



Promoting collaborative action to accelerate the response to antimicrobial resistance in the Eastern Mediterranean Region

Executive summary

Antimicrobial resistance (AMR) is a global public health concern and a major threat to health and health systems. The Global Burden of Disease study has estimated that globally, in 2019, 1.27 million deaths were attributable to bacterial AMR, of which 10% were in countries of WHO's Eastern Mediterranean Region. Addressing AMR is critical to achieving several Sustainable Development Goals related to poverty, hunger, health and well-being, water, hygiene and sanitation, sustainable production and consumption, partnership, and economic growth.

Available data point to an increasing trend of resistance, with an impact on population health, as shown by the increasing prevalence of bloodstream infections due to methicillin-resistant *Staphylococcus aureus* and *Escherichia coli* resistant to third-generation cephalosporin. The Eastern Mediterranean Region has the highest and most rapidly rising levels of antibiotic consumption among all WHO regions. Further, consumption rates vary between the high-income, low- and middle-income, and fragile, conflict-affected and vulnerable countries, indicating issues regarding access and appropriate use.

Since the endorsement of the global action plan on AMR in 2015, many countries in the Region have progressed in terms of structures and processes. However, there are disparities between countries at different income levels. Moreover, active and protracted conflicts and other humanitarian concerns in a number of countries pose challenges to sustaining AMR responses.

During the 77th World Health Assembly in May 2024, Member States endorsed strategic and operational priorities to accelerate the programmatic response to AMR in the human health sector. In September 2024, the United Nations General Assembly High-Level Meeting on AMR aims to secure strong political commitment and accelerated action across all sectors, and in November 2024, the Fourth Global High-level Ministerial Conference on AMR hosted by Saudi Arabia will build on the previous inter-ministerial meeting and the Muscat Manifesto to advance the implementation of action on AMR. These global meetings present a pivotal opportunity to strengthen high-level political support and investment for the response to AMR.

This technical paper presents a plan for collaborative action within the human health sector, and between the health and non-health sectors, that takes into account the heterogeneity in the Region. The plan adapts the WHO people-centred approach to addressing AMR in human health to the regional agenda for building resilient health systems to advance universal health coverage and ensure health security. The paper discusses four cross-cutting themes: a multisectoral, One Health approach to addressing AMR; incorporating AMR actions in health emergency preparedness and responses; a primary health care approach at all levels of the health system; and collaborative AMR work with established programmes to strengthen systems to prevent and manage infections through the appropriate use of antibiotics.

Key recommendations for Member States and WHO are presented in five strategic priority areas: (1) governance; (2) prevention of infection; (3) access to essential health services; (4) health emergencies and resilience; and (5) strategic information through surveillance and research. To achieve progress on these five strategic priorities areas, WHO invites Member States to endorse the proposed regional people-centred collaborative approach to addressing AMR by building resilient health systems for universal health coverage and health security and fully implementing the needed actions to accelerate the regional response to AMR in the Eastern Mediterranean Region.

Introduction: 2024 is a critical year for AMR

1. Antimicrobial resistance (AMR) is a global public health concern and a major threat to health and health systems. The Global Burden of Disease study has estimated that globally, in 2019, 1.27 million (95% uncertainty interval [UI] 0.911–1.71) deaths were attributable to bacterial AMR, of which 10% were in countries of WHO's Eastern Mediterranean Region (1). The World Bank estimates that after 2030, the global gross domestic product (GDP) shortfall due to AMR will exceed US\$ 1 trillion annually, widening economic inequality (2). Addressing AMR is critical to achieving several Sustainable Development Goals (SDGs) related to poverty, hunger, health and well-being, water, hygiene and sanitation (WASH), sustainable production and consumption, partnership, and economic growth (3).

2. In 2015, the World Health Assembly (4) endorsed the global action plan on AMR. The five objectives of the global action plan include: (1) improving AMR awareness and understanding through effective communication, education and training; (2) strengthening the knowledge and evidence base through surveillance and research; (3) reducing the incidence of infection through effective sanitation, hygiene and infection prevention measures; (4) optimizing antimicrobial use in human and animal health; and (5) developing the economic case for sustainable investment that takes account of the needs of all countries and to increase investment in new medicines, diagnostic tools, vaccines and other interventions. WHO, the Food and Agriculture Organization of the United Nations (FAO), and the World Organisation for Animal Health (WOAH) developed the Tracking AMR Country Self-Assessment Survey (TrACSS) to monitor progress in the implementation of AMR national action plans (NAPs).

3. WHO collaborates with FAO, WOAH, and the United Nations Environment Programme (UNEP) in the One Health Quadripartite alliance to support the delivery of these commitments. The regional offices of the Quadripartite organizations are currently developing a regional Quadripartite One Health Coordination Mechanism. In November 2022, the Third High-level Ministerial Conference on AMR in Muscat, Oman, brought together ministers of health, agriculture and the environment. The meeting concluded with the so-called Muscat Manifesto, signed by 16 Member States of the Region, which can be a catalyst for advancing the One Health approach to AMR in the Region. The Fourth Global High-Level Ministerial Meeting on AMR, to be held in Saudi Arabia in November 2024, will build on the commitments outlined in the Muscat Manifesto.

4. Previous WHO Regional Committee for the Eastern Mediterranean technical papers and resolutions related to health systems and security, infection prevention and control (IPC) and AMR have led to important commitments by the Member States of the Region. Action to strengthen systems to prevent, diagnose and manage infections, with more appropriate use of antibiotics, needs to be taken to scale across health systems and throughout the Region.

5. To enhance appropriate antibiotic use, WHO classifies antibiotics into three categories, Access, Watch and Reserve (AWaRe), according to their resistance potential and the levels of care where use is appropriate. In 2023, the first global antimicrobial stewardship (AMS) framework was finalized, with the goal of achieving the WHO Thirteenth General Programme of Work (GPW 13) country-level target (GPW 13 target 4b) of $\geq 60\%$ of total antibiotic consumption being Access group antibiotics. To accelerate this change, strategic leadership and coordination within Member States needs to ensure that AMR NAPs and international commitments can be delivered through all relevant programmes.

6. Three important global events on AMR are taking place in 2024. During the 77th World Health Assembly in May 2024, Member States endorsed strategic and operational priorities to accelerate the programmatic response to AMR in the human health sector. In September 2024, the United Nations General Assembly High-Level Meeting on AMR aims to secure strong political commitment and accelerated action across all sectors. In November 2024, the Fourth Global High-level Ministerial Conference on AMR hosted by Saudi Arabia will build on the previous inter-ministerial meeting and the Muscat Manifesto to advance the implementation of action on AMR. These global meetings on AMR mark a pivotal opportunity to further strengthen high-level political support and investment for the response to AMR.

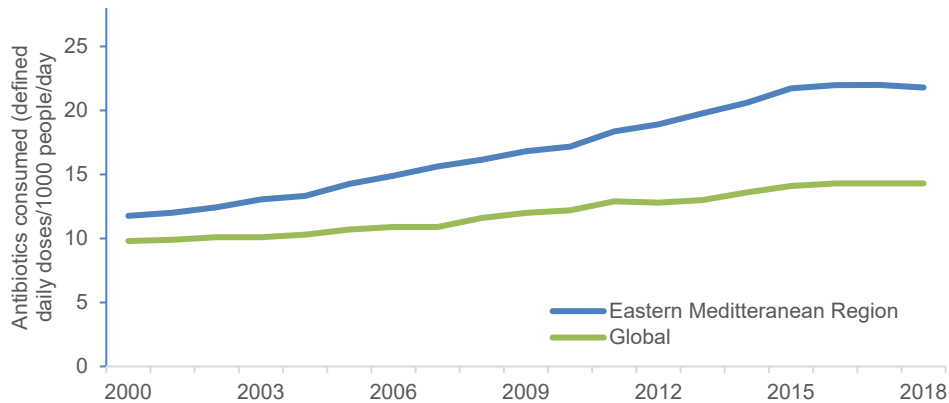


Fig. 1. Mean estimated per capita antibiotic consumption globally and in the WHO Eastern Mediterranean Region, Global Research on Antimicrobial Resistance (GRAM), 2000–2018

Source: GRAM Project (5).

7. This technical paper on AMR proposes three areas of added value. First, it outlines how the regional response needs to be differentiated given the particular challenges faced by the Region and its heterogeneity. Second, it adapts the WHO people-centred approach to addressing AMR in human health to the regional agenda for building resilient health systems to advance universal health coverage (UHC) and ensure health security.¹ Third, it identifies the core cross-cutting areas that need to be addressed through collaborative action, including key dimensions of the engagement and action needed at the regional and country level to achieve results.

8. Under the regionally-adapted people-centred approach to addressing AMR, this technical paper outlines five strategic priority areas, which align with the WHO Regional Director’s flagship initiatives to ensure timely and equitable access to quality assured and safe medical products in the Region, as well as access to a quality, fit-for-purpose and sustainable health workforce. Implementing the recommended actions in these priority areas will accelerate the regional response to AMR and contribute towards achieving the SDGs, UHC and health security in the Region.

Situation analysis and regional responses to AMR

9. Among WHO regions, the Eastern Mediterranean Region has the highest and most rapidly rising levels of antibiotic consumption (see Fig. 1). In 2018, the Region consumed antibiotics at a higher rate per capita (21.8 defined daily doses of antibiotics per 1000 inhabitants per day) than the global average (14.3) and all other WHO regions (5). TrACSS data from 2023 indicate that among the 17 countries and territories of the Eastern Mediterranean Region that responded to the survey, only 11 have national guidelines for appropriate use of antimicrobials and are implementing AMS programmes in at least some health care facilities, and only nine have adopted the AWaRe classification of antibiotics in their National Essential Medicines List (6).

10. Inappropriate use of antibiotics leads to high levels of resistance, with serious impact on population health. Global Research on Antimicrobial Resistance (GRAM) Project data estimate that in 2019, 123 834 people died because of bacterial AMR in the Eastern Mediterranean Region (1). This amounts to 16% of all deaths due to bacterial sepsis in the Region in 2019 (1). Global Antimicrobial Resistance and Use Surveillance System (GLASS) AMR data indicates that the Region has a high prevalence of bloodstream infections due to both methicillin-resistant *Staphylococcus aureus* (MRSA) and *Escherichia coli* resistant to third-generation cephalosporin (ESBL-*E. coli*) among reported isolates (SDG target 3.d.2). GLASS data for the Region in 2021 indicate that the mean proportion of all bloodstream infections due to ESBL-*E.coli* reached 66%, while the mean proportion of all bloodstream infections due to MRSA reached 53% (7) (see Fig. 2).

¹ As outlined in: Regional Committee for the Eastern Mediterranean, Sixty-ninth session, Cairo, Egypt, 10–13 October 2022, Provisional agenda item 3(a): Building resilient health systems to advance universal health coverage and ensure health security in the Eastern Mediterranean Region (2022) (EM/RC69/4; <https://applications.emro.who.int/docs/Build-resilient-health-systems-UHC-EMR-eng.pdf>).

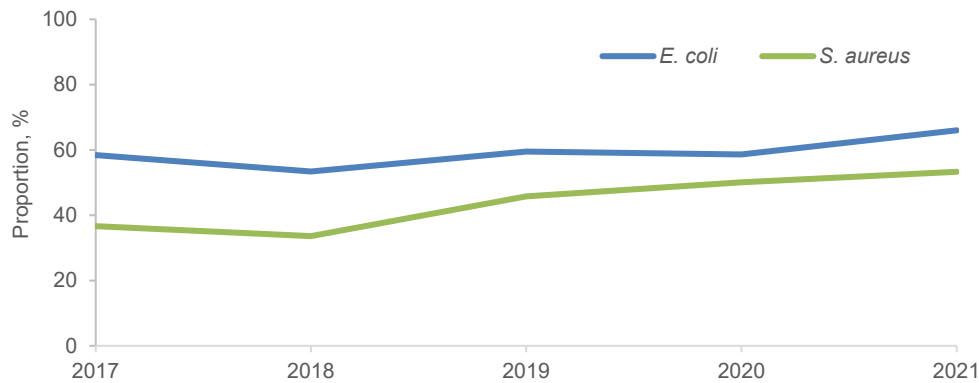


Fig. 2. Proportion of methicillin-resistance among bloodstream infections due to *S. aureus* and proportion of resistance to third-generation cephalosporins among bloodstream infections due to *E. coli*, (core SDG AMR indicators), WHO Eastern Mediterranean Region, 2017–2021

Source: GLASS (7).

11. Although progress has been made in the Region towards developing AMR governance structures, generating data on resistance patterns and antibiotic consumption, and strengthening IPC effort, further coordinated action is needed to better address AMR.

12. AMR governance structures have been built, but implementation of prioritized, realistic and costed plans remains a challenge. As of March 2024, all countries had developed their first AMR NAPs, nine countries were working on reviewing and updating their first AMR NAP and two countries (Jordan and Saudi Arabia) had updated their second AMR NAPs. However, only Pakistan, Qatar and Saudi Arabia report provision for NAP implementation in their national health plans and budgets. Coordination and oversight within the health sector and between sectors is inconsistent. In addition, although 12 countries report having a monitoring and evaluation plan, only seven report having a focal point or specific working group in charge and only five report collecting data across all relevant sectors as defined in the monitoring and evaluation plan.

13. Countries have undertaken consistent awareness-raising efforts, but concrete behaviour change interventions are absent. Every year in November, World AMR Awareness Week (WAAW) targets multiple stakeholder groups. However, moving beyond awareness-raising and advocacy towards behaviour change interventions remains a challenge. To address this, WHO has engaged partners, including new practitioners and medical students, to build and sustain behaviour change, and to encourage country-level student organizations to contribute through social media and digital platforms. Guidelines for antibiotic use are in place in the Region, and countries usually restrict over-the-counter sales of antibiotics, yet implementation and monitoring of these regulations is often weak.

14. Data are available, but quality, representativeness and use remain a concern. All 22 countries/territories are enrolled in GLASS resistance surveillance and 18 are enrolled in GLASS antimicrobial consumption surveillance. The number reporting data to GLASS has increased consistently, and as of 2023, 16 countries report AMR data and 10 countries report consumption data. The quality of laboratory and surveillance systems for both resistance and consumption of antibiotics varies but is improving. Of 17 countries/territories responding to TrACSS 2023, nine reported insufficient technical capacity, resources and established systems in the country to collect data in the health sector and beyond. Most importantly, countries need to focus on data analysis and use. Only 50% of countries report that they use relevant resistance surveillance data to inform operational decision-making and amend policies (6).

15. Research in the field of AMR is increasing over time in the Region (8). There are several clinical, laboratory and epidemiological studies on resistance patterns and a few on antibiotic use. In 2023, WHO launched the first Structured Operational Research and Training Initiative (SORT IT) course on tackling AMR through operational research. Twelve operational research projects on AMR from Egypt, the Islamic Republic of Iran, Tunisia and the United Arab Emirates are progressing as part of this course.

16. Countries have strengthened their core components for IPC, but expansion and monitoring is required. The COVID-19 pandemic catalyzed the strengthening of IPC programmes and systems. By the end of 2023, 17 countries had set up a dedicated IPC unit or programme, and 19 had developed IPC guidelines. In 2024, these programmes are being sustained, and progress is being made in fragile, conflict-affected and vulnerable (FCV) countries. In 2022, the average proportion of households using safely managed sanitation services¹ in the Region was 55% (rural: 47%, urban: 62%). This proportion varied between countries, from less than 30% in Djibouti, Lebanon and Yemen, to more than 90% in Bahrain, Qatar, and the United Arab Emirates.

17. Health systems in the Region are fragmented and face an interrupted supply chain for medicines and diagnostics. Access to health services for the prevention, diagnosis and management of infectious diseases is still a challenge in many countries. Causes include political instability, lack of integration within the human health sector, weak supply chains and limited funding. In low- and middle-income countries, out-of-pocket payments are high and people rely on the private sector for care. Although countries manufacture antibiotics, they lack capacity for the production of active pharmaceutical ingredients and failures in global supply chains result in shortages of specific antibiotics. Furthermore, essential public health functions need to be strengthened to tackle the promotion and prevention agenda through action on the socioeconomic and structural determinants of health.

18. In most countries, very few hospitals operate AMS programmes, with a level of implementation varying across countries and hospitals. Inappropriate use of antibiotics is high. In 2023, only five out of 10 countries reporting data to GLASS achieved the targeted 60% share for Access antibiotics in the most recent year for which data were available, only 61% of prescriptions documented a reason for antibiotic use, and only 21% of antibiotic use was based on culture results according to available point prevalence survey data. Although almost all countries restrict the use of antibiotics for growth promotion, antibiotic consumption in animal health and food production is high. Antibiotics are frequently used inappropriately, mostly as a substitute for good hygiene and biosecurity measures. All this necessitates adopting a One Health approach, with collaborative action across sectors to address AMR. Almost all countries report having a multisectoral coordination mechanism, but only seven report it to be functional.

The need for a differentiated response in a diverse region

19. The Eastern Mediterranean Region is highly diverse, including the six high-income member countries of the Gulf Cooperation Council (GCC), 11 middle-income countries/territories and five low-income countries. Conflicts and humanitarian crises affect nine of the countries and territories of the Region that are classified as FCVs. This diversity is reflected in the AMR situation. Countries impacted by conflict are more prone to, and less able to respond to, other public health concerns, including AMR. The median antibiotic consumption during 2000–2018 varied between FCVs, middle-income countries and high-income countries. The increase in the defined daily dose of antibiotics per 1000 inhabitants per day between 2000 and 2018 was higher among middle-income countries (114%) than in FCVs (62%) and high-income countries (42%). The microbiology testing capacity also varied between countries. For example, in 2021, high-income countries tested on average 158 specimens per 100 000 population, compared with 20 in middle-income countries and less than 0.5 in low-income countries (7). These differences call for a tailored programmatic AMR response, that takes into consideration differences in national income levels and health system maturity.

20. High-income countries have substantial capacity and now need to ensure universal coverage by systems to prevent, diagnose and manage infections and ensure more appropriate use of antibiotics. At the political level, countries are ready to engage in regional and global dialogue to shape the agenda. They may contribute to strengthening the response to AMR across the Region through development programmes. They can engage in global research and surveillance initiatives to ensure that the specific needs and priorities of the Region are reflected in global initiatives. To support this, WHO can provide access to technical advice, guidance and networking opportunities.

¹ Defined as an improved sanitation facility that is not shared with other households and where excreta are safely disposed of in situ or treated off site.

21. Antibiotic use is rising most quickly in middle-income countries. These countries have the capacity to build and strengthen systems to prevent, diagnose and manage infections and ensure more appropriate use of antibiotics. They need to strengthen surveillance systems to provide reliable antibiotic resistance and consumption data, and scale up programmes to address AMR, including stewardship and IPC programmes. The impact of interventions will probably be greatest in these countries, where WHO will adopt a programmatic approach to support the scale-up of sustainable systems.

22. In FCV settings, AMR needs to be incorporated into emergency preparedness and response and primary health care programmes. While preventing and managing infection is fundamental, many other priorities and limited capacity may prevent effective action. The disruption of health systems and access to care can increase risks of infection and inappropriate treatment. Conflicts and complex emergencies often result in infected traumatic injuries, which when resistant are difficult to treat. Appropriate development instruments such as the Pandemic Fund and health security investments must be leveraged to address AMR. Ensuring reliable access to antibiotics will best be organized in line with the WHO AWaRe antibiotic book.

A people-centred approach to addressing AMR through building resilient health systems for UHC and health security

23. In January 2024, the 154th WHO Executive Board adopted, in decision EB154/CONF./7, the WHO strategic and operational priorities to address drug-resistant bacterial infections in the human health sector, 2025–2035 (9). The strategic and operational priorities were then tabled at the Seventy-seventh World Health Assembly (A77/5) in May 2024 (10). The three strategic priorities are: (1) prevention of infections; (2) universal access to quality diagnosis and appropriate treatment; and (3) strategic information and innovation. They represent interdependent elements of a comprehensive public health approach for sustained impact to slow the emergence and spread of drug-resistant bacterial infections and preserve effective antibiotics. Effective governance and financing of the human health sector response to AMR is highlighted as a cross-cutting strategic priority.

24. The approach outlined in this technical paper aligns with the Director-General's report (A77/5) to the Seventy-seventh World Health Assembly on AMR, based on the WHO people-centred approach to addressing AMR in human health (see Annex 1) (11). However, it is also adapted to the regional context, taking into account the regional approach to building resilient health systems to advance UHC and ensure health security (12) (Table 1). The approach has four cross-cutting themes. First, a One Health multisectoral approach is key to addressing AMR. Second, actions to address AMR need to be incorporated in health emergency preparedness and response. Third, a primary health care approach with appropriate action to address AMR is required at all levels of the health system. Fourth, strengthening systems to prevent and manage infections through the appropriate use of antibiotics is needed, by working with and through established programmes, such as the integrated management of childhood illnesses (IMCI) and vertical disease control programmes, and with clinical services where antibiotic use is critical to patient outcomes, such as oncology and organ transplantation.

25. This technical paper is organized along five strategic priority areas: (1) governance; (2) prevention of infections; (3) access to essential health services; (4) health emergencies and resilience; and (5) strategic information through surveillance and research. The following subsections describe the five strategic priorities along with the proposed relevant regional adaptations within the human health sector.

Table 1. Summary of the proposed regional approach and its links with global strategic and operational priorities, the people-centred approach and regional priorities for building resilient health systems

Promoting collaborative action to accelerate the regional response to AMR		WHO strategic and operational priorities to address drug-resistant bacterial infections in the human health sector, 2025–2035 (A77/5)	People-centred approach to addressing AMR in the human health sector Foundations and Pillars	Regional resolution on building resilient health systems to advance UHC and ensure health security (EM/RC69/4) Seven priorities
Domain	Core interventions			
Governance	One Health approaches to AMR AMR incorporated into plans, budgets, governance systems and institutional functioning Coordination in human health AMR advocacy and awareness-raising	Governance	Effective governance, awareness and education (Foundational step) Effective governance, awareness and education (Foundational step)	<ul style="list-style-type: none"> Optimizing ministries of health and building institutions Integrated approach in policy, planning and investments Equity and financial protection
Prevention of infection	Universal access to water, sanitation and hygiene, and waste management Implementation of core IPC components Access to vaccines and expanded immunization	Prevention	Prevention (Pillar 1)	Improving access to medicines, vaccines and health products
Access to essential health services	Adequate, appropriate, motivated health workforce, with appropriate skills Effective use of the WHO AWaRe antibiotics book for training and reference Primary health care-based models of care AMR diagnosis and management health services available and affordable Uninterrupted supply of quality assured antimicrobials and medicines Regulation to restrict sales of non-prescription antimicrobials Up-to-date evidence-based treatment guidelines and programmes for antimicrobial stewardship Good quality laboratory system and diagnostic stewardship to ensure clinical bacteriology (and mycology) testing	Governance Universal access	Effective governance, awareness and education (Foundational step) Access to essential health services (Pillar 2) Access to essential health services (Pillar 2) Appropriate, quality-assured treatment (Pillar 4) Appropriate, quality-assured treatment (Pillar 4) Timely, accurate diagnosis (Pillar 3)	A fit-for-purpose, fit-to-practice health workforce Primary health care-based models of care Improving access to medicines, vaccines and health products
Health emergencies and resilience	Adequate emergency stock of essential antibiotics, diagnostics and IPC supplies, maintained at all times Action plan to respond to emergencies, including outbreaks of resistant pathogens			Strengthening health emergency and disaster risk management
Strategic information through surveillance and research	National AMR surveillance network to generate good quality data for patient care and action on AMR Surveillance of antimicrobial consumption and use to guide patient care and action on AMR AMR research and innovation, including behaviour and implementation science	Strategic information	Strategic information through surveillance and research (Foundational step) Strategic information through surveillance and research (Foundational step) Strategic information through surveillance and research (Foundational step)	

Governance

26. Drug resistance is at the lowest level globally where governance mechanisms are effective and adequately resourced (13). NAPs need to be operationalized, costed and funded, with AMR activities incorporated into plans and budgets across programmes and the health system, including programmes for quality improvement and patient safety (14). An integrated approach to policy, planning and investment for long-term health system resilience is required to address AMR (15). This approach includes building national centres of excellence with expertise in AMR, antimicrobial consumption and AMS that can support governments' efforts to implement and monitor AMR programmes (16).

27. Increasing coverage of vaccination programmes and affordable provision of diagnostic and treatment services for infections, including new generation antibiotics, are needed to protect populations from catastrophic health expenses (17, 18). Pre-payment mechanisms and reimbursement systems can be incentivized to promote appropriate behaviour, including appropriate antibiotic choice. Regulations on over-the-counter sales need to be progressively enforced, with a particular focus on the Reserve and Watch antibiotics for which the risks of resistance are greatest.

Prevention of infection

28. An infection that does not occur, does not need treatment, and cannot spread. Prevention involves, WASH, immunization and IPC at scale. Universal access to WASH and appropriate waste management in communities and health care facilities are essential components of primary health care models, which can mitigate the emergence and spread of resistance (19). In the Eastern Mediterranean Region, improving vaccination coverage against typhoid (where drug resistance is a major problem), pneumococcus (given the disease burden) and viral infections (such as influenza and rotavirus) that lead to widespread inappropriate use is particularly important. Prevention involves ensuring that, at the least, WHO minimum IPC requirements (20) are in place in all countries, as a first step towards full implementation of all IPC core components (21). IPC can only happen if adequate standard operating procedures, training, infrastructure, supplies and human resources are available and monitored. Scaling up prevention requires close collaboration between institutions and agencies within and outside ministries of health (at all levels) working on AMR, IPC, WASH and immunization programmes. This is especially important in populations particularly vulnerable to infection, such as children, oncology patients and those undergoing surgery.

Access to essential health services

29. The ability to treat infection has contributed to most of the gains and improvements in health in the last 70 years (22). A pragmatic approach can help to preserve the available antibiotics, while ensuring access to new generation antibiotics through pooled procurement (23). To guide the implementation of AMS programmes and to align activities with IPC, diagnostic stewardship and AMR surveillance programmes, an operational approach for AMS in the Region has been developed (see Box 1 and Annex 2). The approach guides WHO's support to the countries of the Region to strengthen AMS programmes and achieve appropriate use of antibiotics at country level.

Box 1. An operational approach to AMS in the WHO Eastern Mediterranean Region

While global guidance on implementing AMS programmes exists, there is no comprehensive, tailored guidance for implementing AMS programmes in the Eastern Mediterranean Region. It is in this context that the WHO Regional Office has developed an operational approach that sets out what WHO will do through the its Regional and country offices to support the countries of the Region to implement AMS in the human health sector and achieve appropriate use at the country level by 2035. The operational approach is built on partnership and collaboration, including in developing and rolling out training and supporting countries with data analysis and use. The implementation of this approach will vary according to differences in resources, capacities and contexts across the countries in the Region. In FCVs, a pragmatic approach will be followed to incorporate guidance on appropriate use into primary and secondary care and emergency programmes. In the high-income countries of the Gulf Cooperation Council where capacity is much higher, existing stewardship efforts need to be sustained and scaled-up. Most of the action and investments will be prioritized in middle-income countries, where the risk of inaction is high.

30. Health services at the community level and in primary health care centres and hospitals need an appropriately trained and motivated workforce that can prescribe antibiotics rationally (24). Uninterrupted access to quality assured and affordable services is needed for the diagnosis and treatment of infections, including the diagnosis and management of resistant infections (9). Health systems must be resilient and able to provide these fundamental services, even in an emergency context. These goals align well with the WHO Regional Director's flagship initiatives, launched in early 2024, to secure timely and equitable access to quality assured and safe medical products and to build a resilient and sustainable health workforce.

31. **Appropriately trained workforce.** Addressing AMR requires improved access to essential health services delivered by a fit-for-purpose, fit-to-practice workforce (11). Embedding AMR in pre-service (medical, pharmacy and public health education) and in-service training (for new graduates and senior clinicians) can contribute to this approach (14). In 2023 and 2024, during the consultation and meetings that were held, experts from Member States of the Region expressed the view that AMR needs to be an integral component of medical education (15, 25, 26). Specialist training or post-graduate programmes are also required to develop the additional skills required for members of AMR teams (14). Additionally, an essential minimum qualification may be mandated for all newly-graduated medical practitioners as a prerequisite for licensing, to ensure that they have the minimum standards of knowledge for the appropriate use of antibiotics and patient safety at all levels of care (14).

32. **Community and primary care.** Most antibiotic use and opportunities to prevent infection occur within primary care services and the community. Quality first line (Access) antibiotics need to be ensured at the primary care level on a sustainable basis, to be provided by skilled staff in a clean, safe environment. Primary care must deliver preventive services, particularly immunization at scale, good syndromic management of infection in line with the WHO AWaRe antibiotic book, and referral for diagnosis and more specialist treatment where appropriate. At the community level, awareness campaigns and social mobilization through nongovernmental organizations and civil society should inform the public that antibiotics are not a panacea for all infections and need judicious use under the guidance of a trained health professional. Pharmacists need to be engaged through education or non-financial incentives to discourage the inappropriate use of antibiotics.

33. **Hospitals.** The risks of resistant infections developing and spreading are highest in hospitals (27). Hospital leaders need to prioritize systems and coordinated action to address AMR among those working in IPC, antibiotic stewardship and laboratory, with accountability to the hospital senior management, either directly or through quality and patient safety structures (27). In addition to clinical pharmacists and physicians trained in AMR and the appropriate use of antibiotics, there must be access to infectious diseases specialist advice whenever possible. Hospitals need to design appropriate protocols to generate representative quality data on resistance patterns and antibiograms to support the review of local antibiotic guidelines (28).

34. **Access to diagnostics.** Preventing AMR cannot be done effectively without access to timely and accurate diagnostics and diagnosis. Access to quality diagnostics is a challenge in many of the countries in the Region (29). Ensuring local production of laboratory supplies, pooled procurement, an effective supply chain and a system to generate real-time data on the availability, supply and use of consumables can support the uninterrupted provision of laboratory services (30). Bacteriological laboratory services with good quality diagnostic stewardship can ensure effective and efficient use of antibiotics and improve clinical management and outcomes (31).

35. **Access to treatment.** Evidence-based treatment of infections includes proper assessment and diagnosis, the prevention of unnecessary use of antimicrobials and an uninterrupted supply of quality-assured essential antimicrobials. Depending on the medical condition, level of care and resources available, this may be based on a syndromic approach, clinical diagnosis or on laboratory and other investigations. Evidence-based antibiotic use guidance, such as the WHO AWaRe antibiotic book and IMCI or other guidelines based on local evidence, can support clinical decision-making. Effective integration between the guidelines for the management of childhood illnesses and guidance on antibiotic use, and improving antibiotic use in oncology and transplantation through working groups within ministries of health, and through WHO Collaborating Centres and specialist professional associations, can help to improve the culture of appropriate antibiotic use, and thereby slow down the emergence and spread of resistance and improve outcomes.

36. **Access to medicines.** An efficient uninterrupted procurement and supply of quality-assured essential antimicrobials, in line with the Essential Medicines List and AwaRe classification, needs to be available (32). Local production of antibiotics and active pharmacological ingredients would reduce the overdependence on global supply chains. Countries should promote the registration of antibiotics in line with the AwaRe classification, encourage new products and restrict WHO unapproved and unscientific fixed dose combinations and strengths. Regulatory capacity needs to be improved to ensure that medicine production follows acceptable standards, and that substandard and falsified products do not enter any market. All this should ensure that appropriate antibiotics are always available at the appropriate levels of the health system.

Health emergencies and resilience

37. Armed conflicts and wars are important pathways in the emergence of antibiotic resistance because of trauma, disrupted health systems, poorly managed antibiotic use and other factors, including contamination with heavy metals. Iraq and Palestine, for example, have seen a rise in AMR during periods of conflict (33, 34). A resilient health system needs to be prepared with an adequate stock of appropriate antibiotics, diagnostics and IPC supplies, and with a tried and tested plan to deliver these when triggered (11).

38. The current focus on health emergency preparedness and response presents an opportunity to address AMR, IPC and laboratory strengthening (29). The inclusion of AMR in the International Health Regulations and the Joint External Evaluation (JEE) process provides opportunities and frameworks for addressing AMR and IPC. Additionally, there are many humanitarian agencies and partners providing services in fragile and conflict situations, allowing potential synergies for addressing AMR. Moreover, AMR programme components are eligible for financing from global mechanisms such as the Global Fund to Fight AIDS, Tuberculosis and Malaria and the Pandemic Fund.

39. Infection prevention strategies are vital to prevent the emergence and spread of multidrug resistant organisms, particularly for complicated war injuries and hospital-acquired infections. The provision of medicines and treatment guidelines in emergencies need to align with the AwaRe classification, and mobile and mini-laboratories that can be operated in field conditions need to be established. Maintaining good vaccination coverage, particularly against epidemic-prone diseases, should be a priority. Ensuring the appropriate use of antibiotics and access to antibiotics, laboratory diagnostics and consumables and devices for effective IPC are important measures when preparing for and responding to emergencies and disasters.

Strategic information through surveillance and research

40. Good quality, representative data coming from an effective and sustainable surveillance system allows monitoring to control AMR. A 2023 WHO evaluation indicated that the AMR resistance surveillance system may be prone to bias and over-estimation as it is based on a sample of patients with a history of prior antibiotic use. Other factors, including the quality of specimen collection and testing, affect the reliability of the estimates. A good quality diagnostic stewardship system is defined as coordinated guidance and interventions to improve appropriate use of microbiological diagnostics to guide therapeutic decisions. Such systems are a prerequisite for the ability to generate representative, high-quality unbiased data for strategic information (35, 36). Sentinel surveillance systems and the use of new technologies, such as whole genome sequencing wherever appropriate, could be used to monitor resistance and detect the emergence of resistance.

41. Systems to collect, analyse and use data on antimicrobial consumption need to be established. Antibiotic consumption monitoring is currently limited to procurement, production or licensing data. There is need for better disaggregated data at national and facility level to guide practical stewardship and improve antibiotic use at facilities and in the community. This requires building capacity within countries to identify and use appropriate sources of data and conduct analysis. Digitilization of health systems means that there are more options to do this efficiently and effectively. Countries that have electronic health record systems need to integrate the core elements of appropriate antibiotic use monitoring so that effective dashboard and feedback mechanisms can lead to improved auditing and improvement plans (37). This is compatible with a human-centred health system enabled by digital health (38), consistent with World Health Assembly resolution WHA71.7 on digital health, unanimously approved by Member States in May 2018, which recognized the value of digital technologies in

advancing progress on the SDGs, supporting national health systems in health promotion and disease prevention, and improving the accessibility, quality and affordability of health services (39).

42. Regionally-relevant AMR research projects are needed, including operational research and implementation science to improve the use of antibiotics, qualitative behavioural science research on prescriber and patient attitudes, behaviours and practices, and analyses to quantify the burden of AMR. A regional network of researchers and institutions could support collaborative multi-country research, taking into account the diverse research needs and available resources in the countries of the Region.

Collaborative action to accelerate the regional response to AMR

43. Because there are risks of infection and antibiotic misuse across the health system, actions to address AMR sustainably need to be incorporated into the programmes and structures of the health system.

44. A structured collaborative framework is proposed to incorporate AMR in different departments and programmes within ministries of health. This collaborative framework will enhance the coordination of cross-cutting work, utilize technical and financial resources more efficiently, and strengthen the AMR response in countries (Table 2). Member States can adopt this approach according to the programme structures and organization of their health system.

45. Addressing AMR requires a whole-of-society engagement that engages key stakeholders in national AMR programmes. First, academia can lead research, develop curricula and training programmes, and provide centres of excellence, training and service delivery. Second, the formal and informal private sector that provides care needs to strengthen systems for the prevention and management of infection; quality assurance mechanisms, including accreditation, can engage the formal private sector. Third, professional organizations are a strategic conduit to disseminate information to the “thought leadership” as well as for organizing continuing professional development. Fourth, civil society organizations have multiple potential roles to play according to their mandate, from service delivery, advocacy and campaigning to encouraging networking and information exchange. Fifth, young professionals and students can play a key role in advocacy and encouraging the roll out of education and good practices. Sixth, strong engagement is needed with patients and the community for community empowerment and participation through social marketing and other mechanisms.

46. The One Health approach mobilizes multiple sectors, disciplines and communities to work together to foster the health of people, animals and ecosystems. The Quadripartite developed a strategic framework for collaboration on AMR in 2022 to advance the One Health response to AMR at global, regional and country levels (40). Guidance is available on how to incorporate AMR into the United Nations Sustainable Development Cooperation Framework (3). There is also the AMR Multi-Stakeholder Partnership Platform established by the Quadripartite and hosted by FAO that facilitates coordination and collaboration with multiple stakeholders across the One Health spectrum (41). This links with the broader global One Health Joint Plan of Action (2022–2026) and the Regional Committee for the Eastern Mediterranean resolution EM/RC69/R.5 on One Health, which are guiding Member States in the Region to adopt the One Health approach and accelerate its tailored implementation and progress towards agreed targets.

Table 2. A proposed approach to addressing AMR across programmes within ministries of health and other relevant departments in countries

Programme area	Priority areas for collaboration
Emergency preparedness and response	<ul style="list-style-type: none"> • IPC and appropriate use in emergency contexts • AMR/IPC in JEE, health security and pandemic preparedness plans • One Health/Quadripartite coordination
Health systems	<ul style="list-style-type: none"> • Access to medicines, regulation, quantification price and quality • Health workforce and education • Patient safety/quality improvement • Hospital and primary health care leadership and management • Governance/finance and leadership within the health system
Health promotion and well-being	<ul style="list-style-type: none"> • WASH • Food safety • Maternal, neonatal and child health
Noncommunicable diseases	<ul style="list-style-type: none"> • Prevention and management of infection in noncommunicable diseases (focusing on oncology)
Communicable disease	<ul style="list-style-type: none"> • Public health laboratories • Immunization • AMR in HIV, TB, malaria and neglected tropical diseases
Research and innovation	<ul style="list-style-type: none"> • Operational research • Digital health systems
Communication and partnerships	<ul style="list-style-type: none"> • Partnership working • Communication and advocacy

Recommendations

Recommendations to Member States

Governance

- Adopt a One Health approach and involve all relevant stakeholders to collaboratively address AMR, deliver on the targets of the Muscat Manifesto and global action plan on AMR, and effectively engage at the Fourth Global High-Level Ministerial Meeting on AMR.
- Incorporate AMR into health plans, budgets, governance systems and institutional functioning. Promote collaborative action on AMR in different departments and vertical programmes within ministries of health.
- Regulate and restrict sales of antimicrobials without prescriptions, particularly Watch and Reserve group antibiotics.

Prevention of infection

- Ensure universal access to WASH and waste management within health care facilities.
- Implement core IPC components in all health care facilities.
- Increase vaccination coverage, including introducing more vaccines in national immunization programmes, particularly pneumococcal and typhoid vaccines.

Access to essential health services

- Ensure an uninterrupted supply of all essential antibiotics as per the AWaRe classification, appropriate to the level of care.
- Institute a minimum required level of skills for all prescribers through a mandatory basic certification process, before licensing/renewal of licensing.
- Improve the availability and affordability of AMR diagnosis, appropriate to the level of care, including rapid point-of-care diagnostics to rule out bacterial infections, to reduce the inappropriate use of antibiotics.

Health emergencies and resilience

- j. Secure an adequate emergency stock of essential antibiotics, diagnostics and IPC supplies, maintained at all times, to avoid stock outs during crises.
- k. Prepare an action plan, involving simulation exercises, to respond to emergencies, including outbreaks of resistant pathogens.

Strategic information through surveillance and research

- l. Generate representative, quality-assured resistance data through a national AMR sentinel surveillance network following standard practices such as diagnostic stewardship.
- m. Strengthen surveillance of antimicrobial consumption and use of data at national and health care facility levels to reduce inappropriate consumption and guide and assess the impact of stewardship programmes.
- n. Establish centres of research and build research networks to undertake AMR research and innovation, including behaviour and implementation science.

Recommendations to WHO

- o. Support countries to incorporate actions to address AMR in all relevant health programmes.
- p. Promote context-specific adaptation and learning through facilitating networking between countries and health professionals and encouraging operational research and appropriate use of digital technology.
- q. Build the prevention and appropriate management of infection into emergency preparedness and response programmes and plans.
- r. Encourage collaboration with partners, such as professional organizations, civil society and the private sector, to effect the rapid scaling up of action on AMR.
- s. Develop, disseminate and support the application of the tools required for the use of resistance and consumption surveillance data in policy development, programming and monitoring the implementation of interventions.

Monitoring and evaluation

47. The utilization of existing systems is proposed to monitor and evaluate the implementation of the suggested recommendations to Member States (Table 3), including TrACSS, GLASS, the WHO/UNICEF Joint Monitoring Programme for WASH, the monitoring framework for the Global Strategy on IPC and the JEE. A dedicated dashboard with data on these indicators is proposed to monitor the progress of implementation of the resolution.

Table 3. Proposed indicators and data sources for the monitoring and evaluation of Member State recommendations

Domain	Indicator	Data source at the global/regional level	Link to recommendation number
Governance	Functional, multisectoral AMR governance mechanism in place	TrACSS	1
	Costed, budgeted AMR NAP is developed, and its implementation is being monitored continuously	TrACSS	1
	Country's national planning on AMR is integrated with other existing action plans or strategies (malaria, TB, HIV, One Health, food safety, etc.)	TrACSS	1, 2
	Country has laws or regulations on prescription and sale of antimicrobials for human use in place	TrACSS	3
Prevention	Basic WASH services in health-care facilities	WHO/UNICEF Joint Monitoring Programme for WASH	4
	Percentage of health care facilities where the main source of water is from an improved source, located on premises		
	Proportion of health care facilities with improved and usable sanitation facilities		
	Implementation of IPC core components	Monitoring framework for the Global Strategy on IPC	5
	National routine immunization programmes include relevant vaccines, such as pneumococcal, typhoid, rotavirus and <i>Haemophilus influenzae</i> type b	WHO/UNICEF estimates of national immunization coverage	6
Access to essential health services	Ensuring that Access group antibiotics comprise at least 60% of overall antibiotic consumption in humans (Muscat Manifesto target)	TrACSS	7
	AMR is systematically and formally incorporated in pre-service training curricula for all relevant human health cadres. In-service training or other continuing professional development on AMR is taken up by relevant groups for human health nationwide, in public and private sectors	TrACSS	8
	Country has developed a national list of essential in-vitro diagnostics that includes all essential AMR diagnostics	TrACSS	9
Health emergencies and resilience	Country has a stockpile of medical countermeasures for national use during a public health emergency	JEE	10
	A national action plan for IHR, preparedness or health security is developed and being implemented	JEE	11
Strategic information through surveillance and research	Submission of quality AMR and antimicrobial consumption data to GLASS	GLASS	12, 13
	Number and proportion of clinical bacteriology laboratories performing phenotypic (culture-based) isolation, identification and antimicrobial susceptibility testing (AST) of common bacteria in the public and private sector	TrACSS	13
	Number of reference laboratories performing AST for critically important bacteria		
	Number of research projects funded by government or other agencies on AMR	National AMR report	14

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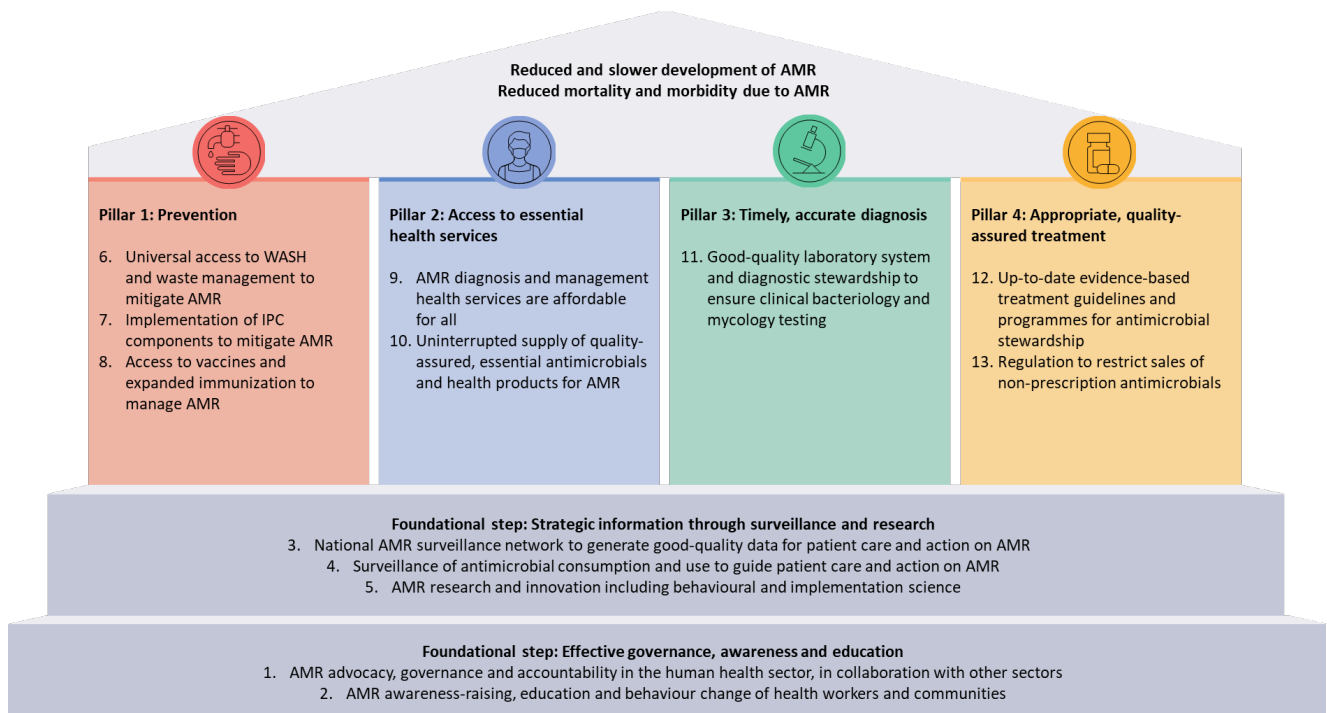
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Annex 1. The people-centred core package of AMR interventions



Source: People-centred approach to addressing antimicrobial resistance in human health: WHO core package of interventions to support national action plans. Geneva: World Health Organization; 2023 (<https://iris.who.int/handle/10665/373458>). License: CC BY-NC-SA 3.0 IGO.

Annex 2. An operational approach to antimicrobial stewardship in the WHO Eastern Mediterranean Region

Background

Antimicrobial stewardship (AMS) and appropriate use of antimicrobials is the fourth objective of the World Health Organization's (WHO) [global action plan on antimicrobial resistance](#), adopted by Member States at the 68th World Health Assembly in 2015. To support the implementation of AMS programmes in the human health sector in low- and middle-income countries, WHO released a [practical toolkit](#) in 2019. Based on further requests by Member States, WHO also issued [policy guidance](#) on how to facilitate the implementation of national AMS activities through an integrated and programmatic approach in 2021. These documents complement other WHO guidance, such as a [technical brief on water, sanitation, hygiene \(WASH\) and wastewater management to prevent infections and reduce the spread of antimicrobial resistance \(AMR\)](#) (2020), an action framework on [leveraging vaccines to reduce antibiotic use and prevent antimicrobial resistance](#) (2021), and the [global action plan and monitoring framework on infection prevention and control \(IPC\), 2024–2030](#), which was endorsed by Member States at the 77th World Health Assembly in 2024.

Member States also endorsed WHO's [strategic and operational priorities to address drug-resistant bacterial infections in the human health sector, 2025–2035](#), at the 77th World Health Assembly. One of the strategic priorities focuses on ensuring universal access to affordable, quality diagnosis and appropriate treatment of infections.

While global guidance on implementing AMS programmes exists, no comprehensive, tailored guidance for implementing AMS programmes in the WHO Eastern Mediterranean Region has been developed to date.

Data suggest that antibiotic consumption rates are higher in the Eastern Mediterranean Region than in any other WHO region. In addition, stewardship approaches in the Region are less well developed than other components of the AMR response, such as IPC and surveillance. Although AMR national action plans have been developed in all countries, with AMS being an integral part of every plan, implementation is weak and effective hospital AMS programmes need to go to scale. Stewardship programmes are much more effective when implemented in conjunction with IPC.

In general, the quality and scope of AMS programmes are better in the formal private sector, where the need for accreditation, reputational issues and cost saving are all drivers. Implementation in the public sector is patchier, with isolated examples of good practice, training and capacity-building, but few countries have effective programmes at scale.

The WHO Regional Office for the Eastern Mediterranean has therefore developed an operational approach to strengthening AMS programmes at the national and facility level. This operational approach sets out what WHO will do through its Regional and country offices to support the countries of the Region to implement AMS and achieve appropriate use at country level. An indicator of appropriate use is the proportion of Access,¹ or first line, antibiotics used, which should reach a target of 60% or more by 2030. This target is set out in WHO's Thirteenth General Programme of Work and in the Muscat Ministerial Manifesto on AMR, endorsed by 17 countries and territories of the Region at the Third Inter-ministerial Conference on AMR in Muscat, Oman, in November 2022. These country outcomes require national governments and other stakeholders to commit to, invest in and implement activities.

¹ The Access, Watch and Reserve (AWaRe) classification is the WHO classification of antibiotics, introduced in 2017. The classification groups antibiotics into three categories: Access antibiotics have a narrow spectrum of activity and a good safety profile in terms of side-effects; Watch antibiotics are broader-spectrum antibiotics and are recommended as first-choice options for patients with more severe clinical presentations or for infections where the causative pathogens are more likely to be resistant to Access antibiotics; and Reserve antibiotics are last-choice antibiotics used to treat multidrug-resistant infections.

The operational approach focuses on how WHO will support countries in the human sector and in One Health coordination and collaboration. As it is not the mandate of WHO to work directly with the animal, agriculture, or fisheries sectors, this document does not cover approaches to monitor or decrease inappropriate use in non-human sectors. However, WHO will encourage and facilitate links with its partner organizations the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (WOAH), which do have this mandate.

Goal, target and country objectives

Goal: Reduce inappropriate use of antibiotics in the Eastern Mediterranean Region by 2035.

Target: In each country, at least 60% of the antibiotics consumed in human health are from the Access group of antibiotics.

Specific objectives for countries:

- 1 Formulate national policies covering the appropriate availability, quality and use of antimicrobials.
- 2 Adopt the AWaRe classification of antibiotics as a reference point for interventions on stewardship.
- 3 Develop a strategic approach to phasing out over-the-counter sales of antibiotics on the basis of the AWaRe classification.
- 4 Generate robust data on antimicrobial consumption by 2025 to guide stewardship programmes.
- 5 Increase awareness and build capacity of prescribers regarding appropriate use of antibiotics and stewardship programmes.
- 6 Implement AMS programmes in the majority of secondary and tertiary hospitals (both public and private).
- 7 Pilot AMS programmes in primary health care facilities.

Practical implementation

Links with the broader AMR strategy

At the national and facility levels, AMS needs to be an integral part of the broader AMR response. Close collaboration with programmes on IPC, diagnostic stewardship and surveillance of AMR is vital to enhance the appropriate use of antimicrobials and decrease AMR.

Stratified approach

This operational approach covers all 22 countries/territories of the Region, but implementation will vary according to their different resources, capacities and contexts.

In fragile, conflict-affected and vulnerable countries, a pragmatic approach must incorporate guidance on appropriate use¹ into primary and secondary care and emergency programmes.

In the high-income countries of the Gulf Cooperation Council, capacity is much higher, and existing stewardship efforts need to be sustained and scaled up. These countries can also serve as role models for other countries of the Region and share their experiences and lesson learned.

In middle-income countries, the rate of change in consumption has been the highest. A 114% increase in median per capita consumption was recorded in these countries between 2000 and 2018, compared to 62% in fragile, conflict-affected and vulnerable states, and 42% in high-income countries. The risk of inaction in these countries is high. While there are some capacities and infrastructure for AMS, these vary substantially, and investment and action need to be prioritized in these settings.

¹ As outlined in: The WHO AWaRe (access, watch, reserve) antibiotic book. Geneva: World Health Organization; 2022 (<https://iris.who.int/handle/10665/365237>, accessed 9 July 2024). License: CC BY-NC-SA 3.0 IGO.

Collaboration with partners

The cornerstone of the operational approach is partnership and collaboration. To go to scale in all countries, collaboration with other partners will be needed, including developing and rolling out training and supporting countries with data analysis and use.

WHO will encourage and collaborate with other partners to work in the critical areas of their expertise, such as mass communication with the general public or school children, hospital and programme accreditation, and work in non-human health sectors.

Operational research

WHO will frame an operational research agenda for all partners to engage with. This includes the generation of new knowledge to support implementation of effective AMS interventions adapted to different contexts.

Interventions

Based on existing infrastructure, technical capacity and available resources, countries are encouraged to select the interventions that are most feasible to implement. To identify suitable interventions, countries may need to undertake a quick situation analysis of their AMS efforts to establish a baseline and identify suitable targets.

Table A2.1 provides a core list of interventions across nine domains. The list is not exhaustive, and countries are encouraged to further tailor interventions to their respective country context.

Table A2.1. AMS core interventions

Domain	Regional Office outputs	Country office outputs	Country outcomes
Governance structures	<ul style="list-style-type: none"> Policy advice on core functions and options for delivery of AMS interventions 	<ul style="list-style-type: none"> Policy advice to governments to align AMR governance with the One Health approach and enhance multisectoral coordination 	<ul style="list-style-type: none"> AMS committees as an integral part of AMR and One Health coordination Policy oversight of AMS activities
Political leadership	<ul style="list-style-type: none"> High-quality, timely advocacy materials and information, e.g. to support engagement in regional and global events, such as the United Nations General Assembly High-Level Meeting on AMR in September 2024 A model country-level policy brief on antibiotic use and AMS 	<ul style="list-style-type: none"> High-level policy dialogue and appropriate timely advocacy that results in meaningful political engagement and system strengthening to address AMR A country-specific policy brief on antibiotic use and AMS 	<ul style="list-style-type: none"> High-level political engagement and financial support for AMS, as part of AMR programmes
National drug regulation policies and practices	<ul style="list-style-type: none"> A collaborative network of countries working to harmonize regulations to restrict over-the-counter sales 	<ul style="list-style-type: none"> A draft plan for phasing out over-the-counter sales of antibiotics, based on the AWaRe classification Policy notes on substandard and falsified antimicrobials Policy notes on the regulation of medicine/antibiotic promotion and pricing A technical document to support the adoption of the AWaRe classification within the national Essential Medicines List 	<ul style="list-style-type: none"> National guidelines on optimizing antimicrobial use (AMU) in place for all major syndromes National policy for over-the-counter sales based on the AWaRe classification and risks of resistance Increased awareness and reporting of substandard and falsified antimicrobials Regulations on medicine/antibiotic promotion The AWaRe classification adopted in the national Essential Medicines List and the management and reporting of antibiotic use A mechanism to monitor over-the-counter sales

Domain	Regional Office outputs	Country office outputs	Country outcomes
National procurement practices and supply chain mechanisms	<ul style="list-style-type: none"> • Consensus-building on approaches to monitoring and analysing antibiotic consumption • Capacity-building in data analysis (workshops, training) 	<ul style="list-style-type: none"> • Review of the supply chain to include access to antibiotics as part of supply chain strengthening 	<ul style="list-style-type: none"> • 60% Access group share in overall antibiotic use at the national level • Antibiotics are available as appropriate to the level of care of the facility
Hospital-based stewardship programmes	<ul style="list-style-type: none"> • An agreed-upon regional plan of action for hospital stewardship • Guidance on AMS and IPC standards for accreditation agencies • Criteria for centres of excellence in AMR, including the identification process 	<ul style="list-style-type: none"> • Capacity-building programmes to support hospital stewardship • E-health and data information programmes that facilitate analysis and use of data on antibiotic use in decision-making • Use of AMU data for quality improvement • Guidelines and antibiotic policies based on the AWaRe antibiotic book, and a strategy for dissemination to encourage use 	<ul style="list-style-type: none"> • Increased coverage of stewardship programmes in hospitals • Functioning and accountable multidisciplinary medicines and therapeutic committee/AMR committee, with enforced antibiotic policies in hospitals • Monitoring and surveillance data are used to update treatment guidelines
Promotion of appropriate use of antibiotics in primary health care	<ul style="list-style-type: none"> • Simplified approaches and practical tools for monitoring antibiotic use and stewardship in primary health care 	<ul style="list-style-type: none"> • A basket of evidence-based and contextualized behaviour-change interventions to improve AMU in primary health care • A technical plan to introduce the AWaRe antibiotic book as reference material in primary health care 	<ul style="list-style-type: none"> • Improved prescription behaviours • Better monitoring of AMU and improved AMU in primary health care • The AWaRe antibiotic book used as reference material in primary health care
Education and awareness about AMS	<ul style="list-style-type: none"> • Tools to assess the needs of new prescribers and primary health care staff, and ongoing continuous professional development • Training packages and tools for hospital AMS identified, adapted and disseminated • Capacity-building of national focal points to collect, compile and analyse national- and facility-level data • Tools to evaluate training effectiveness • A collaborative network of academics to support the incorporation of AMR/rational use in curricula • Community of practice platform for meaningful engagement of students and professionals on AMS 	<ul style="list-style-type: none"> • National stakeholder group for capacity-building and mentorship programmes to underpin effective AMS in hospitals and primary health care • Campaigns on antimicrobial awareness, IPC and appropriate use for health care professionals • Model curricula on AMR and rational use for medical/pharmacy/nursing students in universities • Dissemination of AMR training courses for continuous professional development • An ongoing campaign in universities and health communities • Case studies and stories of effective AMS programmes and AMS champions 	<ul style="list-style-type: none"> • Health care professionals trained across all levels of care • A network of health care professionals sharing AMS experiences and multidrug-resistant organism case management • AMR and rational use integrated into university curricula for medical/pharmacy/nursing students
Monitoring systems for AMU	<ul style="list-style-type: none"> • Consensus approach on mapping and using antibiotic consumption/use data • Adaptation and dissemination of quality standards, checklists and systems for improved AMU data collection, analysis and use for decision-making at national and facility levels 	<ul style="list-style-type: none"> • An antibiotic use country profile • A national consensus plan on the approach to generating and using antibiotic consumption/use data through routine systems and surveys 	<ul style="list-style-type: none"> • Hospitals generate good-quality data on AMU • Hospitals use AMU data for stewardship • AMU data guide medicine procurement • Countries report national AMU data to Global Antimicrobial Resistance and Use Surveillance System (GLASS)
One Health approaches	<ul style="list-style-type: none"> • Quadripartite One Health approach supports and reviews effective multisectoral collaboration • Institutional review supports multisectoral coordination and collaboration 	<ul style="list-style-type: none"> • AMR included in One Health plans and governance • Quadripartite engagement to support antimicrobial policies across sectors 	<ul style="list-style-type: none"> • One Health coordination mechanisms include an effective committee on antimicrobials • National legislation/regulatory framework for optimizing AMU in non-human health sectors • The country generates, submits to GLASS and ANIMUSE (the global database on animal antimicrobial use), and uses AMU data from the human and non-human sectors • One Health AMR campaigns and advocacy

Monitoring and evaluation

The use of existing systems is proposed to monitor and evaluate the outlined country outcomes (see Table A2.2), including the Global Database for Tracking Antimicrobial Resistance (AMR) Country Self-Assessment Survey (TrACSS), Global Antimicrobial Resistance and Use Surveillance System (GLASS), and Joint External Evaluation (JEE).

Table A2.2. Suggested monitoring and evaluation indicators and data sources to follow up on the implementation of AMS programmes

Domain	Indicator	Data source at the global/regional level
Governance structures	Functional, multisectoral AMR governance mechanism in place, including a technical working group/subcommittee on AMS	TrACSS
	Country is using relevant AMU data to inform operational decision-making and amend policies in the human health sector	TrACSS
Political leadership	Country has endorsed the United Nations General Assembly High-Level Meeting on AMR political declaration on AMR	WHO
	National AMR action plan has costed and budgeted operational plan and monitoring mechanism in place	TrACSS
National drug regulation policies and practices	Country has national guidelines on optimizing AMU in place that are implemented for all major syndromes, and data on use is systematically fed back to prescribers	TrACSS, JEE
	Country has adopted the AWaRe classification of antibiotics in their National Essential Medicines List, is monitoring its antibiotic consumption and reporting it according to the AWaRe classification and has incorporated AWaRe into its AMS strategies (e.g. treatment guidelines)	TrACSS
	Country is formally part of the Member State Mechanism to address the issue of tackling substandard and falsified medical products and implements its workplan	WHO regional data on Member State Mechanism to address substandard and falsified medical products
	Country has legislation in place which restricts over-the-counter sales of antimicrobials, with appropriate enforcement and controls in place	TrACSS
National procurement practices and supply chain mechanisms	60% Access group share in overall antibiotic use at national level	GLASS
Hospital-based stewardship programmes	National guidelines for appropriate use of antimicrobials are available and AMS programmes are being implemented in most health care facilities nationwide	TrACSS
	Monitoring and surveillance results are used to inform action and to update treatment guidelines and essential medicines lists	TrACSS
Promotion of appropriate use of antibiotics in primary health care	60% Access group share in overall antibiotic use at the national level	GLASS
Education and awareness about AMS	AMR is systematically and formally incorporated in pre-service training curricula for all relevant human health cadres	TrACSS
	In-service training or other continuing professional development on AMR is taken up by relevant groups for human health nationwide, in public and private sectors	TrACSS
Monitoring systems for AMU	Submission of quality AMU data to GLASS	GLASS
One Health approaches	Country submits AMU data in the veterinary sector to the WOAHP ANIMUSE platform	TrACSS
	Country has a national plan or system in place for monitoring sales/use of antimicrobials in animals	TrACSS
	Country has national legislation/regulatory framework for optimizing AMU in terrestrial animals in place, with appropriate enforcement and control	TrACSS
	Country has national legislation/regulatory framework for optimizing AMU in aquatic animals in place, with appropriate enforcement and control	TrACSS
	Country regularly implements routine targeted, national government-supported activities/campaigns to raise awareness and change behaviour of key stakeholders within/across priority sectors	TrACSS