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# Editorial: Antimicrobial resistance response perspectives in Africa

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## Editorial on the Research Topic

### Antimicrobial resistance response perspectives in Africa

Antimicrobial resistance (AMR) is a significant public health and global challenge. It is projected to be the leading cause of mortality worldwide by 2050, with Africa accounting for more than 50% of the deaths (1). Drivers of AMR in Africa include misuse and overuse in human and animal populations, suboptimal dosing, substandard and falsified antimicrobials, suboptimal or absent diagnostics, poor infection control practices, inadequate vaccination, and insufficient access to clean water and sanitation (2). A One Health approach has been adopted globally to combat AMR, bringing together stakeholders from human, animal, environmental, and agricultural health to design, implement, and monitor programs, policies, legislation, and research to reduce the burden and prevent AMR. In 2015, the Global Action Plan (GAP) on AMR was endorsed by the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO), the World Organization for Animal Health (OIE), and the United Nations Environmental Program (UNEP), which form the Quadripartite. Subsequently, individual countries, including those in Africa, have developed and implemented country-specific national action plans (NAPs) using the GAP as a blueprint (1). Discussions and consultations are underway to update the GAP (3).

Data on AMR is key in informing strategies to combat AMR. Although projections have been made about the impact of AMR on Africa by 2050, there is a paucity of Africa-specific data to confirm these. The World Health Organization reports that by 2022, even though thirty-eight African countries had been enrolled in the Global Antimicrobial Resistance and Use Surveillance System (GLASS), only twenty countries reported surveillance data (4, 5).

This Research Topic aimed to collect and present ongoing work on efforts to combat AMR in Africa, thereby filling the data gap. This focused on research around regulatory frameworks and policies employed in mitigating AMR, surveillance and monitoring, strategies used in promoting rational antimicrobial use and improving sanitation and hygiene practices. Other focus areas included improving diagnostic capacity through rapid diagnostics, strengthening laboratory capacity, using laboratory data to inform antimicrobial use, the environmental impact on AMR, and joint collaborative activities across Africa aimed at combating AMR.

This volume comprises twelve accepted and published manuscripts, eight of which are original research articles, two policy briefs, one scoping review, and one perspective. The

first article measures the impact of implementing an antimicrobial stewardship program in Kenya, through a USAID-funded program (Gitonga et al.). By implementing key elements of antimicrobial stewardship as stipulated in the Antimicrobial Stewardship Guideline developed in Kenya in 2020, this study provides insights into the successes and challenges encountered in implementing key AMS interventions across 15 healthcare facilities in 2 peri-urban counties in Kenya. Healthcare workers are interviewed and their perspectives collated before and after the implementation of AMS interventions, and after a 4-year implementation period. Notably, successful interventions focused on improvements in governance structures, accountability, medical education, and expertise. Challenges with funding for AMS programs underscore the need for more effective resource allocation for AMR-related activities. The second paper highlights the need to develop and implement antimicrobial stewardship guidelines at a private pediatric teaching and referral hospital in Kenya. Although antimicrobial stewardship guidelines have been developed and implemented in public healthcare facilities, little is known about their implementation in private healthcare facilities. Insights are provided into the need to use electronic databases to track antimicrobial use and to use laboratory data to inform antimicrobial use (Mbuthia et al.).

Kenya developed its first draft of the National Action Plan to combat AMR in 2017 (Kenya NAP 2017-2022). Our third publication provides perspectives on the successes and challenges of its implementation. Notable successes include the development of county antimicrobial interagency committees (CASICS) to implement AMS interventions at the country level successfully. Challenges revolved around funding, underutilization of laboratories, and poor internet connectivity, which hampered the transmission of AMR data to data warehouses (Mukoko et al.).

Although numerous studies have reported the inadequate use of laboratory data to inform antimicrobial choice, a study conducted in Ethiopia highlights its use to inform treatment among patients with clinically diagnosed bacterial conjunctivitis (Teklemariam et al.). The causative organisms are documented, and, notably, high resistance rates to commonly used antimicrobials are reported. This underscores the need for interventions to reduce the high resistance rates and continuous use of laboratory data to supplement empirical therapy among this group of patients. Another study conducted in Uganda reports the prevalence, bacteriological profile, and predictors of sepsis among patients clinically diagnosed with sepsis who had a positive blood culture. It highlights the need for early detection and management of patients with sepsis who have a positive blood culture (Kara et al.).

To combat AMR, interventions targeting patients are key. A study in South Africa evaluates knowledge, attitudes, and behaviors regarding antimicrobial use among patients in primary healthcare settings, where the self-purchase of antibiotics without a prescription is likely widespread (Ramdas). It employs the development and piloting of a community antimicrobial use scale to collate patient perspectives. Such tools can be used in the future to develop and implement interventions focused on patient

education to promote the rational use of antimicrobials, especially in primary healthcare settings.

The One Health Approach is key to reducing rates of AMR globally and in Africa. A scoping review of published articles from three countries in the Nile Valley region of Africa (Egypt, Sudan, and Ethiopia) evaluates AMR data, focusing on antimicrobial use patterns in the human, animal, agricultural, and environmental sectors, prevalent pathogens, and the implementation of NAPs in the selected countries (Al-Hassan et al.). The study highlights the need for further research in the field of non-human health.

One of the challenges identified in the fight against AMR in Africa is poor policy implementation. This policy brief delves into existing evidence on the inappropriate use of antimicrobials across several African countries; identifies knowledge gaps among antimicrobial prescribers in ambulatory care settings; and provides policy directions to reduce indiscriminate antimicrobial prescribing (Chigome et al.). A similar paper examines the extent of antimicrobial purchases without prescriptions in rural South Africa, highlighting their prevalence, the antibiotics most commonly purchased, and the indications for purchase. It emphasizes the need to strengthen weak regulatory systems to curb this practice (Maluleke et al.).

Antimicrobial use in critical care settings has been reported as inappropriate. Several factors influence the use of antimicrobials, including pharmacokinetic changes in critically ill patients that affect dosing; the presence of mixed infections and the severity of illness, including sepsis. Antimicrobial prescription and resistance patterns were investigated in the critical care units of the largest teaching and referral hospital in Kenya (Obegi et al.). The study recommended implementing AMS interventions in this setting to address multidrug resistance.

Sub-standard and falsified antibiotics are major drivers of AMR. A policy brief exploring policies to reduce the circulation and sale of these drugs proposes initiatives to curb their circulation and sale, including regulatory enforcement, education, increasing the affordability of genuine antibiotics, and supply chain monitoring. These initiatives target the government, health authorities, regulators, and drug sellers (Maluleke et al.). The final paper in this series highlights the knowledge, attitudes, and practices regarding antimicrobial use among pharmacists and pharmacy assistants in selected rural South African pharmacies. Notably, they had a good understanding of antibiotics, their effectiveness, and their role in promoting rational antibiotic use (Maluleke et al.).

Based on these findings, it is evident that combating antimicrobial resistance across Africa requires a multifaceted approach. Successes, such as the development of interagency committees and the implementation of stewardship interventions, highlight progress; yet, challenges persist, including limited data generation in non-health sectors, inadequate AMS, poor policy implementation, and regulatory gaps. Strengthening laboratory capacities, enhancing policy enforcement, and expanding the One Health approach are crucial for sustainable impact. Furthermore, targeted interventions focusing on patient education on self-prescription and healthcare provider AMS practices, along with robust diagnostic and surveillance systems,

are vital components in reducing inappropriate antimicrobial use and resistance. Collaborative efforts across government, private sectors, and community groups, supported by continued research and policy refinement, will be instrumental in addressing the complex and evolving threat of AMR in Africa.

## Author contributions

SO: Writing – original draft. AE: Writing – review & editing.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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