional microbial genomics capabilities through translational research, comprehensive training programmes, and scientific outreach initiatives. The Centre serves as a hub for genomic surveillance and analysis, contributing to both scientific knowledge generation and practical public health applications.

Addressing the Global Genomic Data Gap

A critical issue highlighted was the significant underrepresentation of African and Middle Eastern data in global genomic databases. This deficit has profound implications for understanding pathogen evolution, tracking antimicrobial resistance patterns, and developing region-appropriate interventions. Dr. Elhadidy explained that this data imbalance weakens surveillance systems by preventing accurate tracking of local resistance patterns, delays response capacity by limiting early detection of emerging threats, and marginalizes the region in global knowledge production, potentially leading to interventions designed for other contexts being applied inappropriately in MENA settings.

The genomic data gap perpetuates a cycle where regional pathogens remain poorly characterized, resistance mechanisms go undetected until they become widespread, and evidence-based policy development is hampered by reliance on data from fundamentally different epidemiological contexts.

AMR as a One Health Challenge

Dr. Elhadidy presented antimicrobial resistance as an inherently One Health challenge driven by complex interactions across human, animal, and environmental systems. He explained that intensive antimicrobial use in healthcare settings, agricultural production, and environmental applications creates selection pressure favoring resistant organisms. Pathogen spillover events, where organisms move between humans, animals, and environmental reservoirs, and ongoing host adaptation enable resistant organisms to circulate across systems, amplifying resistance and creating interconnected transmission networks.

The Role of Genomic Surveillance

Genomic surveillance was described as essential infrastructure for effective AMR response, enabling multiple critical functions:

- **Mapping transmission pathways:** Identifying how resistant organisms move between populations, settings, and species
- **Detecting emerging resistance:** Early identification of novel resistance mechanisms before they become widespread
- **Understanding evolutionary trends:** Tracking how pathogens adapt over time and across geographic regions
- **Informing intervention design:** Providing the evidence base for targeted, context-appropriate control measures

Case Study: Staphylococcus aureus in Egypt

Using *Staphylococcus aureus* as an illustrative case study, Dr. Elhadidy reported that Egypt now hosts one of the largest national genomic collections of this pathogen in Africa, a significant achievement addressing the continental data gap. Comparative genomic analysis of these isolates revealed several important findings:

- **High prevalence of virulence genes:** Regional isolates carry multiple genetic determinants associated with disease severity and treatment complexity
- **Abundant resistance markers:** Widespread presence of genes conferring resistance to multiple antibiotic classes

- **Cross-species transmission:** Genomic evidence demonstrating transmission of identical or closely related strains between humans and animals, confirming the One Health nature of the challenge

Advanced Genomic Applications

Dr. Elhadidy described sophisticated analytical approaches being applied to genomic data:

Genome-Wide Association Studies (GWAS) and Machine Learning
These computational approaches identify genetic variations associated with virulence, enabling researchers to pinpoint specific targets for intervention development and predict pathogen behavior based on genetic profiles.

Reverse Vaccinology and Immunoinformatics
These in silico approaches use genomic data to identify potential vaccine targets without traditional laboratory-intensive methods, accelerating vaccine discovery processes and enabling rational design of protective interventions.

Environmental Resistance Drivers
Analysis revealed disinfectant-driven cross-resistance following COVID-19 pandemic control measures. This finding demonstrated that resistance evolution is influenced not only by antibiotic use but also by environmental practices including disinfection protocols—highlighting the need for comprehensive One Health surveillance that extends beyond clinical settings.

Key Takeaways

- African and Middle Eastern genomic data remain severely underrepresented in global databases, limiting regional AMR understanding
- Genomic surveillance enables early detection of emerging resistance and evidence-based intervention design
- Egypt's national *S. aureus* genomic collection represents a model for addressing continental data gaps
- Cross-species transmission confirmed through genomics validates One Health approaches
- Environmental factors including disinfectant use influence resistance evolution, requiring surveillance beyond clinical antibiotic use

2. Antimicrobial Resistance from the One Health Lens

Presenter: Dr. Heba Mahrous, One Health Technical Officer, WHO Regional Office for the Eastern Mediterranean (EMRO)

AMR as a Global Public Health Emergency

Dr. Mahrous opened by situating antimicrobial resistance within the context of global health priorities, noting that current projections indicate millions of deaths will be directly attributable to AMR by 2050 without urgent, coordinated action. She highlighted a particularly concerning regional reality: the Eastern Mediterranean Region currently records the highest and fastest-growing antibiotic consumption rates worldwide, creating intense selection pressure for resistance development.

Mechanisms Driving AMR

The presentation outlined two primary mechanisms through which AMR develops and spreads:

Selection of Resistant Organisms

Antimicrobial use creates environmental pressure that favors survival and proliferation of organisms carrying resistance genes, gradually shifting population composition toward resistant strains.

Transmission of Resistance Genes

Genetic material encoding resistance can transfer between bacteria through horizontal gene transfer mechanisms, spreading resistance capabilities across species boundaries and between human, animal, and environmental bacterial populations.

These mechanisms were presented as fundamentally interconnected and influenced by multiple interacting factors operating across health, agricultural, environmental, and social systems.

Comprehensive Contributing Factors

Dr. Mahrous outlined a multifaceted set of factors driving AMR across the region:

Healthcare Sector Factors

- Inappropriate antimicrobial prescribing practices, including use without confirmed bacterial infection
- Excessive antimicrobial consumption beyond clinical necessity
- Poor infection prevention and control in healthcare facilities, allowing pathogen transmission
- Limited access to diagnostic tools, forcing reliance on empirical treatment

Infrastructure and Access Issues

- Limited access to safe water and sanitation for both human and animal populations
- Inadequate access to essential medicines and vaccines for infection prevention

- Weak laboratory infrastructure preventing accurate diagnosis and resistance monitoring

Social and Regulatory Factors

- Inadequate public awareness about appropriate antimicrobial use and resistance risks
- Weak regulatory frameworks allowing over-the-counter antibiotic sales and uncontrolled use
- Legislative gaps creating barriers to coordinated AMR action

Dr. Mahrous identified legislative gaps as particularly critical barriers, noting that despite increasing scientific understanding of AMR's One Health nature, implementation of integrated approaches remains uneven due to policy and governance deficiencies. The interdependence between health systems, agricultural practices, environmental management, and governance structures was presented as a core driver amplifying resistance development and transmission.

One Health as an Integrated Framework

Dr. Mahrous described One Health as a fundamentally integrated and unifying framework that recognizes the intrinsic linkages between human health, animal health, and environmental health. She explained that this framework enables cross-sector problem-solving by bringing together stakeholders who traditionally operate in separate silos.

While initially associated primarily with zoonotic disease control, the One Health concept has broadened substantially to encompass food safety systems, environmental threats including climate change and pollution, and antimicrobial resistance as interconnected challenges requiring coordinated responses.

Operationalizing One Health

Dr. Mahrous emphasized that effective operationalization of One Health principles requires collaboration at all stages of policy and programme development:

Planning Phase
Joint priority-setting, shared situation analysis, and coordinated strategy development involving all relevant sectors from the outset.

Implementation Phase
Coordinated governance mechanisms ensuring aligned decision-making, integrated investments maximizing resource efficiency across sectors, and cross-sector accountability frameworks ensuring all partners contribute meaningfully to shared objectives using limited national resources effectively.

The Quadripartite's Role

Dr. Mahrous presented the collaborative work of the quadripartite organizations—WHO, FAO (Food and Agriculture Organization), UNEP (United Nations Environment Programme), and WOAH (World Organisation for Animal Health), in implementing the One Health approach globally and regionally.

Global Coordination Mechanisms

- Establishment of a joint AMR secretariat providing unified technical leadership
- Development of key technical guidelines and frameworks applicable across sectors
- Integration of monitoring through global self-assessment platforms enabling countries to track progress
- Promotion of integrated surveillance systems linking human, animal, and environmental AMR data

Political Commitment Building

The quadripartite has worked to secure high-level political commitment through ministerial conferences bringing together health, agriculture, and environment ministers, World Health Assembly resolutions creating accountability mechanisms, and endorsement of national action plans at the highest government levels.

Regional Implementation in EMRO

At the regional level, Dr. Mahrous described concrete progress in operationalizing One Health:

- **Joint Statement of Intent:** Signed by quadripartite regional directors, formalizing commitment to coordinated action
- **Regional One Health Action Plan:** Comprehensive framework aligning priorities and activities across the region
- **Technical Working Groups:** Specialized groups focusing on zoonotic diseases, food safety, and antimicrobial resistance, enabling deep technical collaboration on priority issues

Key Takeaways

- The Eastern Mediterranean Region faces the highest and fastest-growing antibiotic consumption globally
- AMR drivers operate across interconnected human, animal, and environmental systems

- Legislative gaps and weak regulatory frameworks represent critical barriers to coordinated action
- One Health requires collaboration at all policy and programme stages, not just technical coordination
- The quadripartite framework provides global and regional mechanisms for integrated AMR response
- Political commitment at the highest levels is essential for sustained One Health implementation

3. Antimicrobial Resistance Support to Countries

Presenter: Dr. Shaffi Fazaludeen Koya, Medical Officer, AMR/IPC/One Health Unit, WHO EMRO

AMR Within the Broader Infection Burden

Dr. Koya framed antimicrobial resistance as inseparable from the wider burden of infectious diseases, explaining that meaningful resistance reduction depends fundamentally on decreasing overall infection rates through prevention and comprehensive surveillance. This framing positioned AMR not as an isolated problem but as intrinsically linked to health system performance, infection control practices, and public health infrastructure.

Regional Mortality Trends

Dr. Koya presented concerning regional data showing that mortality related to antimicrobial resistance continues to increase across the Eastern Mediterranean Region. Older populations face disproportionate risk due to higher rates of hospital exposure, intensive care admissions, invasive procedures, and underlying health conditions that increase infection susceptibility.

He highlighted countries with the highest age-adjusted mortality rates, noting that fragile health systems, those affected by conflict, political instability, or severe resource constraints, face a disproportionate burden of AMR-related deaths. These settings often lack the infrastructure, human resources, and stable governance necessary for effective infection prevention and antimicrobial stewardship.

Regional Surveillance Findings

Dr. Koya presented data from WHO's Global Antimicrobial Resistance and Use Surveillance System (GLASS) and the Global Research on Antimicrobial Resistance (GRAM) database, revealing troubling patterns:

Increasing Resistance Rates
Progressive increases in resistance among pathogens causing bloodstream infections,

gastrointestinal infections, and urinary tract infections, the most common serious bacterial infections across the region.

Surveillance System Gaps
Many countries lack essential national surveillance components including standardized laboratory methods, consistent data collection mechanisms, quality assurance systems, and regular reporting infrastructure. Some countries have minimal or no structured AMR surveillance, creating vast blind spots in regional understanding.

Dominant Resistance Patterns
Escherichia coli and *Klebsiella pneumoniae* dominate regional resistance trends, showing particularly high resistance rates against third-generation cephalosporins (commonly used for serious infections), fluoroquinolones (important oral and intravenous antibiotics), and carbapenems (last-resort antibiotics for multidrug-resistant infections).

The widespread carbapenem resistance is especially concerning as it eliminates treatment options and signals the presence of extensively drug-resistant organisms.

Antibiotic Consumption Patterns

Dr. Koya discussed antibiotic consumption as a fundamental driver of resistance development. North Africa emerged as having the highest per capita antibiotic use within the Eastern Mediterranean Region, creating intense selection pressure for resistance.

Unequal Access Paradox
A troubling pattern of inequality exists, with fragile states experiencing inadequate access to essential antibiotics (leading to untreated infections and preventable mortality) while some middle-income countries show excessive consumption (driving resistance). This dual burden complicates regional response strategies.

AWaRe Target Progress
Dr. Koya reported slow regional progress toward WHO AWaRe targets, which recommend that at least 60% of antibiotic consumption should be from the "Access" group, narrow-spectrum antibiotics appropriate for most common infections. Many countries remain far below this target, indicating overuse of broad-spectrum agents that accelerate resistance.

WHO Support to Countries

Dr. Koya outlined comprehensive WHO support mechanisms:

National Action Planning
Technical assistance for developing and implementing national AMR action plans aligned with the Global Action Plan framework.

Surveillance Development
Support for establishing and strengthening laboratory-based surveillance networks, including training, quality assurance, and data management systems.

Vaccination Coverage
Promotion of vaccination programmes that prevent infections, thereby reducing antimicrobial need and resistance pressure.

Stewardship Tools
Development and dissemination of antimicrobial stewardship guidelines, tools, and training materials for healthcare facilities.

Evidence of Impact
Dr. Koya emphasized that countries with adequately funded national action plans demonstrate measurably reduced AMR-related mortality compared to countries without funded plans, providing compelling evidence for investment.

Implementation Challenges

Despite available support mechanisms, significant implementation barriers persist:

Funding Gaps
Many countries lack dedicated domestic financing for AMR activities, relying instead on fragmented project funding that prevents sustained, systematic responses.

Incomplete Awareness Programmes
Public and professional awareness initiatives remain limited in scope and reach, preventing behavior change at the scale necessary for impact.

These challenges underscore the need for sustained political commitment, domestic resource allocation, and long-term capacity building rather than short-term project-based interventions.

Key Takeaways

- AMR-related mortality continues rising regionally, with fragile health systems disproportionately affected
- Surveillance gaps prevent comprehensive understanding of resistance patterns in many countries
- *E. coli* and *K. pneumoniae* resistance to critical antibiotics dominates regional trends
- North Africa has the highest per capita antibiotic consumption in the region
- Countries with funded national action plans demonstrate reduced AMR mortality
- Sustained domestic financing and comprehensive awareness programmes remain critical implementation gaps

4. One Health Approach to Antimicrobial Resistance in Fragile Health Systems: The Case of Palestine

Presenter: Dr. Said F. Abukhattab, Scientific Researcher, Institute of Community and Public Health, Birzeit University, Palestine

AMR as a "Silent Pandemic"

Dr. Abukhattab opened by characterizing antimicrobial resistance as a "silent pandemic", a global health crisis that operates largely beneath public awareness despite projected impacts comparable to major recognized crises including COVID-19 and large-scale natural disasters. This framing highlighted the urgent yet underappreciated nature of the AMR threat.

The Scope of AMR

Dr. Abukhattab emphasized that antimicrobial resistance extends far beyond bacterial infections, encompassing resistance in viruses (antiviral resistance), parasites (antiparasitic resistance), and fungi (antifungal resistance). This broader framing positioned AMR as a comprehensive challenge affecting treatment options across multiple pathogen categories.

Primary Drivers

Misuse and overuse of antimicrobials in human medicine and animal agriculture, combined with environmental contamination through pharmaceutical waste, agricultural runoff, and inadequate wastewater treatment, were identified as central drivers of resistance development and spread.

Challenges in Fragile and Humanitarian Settings

Dr. Abukhattab raised critical concerns about AMR in conflict and humanitarian contexts:

Absence of Early Warning Systems

Fragile settings typically lack effective surveillance and early warning systems for detecting emerging resistance threats, allowing resistant organisms to spread undetected until they cause treatment failures.

Weak Cross-Sector Data Sharing

Even where surveillance exists in individual sectors, poor coordination and data sharing between human health, veterinary, and environmental authorities undermines integrated understanding and coordinated response efforts.

The Situation in Palestine

Dr. Abukhattab provided detailed context on how political division and prolonged instability have exacerbated AMR challenges in Palestine.

Governance Fragmentation

The West Bank is divided into Areas A, B, and C under the Oslo Accords, with Area C

remaining under full Israeli control. This fragmentation creates jurisdictional complexities, restricts movement of people and goods, and prevents unified health system governance.

Impact of Conflict
Extensive destruction in Gaza following October 7, 2023, included severe damage to hospitals, healthcare facilities, residential infrastructure, and essential services. Movement restrictions, checkpoints, and permit requirements in the West Bank disrupt healthcare delivery, medical supply chains, patient access to care, and disease surveillance systems.

AMR Burden
Based on 2019 data, the most recent available, antimicrobial resistance was identified as the fourth leading cause of death in Palestine, representing a substantial and underappreciated contributor to mortality.

Animal Sector Concerns
Palestine was identified as a regional hotspot for antimicrobial use in the animal sector, with intensive use in poultry, livestock, and aquaculture creating selection pressure for resistance and potential for transmission to human populations through food chains and direct contact.

National Response Framework

Dr. Abukhattab referenced Palestine's national AMR action plan, which focuses on five strategic priorities:

1. **Surveillance:** Establishing systematic monitoring of resistance patterns
2. **Infection Prevention and Control:** Reducing healthcare-associated infections
3. **Antimicrobial Use Optimization:** Promoting appropriate prescribing and use
4. **Awareness:** Building public and professional understanding
5. **Research:** Generating evidence for policy and practice

Despite these strategic priorities, implementation faces severe challenges related to political instability, resource constraints, and fragmented governance.

One Health Research Evidence from Birzeit University

Dr. Abukhattab presented findings from One Health research conducted by the Institute of Community and Public Health at Birzeit University, focusing on food safety and resistance in *Salmonella* and *Campylobacter*—important foodborne pathogens.

Surveillance System Weaknesses
Research revealed that regional surveillance systems remain fundamentally weak, with limited laboratory capacity for pathogen identification and antimicrobial susceptibility testing, inconsistent data reporting across facilities and regions, and lack of standardized methods preventing meaningful data aggregation.

Field Study Findings
Comprehensive field studies conducted across farms, food production facilities, and agricultural workers demonstrated shared transmission patterns between animals and humans, confirmed through whole-genome sequencing that identified genetically identical or closely related strains across different hosts and environments.

Genomic Insights

- **Novel genetic types:** Detection of previously unreported genetic variants suggesting ongoing evolution
- **Rapid bacterial evolution:** Observable genetic changes occurring over short timeframes
- **Mobile resistance elements:** Identification of genes carried on plasmids and other mobile genetic elements capable of transferring between bacterial species

These findings confirmed that resistance can spread rapidly across the food production chain and between species, validating the necessity of One Health surveillance.

Innovation in Fragile Settings: Wastewater-Based Surveillance

Dr. Abukhattab described an innovative solution developed through collaboration with national institutions: wastewater-based surveillance for AMR monitoring. This approach offers several advantages in conflict-affected settings:

Accessing Inaccessible Areas
Wastewater sampling enables surveillance in regions where traditional clinical surveillance is impossible due to conflict, movement restrictions, or destroyed infrastructure.

Population-Level Monitoring
Wastewater provides a composite sample representing entire communities, revealing resistance patterns across populations rather than just individuals seeking healthcare.

Environmental Sampling and Metagenomic Analysis
Advanced molecular methods enable detection and characterization of resistant bacteria and resistance genes directly from environmental samples without requiring clinical specimens or functioning healthcare facilities.

This innovation demonstrates how resource constraints and access limitations can drive creative solutions that may ultimately provide surveillance advantages even in stable settings.

Key Takeaways

- Political fragmentation and conflict severely compound AMR challenges in Palestine
- AMR was the fourth leading cause of death based on 2019 data

- Palestine represents a regional hotspot for antimicrobial use in animal agriculture
- Weak surveillance infrastructure and inconsistent reporting prevent comprehensive AMR monitoring
- Genomic evidence confirms cross-species transmission in food production systems
- Wastewater-based surveillance offers innovative solutions for AMR monitoring in inaccessible areas
- Fragile settings require adapted approaches that account for governance constraints and security limitations

Interactive Question and Answer Session

The webinar concluded with an extensive Q&A session addressing practical implementation challenges, resource constraints, and innovative solutions.

Closing Remarks

Maryam Wakkaf, Technical Working Group Member, The Global Health Network MENA

Maryam Wakkaf expressed sincere gratitude to the expert speakers for their insightful contributions on antimicrobial resistance challenges and solutions across the MENA region. She reflected that the session successfully illustrated both the profound complexity of AMR as a multi-sectoral challenge and the remarkable innovation emerging through One Health approaches.

She specifically highlighted the progress demonstrated in integrated genomic surveillance expanding regional capacity and addressing global data gaps, improved data sharing mechanisms breaking down traditional silos, and preventative strategies addressing upstream drivers of resistance rather than only responding to established problems.

Maryam extended thanks to the organizing teams from WHO EMRO and The Global Health Network, with special recognition for the collaborative support provided by UK, Africa, and MENA regional teams. She acknowledged colleagues who contributed to planning, coordination, and logistical support for the event, while encouraging participants to remain engaged through The Global Health Network's ongoing initiatives and platforms.

Godwin Pius Ohemu, Chair and Graduate Assistant, AMR Knowledge Hub

Godwin Pius Ohemu formally closed the broader World Antimicrobial Awareness Week 2025 webinar series, which included regional sessions across Africa, Asia, Nigeria, and the MENA region over multiple days. He reflected on the collective knowledge shared by dozens of expert speakers, the engagement of hundreds of participants from diverse countries and contexts, and the wealth of practical strategies and innovative solutions presented.

He extended appreciation to all speakers who contributed their time and expertise, attendees who participated actively and thoughtfully, and support staff from organizing institutions who enabled the technical delivery and coordination of the series.

Godwin encouraged participants to continue collaborating beyond the webinar format, emphasizing that sustained progress on AMR requires operationalizing the One Health approach in daily practice, policy development, and research activities. He reminded participants that recordings and presentation materials would be made available through The Global Health Network platform and the AMR Knowledge Hub, ensuring continued access to the knowledge shared during WAAW 2025.

Key Takeaways

Regional Context

- The Eastern Mediterranean Region has the highest and fastest-growing antibiotic consumption globally
- African and Middle Eastern genomic data remain severely underrepresented in global databases
- Fragile and conflict-affected settings face disproportionate AMR burdens with limited surveillance and response capacity

Genomic Surveillance

- Egypt's national *Staphylococcus aureus* genomic collection represents one of the largest in Africa
- Cross-species transmission confirmed through genomics validates integrated One Health approaches
- Regional sequencing hubs enable genomic surveillance participation without major infrastructure investment

One Health Implementation

- Legislative gaps and weak regulatory frameworks represent critical barriers to coordinated AMR action
- The quadripartite framework (WHO, FAO, UNEP, WOAH) provides mechanisms for global and regional coordination
- Engaging farmers and agricultural workers is critical yet undervalued for reducing antimicrobial use in food production

Surveillance and Data

- Many countries lack essential national surveillance components for systematic AMR monitoring
- *E. coli* and *K. pneumoniae* resistance to critical antibiotics dominates regional trends
- Countries with funded national action plans demonstrate reduced AMR mortality

Innovation in Fragile Settings

- Palestine's wastewater-based surveillance enables AMR monitoring in conflict-affected and inaccessible areas
- Environmental sampling and metagenomic analysis provide population-level resistance data
- Conflict and political instability compound AMR challenges through healthcare disruption and governance fragmentation

Financing and Sustainability

- Funding in fragile settings relies heavily on international donors and project-based support
- Sustained domestic financing and institutionalized programmes are essential for long-term progress
- Countries require transition from project-based interventions to systematic, sustained responses