Making the invisible visible

Navigating goal conflicts between antibiotic resistance and the Sustainable Development Goals

Summary report from online workshop discussions

27 and 29 April 2026 |

Organized by BRIDGE-ABR: Building transdisciplinary bridges to navigate sustainable development goal conflicts on antibiotic resistance

About BRIDGE-ABR

BRIDGE-ABR is a transdisciplinary collaboration within the **Uppsala University Future Institutes Goal Conflict initiative**. It brings together ReAct, Uppsala University and Stockholm Resilience Centre to make conflicts and synergies between antibiotic resistance action and the Sustainable Development Goals visible and actionable.

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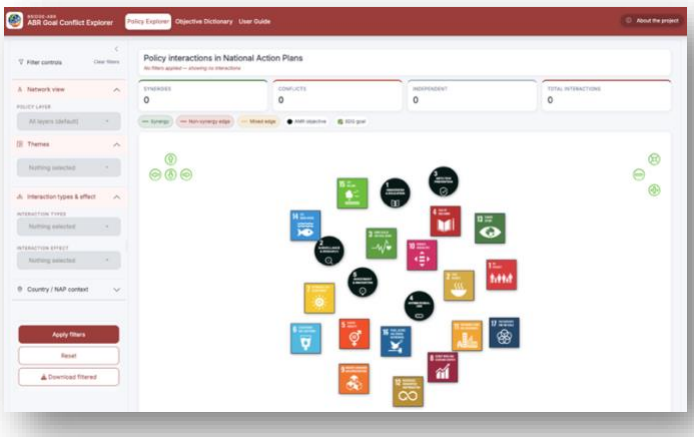
Executive summary

Core message

The global challenge of antibiotic resistance (ABR) is accelerated by the misuse and overuse of antibiotics across sectors. Efforts to curb this trend often clash with vital development priorities, which risk leading to policy silos, misalignment and inefficiencies. Addressing ABR hence requires shifting from isolated control measures to addressing fundamental goal conflicts with broader sustainable development goals (SDGs). Effectively navigating these tensions requires not only making trade-offs visible, but also understanding how they emerge and evolve over time, and applying governance responses appropriate to their stage of evolution. Rather than managing ABR in isolation, this can help prevent interventions in one sector from compromising outcomes in another sector, while ensuring that vulnerable populations are not disproportionately burdened by the economic costs of transition to a new policy direction.

The BRIDGE-ABR project, established within the Uppsala University Future Institutes (UUniFI) Goal conflict initiative, is a transdisciplinary collaboration platform that seeks to make the goal conflicts between and within ABR and the SDGs more visible, while strengthening the research-to-policy and deliberation nexus for developing sustainable solutions on ABR. The project aims to develop an insight framework to help policymakers anticipate complexities and avoid unintended consequences across sectors. Such support may become increasingly important as the need to manage trade-offs and leverage synergies grows in the context of limited financial resources.

The BRIDGE-ABR online co-creation workshop, *"Making the Invisible Visible"*, was organized to explore and refine a map of policy goal conflicts and synergies within and between ABR actions and SDG implementation. The workshop brought together participants from health, agriculture, food systems, environment, water and sanitation, policy, civil society and research. Participants used a prototype of the Goal Conflict Explorer, a mapping and visualization tool developed within the project, to guide facilitated plenary and breakout-group discussions on concrete examples of conflicts, synergies and implementation challenges across sectors.



Screenshot of the Goal Conflict Explorer used in the workshop

The discussions showed that goal conflicts are often not visible from the way policies are formulated or from their stated objectives. At the objective level, many development priorities can support ABR goals. Stronger health systems can improve access to appropriate treatment, diagnostics and stewardship; water and sanitation investments can reduce infections and antibiotic demand; and more resilient food systems can improve food security and disease prevention. However, these synergies depend on how policies are implemented and on whether the necessary systems and capacities are in place. For example, expanding health-care access without adequate diagnostic capacity may increase empirical antibiotic use; expanding wastewater reuse without sufficient treatment and monitoring may create pathways for antibiotic residues or resistant organisms; and increasing food production through intensification without

adequate biosecurity and veterinary support may increase disease pressure and reliance on antimicrobials. Similarly, requiring antibiotic manufacturers to improve wastewater treatment can reduce environmental contamination, but may increase production costs and potentially affect medicine affordability if the costs of transition are not adequately addressed.

In addition to unpacking goal conflicts and their implications, the workshop identified major cross-cutting challenges to managing these tensions effectively, including: limited awareness and attention to the problem of antibiotic resistance, persistent institutional silos separating SDG and ABR policy implementers, as well as severe constraints in system capacity and resources. Beyond addressing these wider issues, strengthening synergies in preventative approaches and taking an anticipatory approach to managing goal conflicts in policy development and implementation design, potential trade-offs can be made visible before they materialize.

Key insights and messages from the workshop

Identifying and managing goal conflicts:

- **Goal conflicts can emerge even when policy objectives appear aligned**. ABR and sustainable development goals may be mutually supportive in principle, yet tensions can arise during implementation through financing, institutional capacity, incentives, market conditions and other practical constraints. Recognizing this distinction is essential for understanding where trade-offs may develop.
- **Make goal conflicts visible early**. Identifying where ABR and sustainable development policies interact can reveal trade-offs, synergies and unintended consequences that may otherwise remain hidden across sectors or institutions. Greater visibility can help decisionmakers understand where risks are emerging, who may be affected, and where opportunities exist to strengthen synergies or intervene before problems become more difficult to address.
- **Adaptive governance is needed to manage goal conflicts**. Making trade-offs visible is not enough. Potential risks should be anticipated when policies are designed; supporting capacity and viable alternatives should develop as interventions expand; monitoring and cross-sector accountability should be strengthened when consequences become harder to detect; and financing, institutional change and transition support may be needed once dependencies make changing course more difficult.

Recommended priority policy directions:

- **Post-2030 Agenda Alignment:** As official negotiations on the post 2030 Agenda officially start in 2027, deliberately integrating ABR across revised SDG targets is essential to avoid unintended consequences and system lock-in. Countries should also embed trade-off screening and management as part of the processes to update National Action Plans.
- **Conducting early policy screening to prevent lock-in:** Screen policies and investments for ABR-related risks during both design and implementation phases, ensuring that goals, financing, regulation, and delivery mechanisms are aligned and do not create unintended long-term dependencies. Pre-screening could also contribute to maximize constrained resources and deliver higher impact and efficiency in tight fiscal environments.
- **Strengthening cross-sectoral Literacy, Communication and Collaboration:** Invest in cross-sectoral learning, communication and collaboration to strengthen awareness of ABR-related goal conflicts and coordination between ABR and SDG policy implementers and stronger institutional links between ABR, sustainable development, finance and sectoral governance mechanisms.
- **Ensuring equitable and inclusive sustainability transitions:** Assess how policy impacts are distributed across stakeholders and ensure that transitions include safeguards, affordable alternatives, and targeted support for vulnerable and low-capacity groups.
- **Investing in integrated interventions with multiple benefits**: Prioritize and finance integrated intervention packages that generate co-benefits across sectors, while screening for trade-offs and unintended consequences to maximize effectiveness and sustainability.

1. Introduction

Antibiotic resistance (ABR) is both a health challenge and a sustainable development concern. Within the wider concept of antimicrobial resistance (AMR), resistance to antibiotics is one of the greatest and most urgent global risks.[1] By making bacterial infections more difficult to treat, it can increase health-care costs, undermine livelihoods and food security, and constrain progress towards poverty reduction. At the same time, its emergence and spread are influenced by development conditions, including access to health care, sanitation infrastructure, food-production practices and environmental management. The relationship between ABR and the Sustainable Development Goals (SDGs) therefore operates in both directions: resistance can undermine development gains, while development policies can influence the conditions in which resistance emerges and spreads.

Yet the connections between ABR and sustainable development are not consistently reflected in policy documents. Nguyen-Thanh et al. examined the alignment between AMR and development policies across 10 African and Asian countries[2], identifying several shared priorities but also important gaps, with broader social, environmental and institutional factors contributing to resistance left unaddressed by either national agenda. The author also used a large language model in another study[3] to examine whether policy objectives and proposed implementation measures supported or conflicted with one another. Preliminary findings suggested that apparently compatible objectives did not necessarily translate into compatible implementation approaches. For example, agricultural intensification intended to improve food security could increase antimicrobial use and create tensions with stewardship objectives. However, both studies examined policy documents rather than implementation outcomes.

Their findings therefore identified gaps in policy coverage and potential interactions, rather than establishing how these policies affected one another in practice. This distinction highlighted the need to complement document analysis with deeper knowledge insights into the conditions under which policies are implemented.

The BRIDGE-ABR workshop, ***Making the Invisible Visible***, was therefore convened to build on this research, explore these potential tensions and identify opportunities for better alignment between ABR action and sustainable development. It combined existing policy research with participants' experience across human health, agriculture and food systems, economy and equity, and environment and climate. The workshop sought to examine how policy interactions arise in different settings and to inform further research and policy deliberation on managing trade-offs and strengthening synergies between the two agendas.

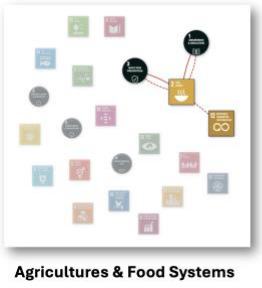
[1] Antimicrobial Resistance (AMR) and Antibiotic Resistance (ABR) are often used interchangeably both in scientific papers and policy documents. In strict technical terms, antibiotic resistance implies resistance to antibiotics and AMR includes resistance to drugs both for treatment of bacteria and other microbes, including viruses and protozoa. However, it is apparent that the term AMR is used in many contexts today to refer to antibiotic resistance. In this policy brief the terms antibiotic resistance and AMR is used interchangeably, referring to antibiotic resistance or "bacterial AMR".

[2] *Nguyen Thanh, Luong, et al. "'When global health meets global goals': assessing the alignment between antimicrobial resistance and sustainable development policies in 10 African and Asian countries." BMJ Global Health 10.3 (2025): e017837.*

[3] *Nguyen Thanh, Luong, et al. "A Large Language Model approach to quantify interactions between AMR and SDG action: Knowledge for seeking synergy solutions." (2025).*

2. Workshop structure and format

1	**Participants:** The workshop brought together policymakers, AMR focal points, public-health and veterinary experts, environmental and WASH (Water, Sanitation and Hygiene) specialists, researchers, civil-society organizations and development partners from Africa, Asia-Pacific, Europe, Latin America and North America. Discussions were recorded for internal use.
2	**Common framing and mapping**: A presentation introduced prior research[4] comparing national ABR action plans with SDGs plans in 10 selected Asian and African countries. Participants discussed synergy, independence and conflict at both objective and implementation levels and explored a prototype of the Goal Conflict Explorer.
3	**Four thematic breakout discussions**: Breakout groups examined SDG/ABR related goal conflicts within four selected themes: (1) Human health and health care systems; (2) Agriculture and food systems; (3) Economy, poverty and equity; and (4) Environment, biodiversity and climate action. Each group considered conflicts and synergies, as well as underlying mechanisms, affected groups and possible solutions.
4	**Interactive contribution and report-back**: Mentimeter and Padlet were used to gather examples, test concepts and allow contributions beyond the live breakout group. Each group reported key insights to plenary.
5	**Cross-cutting governance and use cases:** Participants discussed how to manage goal conflicts in policy practice, which institutions should be involved, how to prioritize conflicts, how evidence should be communicated, and how to manage goal conflicts in the update of National Action Plan on ABR and the post-2030 agenda.



Agricultures & Food Systems

How do these examples resonate with your practical experience in your respective field of work?

Do you recognize these goal conflicts?





Examples of tools used to facilitate the discussion during the workshop

[4] *Nguyen Thanh, Luong, et al. "A Large Language Model approach to quantify interactions between AMR and SDG action: Knowledge for seeking synergy solutions." (2025).*

3. Framing goal conflicts: Evidence and workshop insights

What is a goal conflict?

Participants discussed the meaning of the term "goal conflict" and used several overlapping terms - incoherence, misalignment, trade-off, unintended consequence, competing priorities and difficult choices. Building on these discussions and for the purposes of this report, a goal conflict can be defined as occurring *when the pursuit of one policy objective or implementing one intervention reduces the ability to achieve another objective,* and as a result often shifts disproportionate costs or risks on to another group or sector, or creates a risk of such outcomes.

Objective-level alignment can hide implementation conflict

A recurring workshop observation was that alignment between ABR and SDG policies is often stronger at the policy objective level than at the implementation level. Policies promoting clean water, stronger health systems, sustainable food systems, climate mitigation and poverty reduction generally support ABR prevention. However, whether these synergies are realized depends on how policies are implemented, including financing, institutional mandates, technical capacity, supply chains, regulation and enforcement. These factors may lead to unintended conflicts when policy objectives appear aligned. Goal conflicts can also occur within the same policy agenda, such as between access and stewardship of antibiotics within the ABR agenda, or between promoting resource circularity (such as wastewater reuse) and ensuring safe waste treatment within the sustainability agenda.

Illustrative scenarios used to open the discussion in the workshop[5]

- Expanded healthcare and social protection can improve equity while simultaneously increasing antibiotic demand if prescribing regulation, diagnostics and stewardship are inadequate.
- Urban planning that promotes accessible recreational and sports facilities can support health and well-being. However, shared facilities, such as swimming pools with inadequate hygiene or water treatment, may increase infection risks and, indirectly, antibiotic use.
- Agricultural intensification, through increased use of inputs such as seeds, fertilizers and pesticides and higher livestock densities can increase food production. However, without adequate farm biosecurity, veterinary services and environmental safeguards, it may increase disease risks and antimicrobial use, and create environmental conditions that favor the selection or spread of resistance.
- Expanded food access can improve nutrition, but weak food-safety practices, inspection and regulatory capacity may increase the risk of foodborne illness and the spread of antibiotic-resistant bacteria as distribution expands.
- Climate action can reduce infection drivers, while poorly managed waste from green technologies (such as electric-vehicle and battery materials) may release metals that contribute to the co-selection of ABR.

Other terms used in the report

Synergy	A policy or intervention supports both ABR and SDG objectives, such as WASH reducing infections, antibiotic demand and household healthcare expenditure.
Implementation conflict	Policy objectives may appear aligned, but their implementation can create unintended problems, such as wastewater reuse increasing exposure to antibiotic residues or resistant organisms when treatment is inadequate.
Distributional impacts	A policy may benefit society overall, while some groups bear a disproportionate share of the costs or risks, such as patients, farmers, local authorities or low-income communities.

[5] *Nguyen Thanh, Luong, et al. "A Large Language Model approach to quantify interactions between AMR and SDG action: Knowledge for seeking synergy solutions." (2025).*

Policy blind spot	ABR and SDG policies may address related issues without recognizing their connections or coordinating actions, potentially overlooking conflicts, risks or opportunities for synergies.

The next chapter outlines a summary of key highlights from each of the thematic discussions, with a focus on policy and practical implications of the goal conflicts and synergies identified. Participants were allocated to two of the four thematic sub-groups and invited to provide examples of goal conflicts and synergies between ABR and SDG policies (see **Annex D**I) and their implementation within each theme, as observed from their respective experience and expertise. A detailed list of examples identified in these discussions can be found in **Annex A.**

4. Key findings by theme

1 Human health and health care systems

A central tension identified in human health was "access versus excess". Participants described three interconnected challenge: ensuring timely access to effective antibiotics, prevent unnecessary or inappropriate use, and providing the services and resources needed to support both. These include qualified health care staff, quality-assured medicines, WASH-services, surveillance and social protection, which are often insufficient, unevenly distributed or unaffordable.

Improving access may increase inappropriate antibiotic use

Universal health coverage (UHC), social protection services and poverty reduction policies can be designed to reduce reliance on cheap, unregulated or incomplete antibiotic courses. At the same time, expanded access can increase consultations and medicine demand if stewardship and diagnostics are weak. Participants stressed that restricting Over-The-Counter (OTC) sales without strengthening primary care, affordability and rural access can make a formal stewardship gain at the cost of real access for low-income communities. At the same time, access restrictions may also create tensions with gender equality objectives, disproportionately affecting women of reproductive age who have specific infection-related healthcare needs during pregnancy, childbirth and the postpartum period.

Health-system vulnerability to climate shocks and urban pressures

Examples from India and Ghana linked increased incidents of flooding (due to climate change) to water-borne infection and increased empirical or prophylactic antibiotic use. A participant described doxycycline being distributed after floods for leptospirosis prevention, but with limited follow-up of adherence. Another example from Benin and other countries in West Africa showed how urban improvement can raise central-city living costs and displace poorer communities to peripheral settlements with weaker sanitation and higher infection risks.

Diagnostics are a system capacity and equity issue

Diagnostics support targeted treatment and surveillance, but their costs are often excluded from social insurance and paid out of pocket. In India, participants described clinicians choosing empirical treatment because of patient affordability, while universal testing could overwhelm existing laboratory capacity. The resulting "catch-22" illustrates why a stewardship policy cannot be separated from financing and laboratory planning.

Balancing low prices with quality and safe production

Participants highlighted a tension between keeping medicine prices low and ensuring long-term quality and reliable supply, using the Philippines as an example. Choosing the lowest-price supplier may reduce costs in the short term, but can create challenges for quality and supply resilience. Local pharmaceutical production can also improve access to medicines and support economic development, but waste from pharmaceutical manufacturing and hospitals can increase environmental contamination when wastewater is not properly managed.

Strong synergies already exist and should be leveraged

Education, WASH, infection prevention, integrated diagnostics, surveillance and accountable One Health governance were repeatedly identified as co-benefit areas. Examples included India's National Action Plan 2.0 linking AMR awareness to education across departments; Thailand's UHC auditing and hospital accreditation contributing to reducing unnecessary antibiotic use; and India's health-budget support for sanitation and hygiene programs also contributing to safe drinking water and reduced infections in the communities. Participants also proposed integrating AMR into existing human immunodeficiency virus (HIV), malaria and tuberculosis (TB) diagnostic and surveillance platforms rather than creating parallel systems.

Highlights from the discussion

Core tension	Equitable access to effective antibiotics versus stewardship when primary care, diagnostics and affordability are weak.
Affected groups	Low-income patients, rural communities, women around pregnancy and childbirth, health workers and under-resourced facilities.
Implementation risks	OTC markets, incomplete courses, empirical treatment, lowest-price procurement, weak wastewater control and fragmented reporting.
High-value synergies	UHC with quality controls, WASH, Infection Prevention and Control (IPC), education, integrated diagnostics and surveillance, and SDG-17 partnerships.
Implication for action	Regulation must be paired with affordable alternatives and strengthened services; otherwise stewardship may deepen inequity.

2 Agriculture and food systems

The agriculture discussion centered on the tension between producing affordable food and producing it safely. Intensification can increase food production and farmer's income, but higher animal density, genetic uniformity, heat stress and weak biosecurity can increase disease risks and antibiotic use. These effects can extend beyond the farms and aquaculture facilities through water, manure, trade and food-supply chains.

Misalignment of public and private costs and benefits

Participants described farmers being asked to finance vaccination, diagnostics, veterinary services, safer water, waste management and infrastructure, while the benefits of reduced resistance accrue broadly. In India and other low-and-middle-income countries (LMIC), smallholders may lack the financial resources to make these investments. In Thailand's shrimp sector, regulations were described as strong, while veterinary and diagnostic services were costly or difficult to access and farmers carried much of the production risk.

Fragmented regulation can obscure responsibility

The "burger supply chain" was used to show how meat, lettuce, tomatoes, bread, water, waste and food handling can fall under different agencies. When a foodborne outbreak occurs, fragmented mandates may delay action, make source tracing difficult and leave farmers or producers carrying reputational and financial losses. Related examples concerned imported seeds and flower bulbs that met formal biosecurity requirements while participants reported resistance-related risks not captured by existing rules.

Trade and growth narratives can dominate ABR concerns

Participants from South America discussed free-trade agreements and agribusiness expansion as policies framed around poverty reduction and employment. They argued that these narratives can marginalize concerns about antibiotic use and make agroecological alternatives harder to advance. In Canada, agricultural economic importance and coordinated industry lobbying were described as factors that can outweigh public-health arguments for stricter biosecurity or antimicrobial rules.

Nature-based and prevention-first alternatives were proposed

Examples included ethnoveterinary approaches for mastitis in India, backyard poultry based on native breeds, agroecological and regenerative producer networks in Argentina and other Latin American countries, and low-water or dry sanitation that keeps waste out of waterways. Participants also stressed that regenerative or circular systems are not automatically safe: manure, wastewater and organic soil can carry residues, resistant organisms or resistance genes unless treatment and monitoring are built in.

Water links farm, city, food and ecosystem health

Examples from the Asia-Pacific highlighted how typhoons, floods and shared water systems affect irrigation, fresh produce and aquaculture. In Thailand, participants described resistance genes and fecal markers flowing into aquaculture, while disinfectants used to manage water may themselves select for resistance. WASH programs that fail do not integrate livestock manure management and biosecurity were seen as a missed opportunity. Examples from Burkina Faso showed how these issues can be integrated into WASH interventions, including through safer recycling practices, although such approaches are not yet mainstream.

Highlights from the discussion

Core tension	Food security and livelihoods versus food safety, stewardship and long-term antibiotic effectiveness.
Affected groups	Smallholders, farm workers, consumers, exporters, local communities, animals and aquatic ecosystems.
Implementation risks	Intensification, weak veterinary access, fragmented regulation, unsafe manure reuse, trade pressure and poorly managed shared water systems.
High-value synergies	Vaccination, biosecurity, clean water, agroecology, native breeds, integrated WASH and biosecurity, and safer circular systems.
Implication for action	Integrate ABR prevention into agricultural and food-system policies, balancing food security and livelihoods with effective regulation, safer production practices and environmental safeguards.

3 Economy, poverty and equity

Economic goals and financing decisions influence almost every ABR pathway. At the national level, participants described national budgets for health and ABR interventions often receives lower priority than investments expected to generate economic returns. At the healthcare delivery and retail levels, financial incentives may encourage unnecessary antibiotic prescribing or sales. Participants also highlighted how the cost of diagnostics, pollution control and safe production can be shifted to patients, farmers or public systems. They emphasized the reverse relationship: effective ABR prevention can reduce hospital stays, household expenditure and lost productivity. Participants also noted that achieving the five objectives of the Global Action Plan on AMR could directly contribute to reducing poverty.

The tension between affordability and stewardship

In India and other LMIC settings, participants described patients with low incomes relying on informal providers or over-the-counter sales because consultations, diagnostic testing or full treatment courses are unaffordable. While investments in diagnostics and surveillance are necessary, their costs often falls on communities and patients, creating goal conflicts between stewardship, affordability and equitable access to care. A Kenyan example involved a senior health care official obtaining an antibiotic without prescription from a high-end pharmacy, illustrating both enforcement gaps and retail incentives. Pharmacists were reported to fear losing customers to competitors if they refused a sale.

Governance gaps can reproduce inequality

A participant described Kenya's devolved AMR architecture, where only a minority of counties had established County Antimicrobial Stewardship Interagency Committees by the end of 2023. Poorer and more rural counties were described as less likely to have these structures despite high infectious-disease burdens. The example highlighted the tension with SDG 16 on effective institutions with SDG 10 on reduced inequalities.

Taxes, subsidies and industrial policy create mixed effects

Participants discussed new taxes increasing the cost of diagnostics and medicines before households see public benefits, and tax exemptions for manufacturers lowering prices while weak environmental compliance allows pollution. Ghanaian examples linked mining-led growth to heavy-metal exposure, fragmented regulation and wider health effects, including on antibiotic resistance. The 2021 Sri Lankan pesticide ban was raised as a warning that rapid environmental reform may be beneficial to AMR policies, but without transition support, it could threaten both production and poverty goals.

Education, WASH and quality care create economic co-benefits

Participants identified a strong economic case for prevention through the synergy between prevention policies and responsible resource management and economic growth: fewer infections and complications, shorter hospital stays, lower out-of-pocket expenditure and a healthier workforce. Specific entry points included boreholes, piped water in informal settlements, sanitation upgrades, standard treatment guidelines and vaccination. A participant cited a 2024 AMR literacy survey across African countries and Kenyan counties to show the scale of the education gap among health workers. Strong synergistic co-benefits from strengthening gender sensitive AMR policies were also highlighted.

Global market rules shape equity

The discussion connected ABR with debates on intellectual property, technology transfer, pandemic countermeasures and pooled purchasing and the tensions and potential synergies they represent in relation to policies to promote access to antibiotics Participants argued that the next generation of antibiotics and diagnostics should not repeat inequities seen during COVID-19. Regional pooled procurement and rapid diagnostic tests were proposed as possible access,

quality and cost synergies. The solidarity and access strategies of the TB and HIV movements were suggested as relevant lessons.

Highlights from the discussion

Core tension	Short-term economic growth, commercial incentives and fiscal pressures versus affordable access, prevention, stewardship and long-term resilience.
Affected groups	Poor households, rural patients, women, informal workers, small businesses, low-capacity countries in the Global South.
Implementation risks	Out-of-pocket diagnostic costs, unintended effects of taxation, OTC markets, weak regulation, unequal subnational institutions and pollution externalities.
High-value synergies	Prevention, ABR education, standard quality care, pooled procurement, regional cooperation, supported by country-specific return-on-investment (ROI) evidence.
Implication for action	Align financing, market incentives and regulation with ABR prevention while ensuring affordable access and equitable distribution of costs and benefits.

4 Environment, biodiversity and climate action

Environmental and climate policies often show synergies with ABR prevention at the policy objective level, but potential conflicts may arise during implementation. Climate mitigation, ecosystem protection and clean water can reduce infection risks. However, the implementation of circular systems, wastewater reuse, renewable-energy supply chains and climate-adaptation measures may create new exposure pathways if antibiotic residues, resistant organisms, resistance genes and co-selective pollutants are not adequately managed.

Pollution control can affect access and prices

Participants discussed a tension related to the "polluter pays" principle in antibiotic manufacturing. Stricter wastewater controls may increase production costs, including those of active-pharmaceutical-ingredients, potentially affecting medicine affordability unless the costs of transition are addressed. This illustrates a potential conflict between environmental protection and affordable access to antibiotics.

Green-transition materials can carry hidden ABR risks

Examples from Australia, Ecuador and Argentina linked expanded mining for lithium, cobalt and copper to heavy-metal contamination, water conflict and potential co-selection of ABR. In Australia, a participant described first rains after drought washing accumulated mining residues into rivers and associated this with outbreaks affecting fisheries, recreation or crops. In Latin America, mining expansion was discussed in relation to clean-energy narratives, economic growth and protection of Andean or glacier-fed water sources.

Circular systems need treatment, not just reuse targets

Wastewater and resource reuse can support sustainability, but participants stressed that the treatment and monitoring needed to reduce ABR risks can be costly. Examples included poultry manure used in Egyptian aquaculture ponds, reclaimed-water restrictions and constructed wetlands in Tunisia, and highly chlorinated recycled water in South Australia. "Flush and forget" sanitation approaches were criticized for potentially spreading nutrients and contaminants into water systems.

Climate adaptation can reduce or increase antimicrobial use

Examples of positive synergies included seaweed or probiotic feed supplements, precision aquaculture and biofloc systems, poultry-litter management and aquaculture shading in the Philippines. Participants reported that these measures may reduce greenhouse gases, heat stress, disease risks and antimicrobial use. Conversely, climate-related pressures such as heat stress, typhoons, salinity and water scarcity may increase prophylactic or empirical use and drive unsafe water practices.

Biodiversity remains a major evidence gap

Participants linked industrial monocultures, land conversion, intensive production and some renewable-energy developments with biodiversity loss and potential ABR risks. At the same time, the direct relationships between ABR and biodiversity policies, protected areas and ecosystem restoration were identified as important evidence gaps. Regenerative agriculture was viewed as a potentially beneficial pathway, provided that manure, water and other waste streams are managed safely.

Highlights from the discussion

Core tension	Environmental and climate progress versus unmanaged waste, pollution control costs, and new pathways for the co-selection or transmission of ABR.
Affected groups	Communities near mines and factories, farmers, aquaculture producers, water users, wildlife and future generations.
Implementation risks	Heavy metals, antibiotic residues, unsafe reuse, disinfectant-related selection pressures, heat stress, salinity and biodiversity loss.
High-value synergies	Climate-smart prevention, constructed wetlands, precision farming, clean water, safer sanitation and effective waste management.
Implication for action	Integrate ABR considerations into environmental, biodiversity and climate policies, ensuring appropriate safeguards, safe resource management and monitoring to prevent unintended consequences.

5. Cross-cutting challenges related to goal conflict management

Across the workshop discussions, several recurring challenges in identifying and addressing goal conflicts were recognized across health, agriculture, food systems, environment and economic policy.

At the national level, participants highlighted **limited awareness and political attention to ABR.** This includes the challenge of communicating the complexity of the problem, and how it often competes with more immediate policy priorities, such as economic development, food security and access to health services. They also emphasized persistent challenges in **policy coordination and integration,** including fragmented governance arrangements and a tendency for policymakers and implementers working on ABR, health, agriculture, environment and SDG policies to work in silos without effective platforms for collaboration.

Limited system capacity and resource constraints were identified as major factors affecting how goal conflicts are recognized, assessed and managed. Participants pointed to insufficient financial resources (often linked to competing priorities and attention), institutional capacity and data to support integrated decision-making and implementation. Cultural and contextual factors, institutional norms and insufficient attention to equity and distributional impact were also identified as influencing how trade-offs were perceived and addressed.

Another recurrent theme concerned the tension between **short term incentives and long-term sustainable objectives,** how policies designed to address immediate development needs or sectoral priorities over time can contribute to unintended consequences for ABR, if tradeoffs are not adequately considered. Discussions often returned to questions of whether the trade-offs are intentional or unintentional, inherent or avoidable and whether they remain visible to decision makers as policies are implemented and scaled. More broadly, participants emphasized that hidden or poorly understood trade-offs are often reinforced by fragmented governance, limited coordination, and inadequate mechanisms for integrating diverse policy objectives.

In summary, the range of challenges discussed underscore the importance of strengthening mechanisms to identify, anticipate, and manage trade-offs while actively fostering synergies across policy domains.

6. How goal conflicts evolve: Insights from Systems Thinking

Building on the insights from the workshop discussions, we extend the "Anthropocene traps framework" as an additional analytical lens to examine how development policies aimed at achieving the SDGs may unintentionally create conflicts with ABR objectives. The framework helps explain how the goal conflicts may emerge, evolve and become increasingly difficult to address over time.

Søgaard Jørgensen et al. (2024)[1] use antibiotics and antibiotic resistance as an example of how solutions that initially bring major benefits can create unintended consequences and long-term dependencies. Antibiotics transformed healthcare, but their widespread use increased reliance on them and contributed to the spread of resistance. Over time, inadequate monitoring and delayed responses made these consequences more difficult to address, while healthcare systems became increasingly dependent on antibiotics despite their declining effectiveness. This example illustrates the concept of "Anthropocene traps", in which practices or interventions that initially address important needs can, as they expand and become embedded in institutions, infrastructure and behaviors, generate unintended consequences and dependencies that are difficult to reverse. Søgaard Jørgensen et al. (2024) describe four phases in this process: **initiation, scaling, masking and trapping.**



For example, policies promoting agricultural intensification may initially improve food security and farmers' incomes (**initiation**). As production expands, higher animal density and inadequate biosecurity or veterinary services may increase reliance on antimicrobials to manage disease risks (**scaling**). Over time, the consequences for ABR may become difficult to recognize as resistance spreads through food, water and supply chains, often beyond the responsibilities of individual sectors (**masking**). If production systems become dependent on these practices, reducing antimicrobial use without affordable alternatives may threaten farmers' livelihoods and become increasingly difficult to achieve (**trapping**).

Similarly, climate adaptation policies promoting wastewater reuse for irrigation may initially help address water scarcity and support agricultural production (**initiation**). As these practices expand, infrastructure and agricultural activities may become increasingly dependent on reused water, potentially without adequate investment in treatment and monitoring (**scaling**). Antibiotic residues and resistant microorganisms may then spread through water and food systems, with consequences that are difficult to detect or trace across sectors (**masking**). Once these systems become established, improving treatment standards or changing existing practices may require substantial investment, institutional coordination and support for affected communities (**trapping**).

These examples illustrate how policies that initially provide clear development benefits may create unintended ABR risks as they expand and become embedded in institutions, infrastructure, markets and practices. The Anthropocene traps perspective helps frame the cross-cutting challenges identified during the workshop as different stages of a potential trajectory: from expansion without adequate safeguards, through weakened visibility and fragmented feedback, to increasing dependency and reduced capacity to change course. Applying this framework to ABR–SDG goal conflicts can help identify appropriate governance responses at different stages of policy development and implementation, as summarized in the following table.

[1] *Søgaard Jørgensen, Peter, et al. "Evolution of the polycrisis: Anthropocene traps that challenge global sustainability." Philosophical Transactions of the Royal Society B: Biological Sciences 379.1893 (2024).*

Phase	How an ABR–SDG tension may develop	Cross-cutting challenge	Policy response
Initiation	A policy or intervention responds to a development need and produces clear benefits. Potential implications for ABR may not yet be apparent.	Emerging ABR risks may receive limited attention while the immediate development benefits are prioritized.	**Anticipate emerging risks.** Assess potential ABR pathways early and incorporate appropriate safeguards into policy and investment design.
Scaling	The intervention expands and institutions, infrastructure, markets and practices increasingly organize around it.	Safeguards and enabling capacities may lag behind expansion, while short-term responses may substitute for longer-term investments in prevention and infrastructure.	**Build capacity alongside expansion.** Ensure that prevention, regulation and viable alternatives develop in parallel before dependency becomes established.
Masking	Wider consequences may emerge but become difficult to detect, attribute or connect to the original intervention across sectors, locations or time.	ABR consequences may remain poorly visible, while fragmented governance weakens feedback and delays corrective action.	**Strengthen visibility and feedback.** Improve monitoring, information-sharing and cross-sector accountability so that emerging consequences can inform policy decisions.
Trapping	Existing practices become increasingly embedded through infrastructure, incentives, institutional arrangements and dependence on the established approaches.	Unequal capacity and limited alternatives can make changing existing practices increasingly difficult, particularly for lower-resource actors.	**Enable transition.** Combine regulatory change with financing, institutional reform, feasible alternatives and targeted support for actors facing disproportionate transition costs.

Navigating trade-offs: Post-2030 and the wider political context

Taken together, these challenges suggest that the management of ABR–SDG trade-offs should be **phase-sensitive and anticipatory**. The relevant policy question is not only whether a trade-off exists, but how the interaction is evolving and at what point the range of feasible responses is beginning to narrow.

During initiation, the priority is to anticipate potential ABR pathways and incorporate safeguards into policy design. During scaling, attention should turn to whether prevention, regulatory capacity and viable alternatives are developing alongside the intervention. During masking, monitoring and cross-sector accountability become important for reconnecting actions with consequences that may otherwise remain invisible. Where trapping has begun to occur, transition may require not only regulation, but also financing, institutional reform and support for the actors expected to change. This is particularly relevant to the post-2030 development context, where workshop participants raised concerns that future development arrangements may involve tighter financing, fewer or more consolidated global goals, and increasing pressure on multilateral institutions. Under such conditions, ABR may be increasingly difficult to sustain as a stand-alone priority, while competition for resources may make corrective action more difficult once conflicts have become entrenched.

A post-2030 approach should therefore place greater emphasis on **preventing lock-in before it becomes difficult and costly to reverse**. This will require integrating ABR considerations into broader investments in health systems, food production, water, climate adaptation, industrial development and environmental management; prioritizing prevention-first measures that generate benefits across multiple objectives; strengthening links between existing ABR and sustainable-development

institutions; and providing transition support for lower-capacity actors. The aim is not to eliminate all trade-offs, but to identify emerging risks early enough to preserve feasible alternatives. In a context of constrained resources, safeguards introduced during initiation or scaling may be far more effective than corrective action taken once adverse effects are masked and dependencies have become entrenched.



7. Workshop discussions on managing goal conflicts

Throughout the workshop, participants also explored transversal solutions. Discussions on managing goal conflicts emphasized **strengthening One Health governance,** by improving coordination across sectors and governance levels, bridging sectors and the AMR and SDG agendas, and strengthen leadership and accountability structures. While recognizing the challenge of wider coordination and integration, participants raised the need to integrate AMR into broader development agendas (incl. UHC, WASH, education, etc).

Participants also raised the need to **create incentives for collaboration**, noting that it will not happen automatically: financial, institutional, and political incentives may be needed to encourage cross-sectoral cooperation.

Participants encouraged adoption of language that lean more towards a "positive" approach, with **a focus on synergies and co-benefits** rather than only conflicts as it may be more politically attractive and help justify investments. Participants suggested identifying "hotspots" of goal conflict and high-leverage interventions that could generate the greatest co-benefits across sectors, thereby maximizing returns on limited resources. For example, given the strong synergistic effects related to prevention interventions, funding and coordination should be strengthened for a package of interventions (WASH, IPC, vaccination, biosecurity, diagnostics, waste management, quality care and education) rather than funding them in isolation.

Finally, **making hidden trade-offs and synergies visible** was seen as a key function of both the analytical framework and the emerging AMR-SDG mapping tool as a way to support policy learning, advocacy and decision-making. Some participants suggested piloting approaches that deliberately link AMR and SDG implementation in a few countries to demonstrate value and generate practical examples for wider adoption. This could involve testing integrated ABR-SDG planning and the Goal Conflict Explorer in one to three diverse national or subnational settings, document decisions and compare outcomes.

8. Key highlights and messages for policymakers

Antibiotic resistance and sustainable development objectives often appear aligned on paper, yet tensions frequently emerge during implementation through financing gaps, weak regulatory capacity, market incentives, and fragmented governance. To avoid creating long-term dependencies, adverse effects or shifting costs onto vulnerable populations, policy framework processes should move from developed in isolation to joint anticipatory, cross-sectoral trade-off management.

As the post-2030 Agenda negotiations are set to formally start in 2027, policymakers and the scientific community are increasingly recognizing the need for addressing inherent trade-offs across the goals and targets across sectors. As shown in previous studies and the mapping carried out in this workshop, ABR policy and implementation interact closely with multiple SDG goals and targets. Despite its cross-sector and developmental impact, ABR is currently only measured under the Human Health SDG 3 goal. Integrating ABR more broadly and deliberately across a revised set of goals and targets will be essential to avoid unintended consequences and lock-in of systems that create reverse effects and costly outcomes.

Furthermore, as countries are updating their NAPs, adapting their plans in line with the revised Global Action Plan (adopted in 2026), they should adopt a critical lens to predict and prevent trade-offs as an integral part of the process. A broad and inclusive dialogue with implementation stakeholders, including communities and civil society, who may be affected by different interventions can help making potential trade-offs visible while also supporting the assessment of possible synergies.

Given the current environment of resource constraints surrounding both the SDG Agenda and NAP implementation efforts, valuable gains can be made by exploring integrated approaches that have been screened for evident and more hidden trade-offs from the start.

The following **proposed priority actions** are based on a synthesis and analysis of the workshop deliberations, and are directed towards governments, AMR and SDG coordination bodies, funders, development partners, civil society and other stakeholders navigating AMR and SDG related policy development and implementation:

1 Connect ABR with current and future sustainable development policies

- **Strengthen ABR-SDG connections within current sustainable development policies:** Embed ABR-relevant safeguards and indicators across broader global climate, food security, water, biodiversity, and industrial development goals and targets rather than relying solely on a single standalone target. Expanding and mainstreaming ABR across sector-wide goals enables a more sustainable and effective management.
- **Integrate ABR more broadly across the revised SDG Agenda:** Anticipate and address ABR related trade-offs as part of the post-2030 Agenda negotiations to ensure the goals and targets across sectors reinforce co-benefits rather than unintended consequences, in view of more restricted economic and fiscal environments.
- **Embed ABR-SDG trade-off screening into NAP updates:** Countries should proactively assess and integrate screening for goal conflicts into their plan updates.

2 Conduct two-level policy screening early to prevent lock-in

- **Anticipate ABR risks early:** Assess trade-off related risks in planning, during the design phase of major development investments, such as agricultural expansion, local drug manufacturing, or wastewater reuse. Early technical and regulatory safeguards prevent systems from becoming "trapped" in costly, high-risk dependencies that are difficult to reverse later.
- **Screen policies at two levels:** High-level alignment between development and ABR goals often masks operational conflicts during rollout. Screen both objectives and implementation from a goal conflict perspective, including financing, regulation, capacity and expected behavior. Evaluate concrete execution mechanisms, such as subsidies, procurement rules, budgets, and enforcement, before scaling up interventions.

3 Invest in cross-sectoral literacy, communication and collaboration

- **Promote cross-sector learning and collaboration:** Train AMR, SDG and sector representatives to understand common drivers and goal conflicts, and to communicate in local languages and through civil society, education systems, arts and social communication. Encourage collaboration by creating financial, institutional or political incentives.
- **Connect existing AMR and SDG governance**: Create formal planning, budgeting and reporting links between National Action Plan structures, SDG mechanisms, finance and planning ministries, sector agencies and subnational governments.

4 Protect low-capacity actors and ensure equitable sustainability transitions

- **Make distribution of the impact visible:** For each policy interaction, identify who benefits, who pays, who may lose access and what compensation, subsidy, transition support or accountability mechanism is needed.
- **Protect access during transitions and build safeguards:** Ensure regulations that restrict antibiotics, pesticides, water reuse or informal markets enable affordable alternatives, realistic timelines and support for patients, farmers and low-capacity communities. Require ABR pathway assessments for system interventions (such as nutrient systems, mining, pharmaceutical procurement and production) and ensure transition financing and technical support to avoid compliance cost falling disproportionally on smallholders and low-income earners.

5 Identify and fund integrated co-benefit packages

- **Screen policies for potential synergies:** Pre-screen integrated policies to identify policy areas that create co-benefits, and once screened for hidden trade-offs, can delivery valuable gains in terms of impact, cost savings and efficiencies.
- **Support packages of synergistic high-leverage interventions:** Direct public development, health and climate funding toward bundled high-impact interventions to maximize returns on limited resources. For example, combining WASH, IPC, vaccination, biosecurity, diagnostics, and safe waste management, rather than funding them in isolation. Or funding green transition projects with the condition to incorporate explicit waste treatment and monitoring so resource-efficiency goals do not inadvertently spread residues or resistant microbes.

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Annex A. Participant-reported case studies and examples

1.1 Human health and health care systems – Assessment of goal conflicts

No.	Sub-theme	Setting - Case study summary
1	**SDG 1, SDG 3 → equitable access and affordability vs appropriate antimicrobial use and stewardship**	**India:** Laboratories may exist, but diagnostic uptake remains low because patients pay and clinicians choose empirical treatment. Universal testing could also overwhelm current capacity. **Thailand**: The tension between Ending poverty (SDG1) and ABR stewardship was discussed. Affordable antibiotics exist in many countries and may be beneficial from an SDG1 perspective, allowing people in poverty to access antibiotics. These are however often systems where antibiotics are available over the counter, without prescription, which is driving ABR. The issue of access and affordability is conflicting with the ABR policy. **Philippines**: Lowest-price procurement through tenders may lead to lower-quality products, quality-assurance problems and weaker long-term supply resilience.
2	**Climate shocks & antibiotic use**	**India**: The interaction between AMR policies and Climate Action (SDG13) where the disconnect between policies represents a systemic risk. Doxycycline may be distributed by auxiliary health workers after floods for leptospirosis prophylaxis. Participants raised concerns about follow-up, adherence and increased misuse as climate-related flooding becomes more frequent. **Ghana:** The tension supported by example from Ghana, where more infections follow in the tracks of climate change leading to non-empirical use of antibiotics.
3	**Urbanization, sanitation & equity**	**Benin / West Africa countries:** Rapid urbanization (driven by policies prioritizing big cities, linked to SDG 11) where water and sanitation is improved (which can present synergy with ABR policies) but also comes with rising cost of living, crowding out of poorer people, leading to people living in poor sanitation and rising infections affecting people in poverty. This also demonstrates the risks of siloed approaches to addressing infectious diseases.
4	**Competing disease priorities & AMR**	**Sub-Saharan Africa:** Policies to eliminate Malaria (SDG3) and other vector borne diseases are not well coordinated with ABR policies, which poses challenges for policy makers having to make difficult resource and funding decisions. **No countries specified:** Pandemic policy trade-offs were used as an analogy for how one public-health gain can be set against another and why implementation conflicts need explicit deliberation.
5	**Pharmaceutical innovation & access**	**Multiple countries**: Pharmaceutical production (SDG 9) may be led by a different agenda that is not necessarily aligned with an agenda for sustainable access to antibiotics. There can be synergies here if these models can be aligned with an agenda based on developing the molecules needed for patients.
6	**Mining, water pollution & AMR** **WASH, IPC & health financing**	**Ghana:** With the increased mining sector (in pursuit of SDG 1 and 9, and in tension with SDG9?) follow increased risk as water residues are creating reservoirs for resistant bacteria, which is conflicting with ABR prevention policies. **Multiple countries**: A tension exists in the policy commitments over the short and longer term. The longer-term impact of investing in clean water, sanitation and health-system strengthening remains weak at implementation level because finance ministries and sector budgets did not prioritize them in the short term.
7	**Local antibiotic production & effluent**	**Ghana:** AMR policies promoting local production of Antibiotics (in line with SDG 3, 9 and 12) promotes better access to antibiotics but the residues in effluents are common in draining systems in production sites which creates a tension between access and economic objectives with AMR prevention objectives given the risk of resistance development.

No.	Sub-theme	Setting - Case study summary
8	**NAP AMR/SDG prioritization, reporting & policy coordination**	**Multiple countries** Cross-target observation: Reporting of ABR policies (NAP) and SDGs are usually done separately, which in itself creates tensions and misalignments of goals. The two AMR-related SDG indicators were described as difficult to find in reports and rarely used as a communication entry point. **Multiple African countries:** A NAP prioritization assessment found recurrent access-stewardship tensions and growing interest in local production, laboratories, surveillance, WASH and waste management, each with resource implications that may come in tension with one another due to resource constraints.
9	**AMR awareness & professional education**	**No countries specified:** A participant reported that even some medical professionals were unclear about AMR during a hospital outbreak-response workshop, illustrating the continuing visibility and communication gap. **Bolivia**: Education objectives that do not take into account cultural aspects and local language perspectives can undermine the already underdeveloped ABR Surveillance policies and objectives, thereby undermining success.
12	**Access, affordability & stewardship**	**No countries specified:** Simpler treatment regimens were cited as an innovation that can improve adherence and reduce resistance-related behaviors, while participants cautioned that pharmaceutical innovation may not match local needs.
13	**Health-system equity**	**Multiple countries:** Strengthening AMR systems were expected to reduce inequalities in access, quality and outcomes, but only when capacity reaches rural and low-income populations. **No countries specified:** Participants highlighted possible higher AMR infection risks around prenatal care and delivery and argued for a stronger gender lens in AMR policy.

1.2 Human health and health care systems – Synergistic relationships

No.	Sub-theme	Setting - Case study summary
1	**Education & AMR awareness**	I**ndia**: Synergies between education objectives in both ABR policies and SDGs. Synergies were identified in India in the development of the AMR NAP, with wide discussions about the critical area and need to address lack of awareness both in general public and sector specific work, such as among prescribers. Education has therefore been enshrined in the NAP 2.0. This synergistic example was reinforced by other participants as important, highlighting the problem of lack of visibility of AMR.
2	**Partnerships & One Health governance**	**Multiple countries**: A high-level example of solutions to different trade-offs and misalignments is under SDG 17 on Partnerships (in this case partnerships across systems, public-private) which should be leveraged to facilitate synergies and coordination objectives to work across private and public structures leveraging multiple stakeholders to support implementation of one health.
3	**Climate resilience & One Health**	**Multiple countries:** Link to Goal conflict 2 above. The need for more holistic One Health approaches was discussed in relation to the systemic risks discussed around examples such as flash floodings leading to irrational use. Cross-sectoral approaches to climate change policies are needed, that takes into account the need for auxiliary health adherence interventions.
4	**Integrated laboratories & surveillance**	Multiple countries - Integrated laboratory systems were proposed to cover AMR alongside HIV, malaria and tuberculosis, and AMR surveillance could be added to existing disease-surveillance platforms.

2.1 Agriculture and food systems - Assessment of goal conflicts

No.	Sub-theme	Setting - Case study summary
1	**Production intensification & antibiotic use**	**Agrifood expansion** **Brazil / Latin America**: The expansion of the private sector for agricultural production (linked to Decent work and Economic growth, SDG 8), involves heavy use of agrochemicals and antibiotic use, especially in livestock farming, which drives ABR. **Multiple countries:** Expanding or intensifying animal production can increase disease risks and antibiotic use particularly where biosecurity and veterinary services are inadequate. Shared water systems may also spread contamination between aquaculture farms and downstream users. **Food security, farmer livelihoods & safer alternatives** **India / LMIC:** Participants described a tension between food security, farmer livelihoods, and food safety. Smallholder farmers may be expected to reduce antimicrobial use, but alternatives such as vaccines, veterinary services, biosecurity, and diagnostics can be costly and difficult to access.
2	**Food-chain governance**	**Biosecurity & imported agriculture products** **Australia:** Participants raised concerns that imported agricultural products, including grains and flowers, may comply with formal biosecurity requirements while still carrying resistant organisms or resistance-related risks. **Agroecology, food sovereignty & policy priorities** **Ecuador:** An agroecological movement proposed a law on food sovereignty and healthy production, but participants said national policy continued to prioritize major trade agreements and agribusiness expansion. **Trade regulation & AMR surveillance** **Samoa / Fiji / Vanuatu (Pacific Island Nations) / Australia:** The "burger supply chain" showed how meat, lettuce, tomatoes, bread, sauces, irrigation water and environmental conditions are regulated by different agencies, complicating outbreak accountability and source tracing. **Ecuador / Mercosur:** Free-trade agreements with the United States or European Union were discussed as narratives of jobs and poverty reduction that can accelerate agribusiness and antimicrobial use. **No countries specified:** Food supply chains were discussed as involving ingredients and products regulated under different frameworks. This can complicate accountability for AMR-related food safety risks and highlights the need for stronger value-chain governance.
3	**Veterinary antimicrobial regulation**	**No countries specified**: Regulations on medically important antimicrobials and prophylactic use may create tensions between ABR prevention objectives and the practical needs of farmers and veterinarians. **Veterinary access** **Thailand**: Strong regulations were described alongside expensive or unavailable veterinary diagnostics and appropriately formulated medicated feed, leaving farmers to manage production risk themselves while having limited access to appropriate services.

No.	Sub-theme	Setting - Case study summary
4	**WASH & farm biosecurity**	**No countries specified:** WASH interventions often ignore livestock manure and farm biosecurity even where households live closely with animals, creating a missed One Health opportunity. **Canada**: Farm-level biosecurity can provide a public-health benefit while imposing costs on farmers. Differences in antimicrobial classifications can create trade barriers, while agricultural lobbying may influence decisions on biosecurity and antimicrobial regulation. **Manure management & safe resource reuse** **Egypt:** A participant described tilapia aquaculture relying on agricultural drainage water because Nile River water is prioritized for human consumption. Poultry manure is also used to fertilize aquaculture ponds. Where poultry production involves high antibiotic use, manure reuse may introduce antibiotic residues, resistant bacteria and resistance genes into already contaminated water, creating potential conflicts between food production, resource reuse and ABR prevention. **No countries specified:** Manure recycling supports sustainable agriculture, but the SDG framework was seen as insufficiently explicit about safe treatment of agricultural waste flows. **No countries specified**: Ecological intensification can reduce pesticide and antibiotic use, but greater reliance on manure can transfer residues and resistance. A participant described an example of tomatoes requiring artificial fertilizer because organic soil contained pesticide residues traced to animal feed.
5	**Climate shocks, water quality & food safety**	**Asia-Pacific / Pacific islands / LMICs:** Participants highlighted potential synergies between clean water (SDG 6), health (SDG 3) and ecosystem protection (SDG 15) in preventing foodborne infections. However, climate-related events such as typhoons and flooding may undermine these benefits by affecting irrigation and aquaculture water quality and increasing infection risks associated with raw vegetables, fish and shellfish, particularly where water and sanitation infrastructure is inadequate
6	**Values, animal health & planetary health**	**No countries specified:** Human health and economic outcomes were described as more highly valued than animal health and planetary health, shaping which food-system policies are politically acceptable.
7	**Urban food access, crowding & prevention**	**No countries specified:** Food deserts, overcrowding and missing health or veterinary infrastructure can increase infection and use antibiotics as a substitute for prevention services.

2.2 Agriculture and food systems – Synergistic relationships

No.	Theme	Setting - Case study summary
1	**Ethnoveterinary mastitis management**	**India:** A participant reported a National Dairy Development Board ethnoveterinary program using herbal preparations for mastitis in more than 700,000 dairy animals, with reduced antibiotic use, costs and veterinary visits and later policy adoption. This requires external validation.
2	**Native breeds, backyard poultry & biodiversity**	**India:** Backyard and rural poultry systems using native breeds were discussed as potentially more resilient and less dependent on antibiotics than intensive poultry systems, while also supporting livelihoods and agricultural biodiversity.
3	**Dry sanitation & safe resource reuse**	**No countries specified:** Dry or low-water sanitation was proposed to keep human and animal waste out of surface and groundwater and support safer nutrient and water reuse.

4	**Joint WASH-biosecurity & safe reuse**	**No countries specified:** Participants proposed combined management of human and animal waste, hygiene, vaccination and safe reuse of treated waste streams. **Burkina Faso**: Participants described emerging WASH initiatives that integrate livestock manure management, biosecurity and safer recycling practices. These approaches may create synergies between sanitation, agricultural production and ABR prevention, although further documentation is needed to assess their implementation and outcomes.

3.1 Economy, poverty and equity - Assessment of goal conflicts

No.	Sub-theme	Setting - Case study summary
1	**Budget allocation, growth & health investment**	**No countries specified:** When investment choices are made in resource limited countries to increase Economic growth (SDG 8), health investment may be negatively affected, as it is not a direct revenue generating area. These choices may also negatively affect investments in ABR interventions, which is often a lower priority than health overall. Another dimension is how investments are made may reinforce inequity, benefiting some groups more than others. **Stewardship & pharmaceutical market incentives** **No countries specified:** ABR stewardship policies aiming to limit antibiotic use and thus sales can have a negative impact on economic goals and revenues of companies (SDG9).
2	**Pesticide ban, food security & poverty risks**	**Sri Lanka**: Banning of pesticides (as part of ABR policy practice) can lead to a depletion of food production (as in Sri Lanka 2021), pushing the country into poverty, illustrating the goal conflict between food security and agricultural productivity. Solutions must be sensitive to a country's reliance and poverty risk, to ensure sufficient "cushions" are in place when alternative practices such as organic farming are promoted.
3	**Taxation, access, affordability & equity**	**India / multiple countries:** The tension between ABR policies to increase diagnostics and increase stewardship and access to treatment including antibiotics (SDG 3) can present inequitable distribution of access and quality of care among rich and poor and urban and rural populations (a conflict between system capacity and inequality, SDG 10). **Multiple LMICs countries**: Taxes are rapidly raised on farm produce, health to increase public revenues (SDG 17). As tax systems are being built, the burden on households initially increases. This may make antibiotics and diagnostics less affordable to many people, limiting access.
4	**Tax incentives, manufacturing & pollution**	**Ghana**: Tax exemptions intended to lower medicine prices can coexist with weak environmental compliance and antibiotic pollution in soil and food chains.
5	**Mining industry & AMR risks**	**Ghana:** The mining industry is central to driving economic growth, but mining-led growth is linked to heavy-metal exposure, resistance risks and possible interference with health, while mining and health regulation were described as institutionally disconnected. Countries may improve medicines regulation while lacking control over products and practices used in the mining sector, producing policy incoherence.
6	**Intellectual property, technology transfer & equity**	**Multiple countries:** Participants discussed tensions between economic and intellectual-property interests, technology transfer and needs-based countermeasure allocation related to the Pandemic agreement negotiations, and warned that similar conflicts could shape AMR policy.

No.	Sub-theme	Setting - Case study summary
7	**Multiple economic, surveillance & regulatory tensions**	**Multiple countries** AMR surveillance depends on routine microbiology, but testing is often excluded from social insurance and paid out of pocket, linking surveillance to poverty and equity. Tension between ABR 2 on Surveillance and SDG1 and 10. Surveillance data is dependent on routine clinical samples from patients and countries need investment in microbiological testing capacity which require money to be allocated from the health budget. In many countries testing is not included in social insurance meaning patients rely on Out Of Pocket expenditures. This illustrates a tension between ABR surveillance, poverty, economy and equity. AMR polices aiming to regulate and with more investments going to increase the use of diagnostics has the potential to increase the system costs, causing a tension between Economic growth (SDG8) and regulatory ABR policies. Countries are seeking to be WHO compliant in their regulatory policies on AMR, but out of their control are regulatory policies and practices in other areas affecting which products are brought in for the mining industry. (I.e. ABR regulatory policies are not linked to mining regulatory policies, TBC). Some tax policies (SDG 17) enables tax exemptions to antibiotic manufacturers, which is supposed to benefit patients. However, manufacturers do not always adhere to regulations and antibiotic pollution is found in the soil, which affects the food chain. **AFRICA:** The productivity and market expansion of the private sector in Africa is creating a tension between SDG 8 and 3, where the private sector is relying on heavy use of antibiotics, since the private sector incentives are driven by profit. A private pharmacy refers to competition when they sell antibiotics OTC. One solution can be to introduce a fine that can be used to fund AMR interventions
8	**Decentralized AMR governance & inequality**	**Kenya:** Kenya's 47-county system was described as having County AMR Stewardship Interagency Committees in only about 34% of counties by end-2023, with poorer rural counties less likely to have them. This quantitative claim requires validation. Tension with SDG 10 and 16. Kenya is a devolved system with 47 county governments implementing the NAP, but only a minority of counties have so far established Country AMR Inter-Agency Stewardship Committees. SDG 16 calls for effective and accountable institutions at all levels. The counties without committees are rural, with poorest populations and often highest infectious diseases rates, which means the inequality in institutional governance is undermining the response.
9	**Pharmacy competition, regulations & OTC antibiotic sales**	**Kenya:** A senior health official reportedly used a "mystery shopper" visit to obtain an antibiotic without prescription from a high-end pharmacy and referred the pharmacy for action, illustrating the tension between sales incentives and stewardship policies. **No countries specified:** Pharmacists were reported to sell antibiotics OTC because refusing a sale may send the customer to a competitor, illustrating the interaction between stewardship and market survival. A participant proposed earmarking fines from illegal antibiotic sales for AMR interventions; the group noted that this raises practical and ethical questions.

3.2 Economy, poverty and equity - Synergistic relationships

No.	Sub-theme	Setting - Case study summary
1	**Gender, education & household resilience**	**Multiple countries / Africa:** Leveraging the SDG 4 on Education and SDG 5 on Gender can be instrumental for AMR policies (synergy with pillar 1), as women are the pillar of the health system and of the household. Giving them the right education and information will catalyze the reduction of infections and increase their revenues to manage the disease burden.
2	**Countermeasure equity**	**Global South:** Increasing vaccine and countermeasure equality (linked to SDG 10) can support synergies with ABR policies.
3	**Responsible consumption**	**No countries specified:** A participant proposed earmarking fines from illegal antibiotic sales for AMR interventions; the group noted that this raises practical and ethical questions.
4	**Economic co-benefits of AMR containment**	**India:** Synergies between SDG 3, 8 and 12. AMR containment would lead to a reduction in healthcare costs with fewer complications, shorter hospital stays and wider workforce being available for productivity, supporting economic growth.
5	**WASH, IPC & poverty reduction**	**Multiple countries:** Synergies between SDG 1, 3 and 6, when investing in IPC and WASH will lead to preventing infections, and prevent ABR. And with reduced infection and illness, also reduced Out of Pocket expenses, reducing the risk of poverty.
6	**Quality of care & equity**	**Multiple countries:** Reinforcing uniform quality of care, including standard treatment guidelines and antimicrobial stewardship, as well as the wider public health interventions (water, sanitation upgrades, vaccination etc) helps to improve health outcomes (SDG 3) and overcome inequalities (SDG 10) both within health and beyond, on poverty reduction (SDG 1).
7	**AMR education & One Health curricula**	**Multiple countries:** Synergy between SDG 4 on education and AMR awareness. More efforts needed to integrate ABR into curriculums of health care workers and pharmacists, as well as other fields like planetary health courses in universities, and a One Health education that goes beyond an anthropocentric focus that also includes protection of animals and biodiversity.
8	**Pooled procurement & access**	**Africa:** Synergy between SDG 3 and 8 and AMR GAP, with 4-5 countries that tend to follow new market models like the regional medicines pooled purchasing, which will improve accessibility and quality.

4.1 Environment, biodiversity and climate action- Assessment of goal conflicts

No.	Sub-theme	Setting - Case study summary
1	**Industrial pollution, manufacturing costs & antibiotic access**	**China, India and other manufacturing countries**: Industrial and pharmaceutical production can support economic growth and medicine access but may also release antibiotics and other pollutants into the environment. Stricter pollution controls and polluter-pays rules can increase production and active pharmaceutical ingredient costs, potentially affecting antibiotic affordability unless the costs of transition are addressed.
2	**Competing climate-ABR priorities & financing**	Climate change and AMR were described as competing for political attention and funding, even though many interventions can advance both. Veterinary, human-health and environmental actors may also prioritize different interventions, raising questions about how costs and benefits are distributed across sectors **LMICs:** Participants highlighted the high costs of environmental monitoring and emphasized stronger investment in prevention and waste management rather than making surveillance a prerequisite for action.
3	**Green-transition mining, heavy metals & co-selection**	**Australia:** Lithium, cobalt and copper mining residues were linked by a participant to heavy-metal co-selection. First rains after prolonged drought were described as washing residues into rivers and being associated with outbreaks in fisheries, recreation or crops. **Ecuador / Argentina:** Mining expansion linked to green-transition demand was discussed as a potential source of heavy-metal pollution, water conflict, and AMR co-selection risk. Participants noted social conflict around water resources and environmental protections. **Mining near glacier-fed water sources** **Argentina / Andes:** A participant described social conflict around proposed changes affecting mining near glacier-fed water sources used by millions of people.
4	**Agricultural intensification, biodiversity loss & antibiotic residue**	**India:** Industrial poultry based on a narrow genetic pool was contrasted with locally diverse backyard breeds, highlighting potential connections between intensive production, antimicrobial use and loss of food-system biodiversity. **No countries specified:** Deforestation and conversion of biodiverse ecosystems to monocultures for food production were linked to land erosion, dissemination of resistance and outbreak risks. **No countries specified:** Agricultural intensification aimed at increasing food production (SDG 2: Zero Hunger) was linked to rapid production cycles, failure to observe antibiotic withdrawal periods and the presence of antibiotic residues in slaughterhouse waste.
5	**Waste management, sanitation & ABR risks**	**Multiple countries -** Sanitation prevents infection and contains residues and genes, but AMR-safe treatment and reuse can be costly. Water-flush systems were criticized for dispersing hazards into waterways. Participants from multiple countries emphasized that wastewater, flooding, extreme weather, and weak WASH infrastructure can act as pathways for spreading resistant bacteria, residues, and resistance genes. Well-designed WASH and sanitation systems were identified as key AMR prevention opportunities. **Global South:** Participants argued that vaccination and biosecurity produce limited benefit if waste from farms, pharmaceutical plants, slaughterhouses and processing units remains poorly managed.
6	**Manure reuse & aquaculture contamination**	**Egypt:** Tilapia aquaculture in agricultural drainage water combined with poultry-manure fertilization was described as transferring antibiotics and resistance risks into already polluted and eutrophic ponds.

No.	Sub-theme	Setting - Case study summary
7	**Recycled water, chlorination & salinity**	**South Australia:** Participants discussed how water reuse, chlorination, sanitation products, high salinity, and climate-driven water scarcity may create complex trade-offs for AMR risk management in agriculture and irrigation systems.
8	**Rainwater storage, wildlife & contamination**	**Samoa / Fiji / Vanuatu:** Participants discussed rainwater collection, open dams, and stored water systems that may interact with birds and other animals, creating possible pathways for contamination of water used in agriculture or aquaculture. **Australia:** Birds nesting under rooftop solar panels can contaminate roof runoff collected in household rainwater tanks used for gardens or toilet flushing.
9	**Climate pressure, animal health & antibiotic use**	**Philippines:** Heat stress and typhoons can increase fish disease and antimicrobial use. Aqua Shade technology was being assessed for temperature control, lower disease incidence and reduced antimicrobial residues.
10	**Seafood demand, intensification & pollution**	**No countries specified:** High global demand can drive intensive aquaculture, antimicrobial emissions, and environmental harm while generating regional economic growth.
11	**Agricultural azoles & antifungal resistance**	**No countries specified:** Agricultural azole fungicides overlap with classes important for human treatment. Participants proposed formulation changes or buffer distances from communities.

4.2 Environment, biodiversity and climate action - Synergistic relationships

No.	Sub-theme	Setting - Case study summary
1	**Climate-smart animal production & ABR co-benefits**	**No countries specified -** Seaweed and probiotic feed supplements were reported to reduce methane-related bacteria and resistant bacteria, creating a climate-AMR synergy. Improved litter management was also reported to reduce ammonia, greenhouse gas emissions, disease risks and antimicrobial use.
2	**Precision aquaculture, water reuse & antimicrobial reduction**	**No countries specified -** Internet-of-Things monitoring, precision farming and biofloc systems were reported to provide early warnings, reduce disease and antimicrobial use and support water recycling.
3	**Biodiversity, regenerative agriculture & safe waste management**	**No countries specified:** Transition to regenerative agriculture was viewed as likely to benefit ABR, but only when manure, water and other waste streams are handled safely.
4	**Water scarcity, reclaimed water & constructed wetlands**	**Tunisia:** Saltwater intrusion and water scarcity were described as pressures leading farmers to reuse or reclaim water. Constructed wetlands were discussed as a possible nature-based solution to reduce resistant bacteria, antibiotic residues, and resistance genes before water is reused for irrigation.

Annex B. Workshop agenda and Participants

Workship agenda

Day 1 - 27 April 2026, 13:00-17:00 CEST

- Welcome and opening remarks: why ABR-SDG goal conflicts matter.
- Presentation and discussion on recent research on policy alignment and goal conflicts.
- Parallel focus groups: human health; agriculture and food systems.
- Breakout report-back and wrap-up.

Day 2 - 29 April 2026, 13:00-17:00 CEST

- Brief recap of Day 1.
- Parallel focus groups: economy, poverty and equity; environment, biodiversity and climate action.
- Summary of breakout discussions.
- Cross-cutting session on managing trade-offs and synergies, governance and the Goal Conflict Explorer.
- Conclusions and wrap-up.

Moderators and organizers

- Anna Sjöblom - Director, ReAct Europe Uppsala University
- Kerstin Åkerfeldt - Policy Expert, ReAct Europe Uppsala University,
- Luong Nguyen Thanh – Postdoctoral Researcher, Stockholm Resilience Center, Stockholm University
- Peter Søgaard Jørgensen – Associated Professor, Stockholm Resilience Center, Stockholm University

Participants

Name	Title	Organization	Country
Dr Mario Medegan	CEO	Heka public health services	Benin
Ms Rayan Hayder Alsheikh Mahdi	AMR Country coordinator	Government	Sudan
Ms Yara Mohsen Khalaf	Antimicrobial Resistance Officer	WHO CO	Egypt
Dr Hafeez Hamza	Member, Quadripartite (WHO-UNEP-FAO-WOAH) Working Group on Youth Engagement for AMR	Quadripartite Youth group	Kenya
Dr Martha Gyansa-Lutterodt	Head of Division, Ghana College of Pharnmacists	Ghana College of Pharnmacists	Ghana
Mr Kléver Marcelo Calle Heras	MA in Strategic Communication -	ReAct Latin America	Ecuador
Ms Hyfa Mohammed Ali	Program Manager	ReAct Asia Pacific	India
Prof Mirfin Mpundu	Co-founder and Executive Director	ReAct Africa	Zambia
Oskar Nyberg	Project manager	ReAct Europe	Sweden

Dr Anuj Sharma	WHO country office for India	WHO	India
Dr Sunday Ochai	Head of One Health - International Centre for Antimicrobial Resistance Solutions (ICARS)	ICARS	Denmark
Ms Kadia Petricca	Senior Policy Lead, Global Strategy Lab, AMR Policy Accelerator	AMR policy Accelerator	Canada
Dr Rajeshwari Sinha	Senior Programme Manager, Sustainable Food Systems	CSE	India
Prof Barbara Drigo	Academic Lead, Associate Professor, Enterprise Fellow, SAAFECRC Researcher	Adelaide University	Australia
Dr Linus Dagerskog	Research fellow, Stockholm Environment Institute	Stockholm Environment Insititute	Sweden
Dr Robin J Paul	Senior Veterinary Surgeon	State Veterinary Department, Kerala	India
Ms Geneviève Boily-Larouche	Managing Director	AMR Policy Accelerator, Global Strategy Lab	Canada
Mr Andre Luiz de Abreu	Antimicrobial Resistance Technical Group - GTRAM, General Coordination of Public Health Laboratories - CGLAB/SVSA/MS	Health and Environment Surveillance Secretariat - SVSA, Ministry of Health of Brazil	Brazil
Viviana Munoz	Coordinator	South Centre	Switzerland
Dr Angkana Lekagul	Health Policy and Systems Research on AMR Network	International Health Policy Program, Ministry of Public Health, Thailand	Thailand
Dr Christian Trigoso	Former member of the national AMR committee	Independent	Bolivia
Marina Paullelli	Coordinator	IDEC	Brazil
Anne Brink	Consultant for AMR, WHO Regional Office for the Western Pacific	WHO regional office	UK

Annex C. Table of Acronyms and Abbreviations

ABR	Antibiotic Resistance
AMR	Antimicrobial Resistance
HIV	Human Immunodeficiency Virus
IPC	Infection Prevention and Control
LMIC	Low-and-middle-income countries
NAP	National Action Plan
OTC	Over-the-counter
ROI	Return on investment
SDG	Sustainable Development Goal
TB	Tuberculosis
UHC	Universal Health Coverage
UUniFI	Uppsala University Future Institutes
WASH	Water, Sanitation and Hygiene

Annex D. Global Action Plan on AMR (2016) and SDGs

AMR Pillar 1: Improve awareness and understanding of AMR

GAP Objective 1: Improve awareness and understanding of antimicrobial resistance through effective communication, education and training

AMR Pillar 2: Strengthening surveillance and research

GAP Objective 2: Strengthen the knowledge and evidence base through surveillance and research

AMR Pillar 3: Reduce infection incidence through prevention

Objective 3: Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures

AMR Pillar 4: Optimize antimicrobial use

Objective 4: Optimize the use of antimicrobial medicines in human and animal health

AMR Pillar 5: Ensure sustainable investment and innovation

Objective 5: Develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions

World Health Organization. Global Action Plan on Antimicrobial Resistance [Internet]. *www.who.int*. 2016 [cited 2026 Sept 30]. Available from: *https://www.who.int/publications/i/item/9789241509763*



United Nations. United Nations Sustainable Development Goals [Internet]. United Nations. 2024 [cited 2026 Sept 30]. Available from: *https://www.un.org/sustainabledevelopment/*