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Review Article

Implementation determinants of national antimicrobial resistance strategies: a comparative policy analysis of the Russian federation and Nigeria

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ABSTRACT

Antimicrobial resistance (AMR) policies implementation across national health systems is still poorly understood, despite the growing global health burden. A comprehension of how different countries implement AMR policies will help identify effective and context-sensitive control measures. A comparative scoping review was carried out in accordance with PRISMA Scoping Review guideline. Grey literature and structured database searches were employed to find peer-reviewed literature, national policy documents, and institutional reports released between 2010 and 2025. The One Health framework served as the basis for the analysis, which encompassed cross-sectoral coordination, pharmaceutical regulation, antimicrobial stewardship, governance structures, surveillance systems, and funding sources. The findings were narratively synthesised, with a focus on implementation capacity rather than policy formulation. National action plans that were in conformity with the WHO Global action plan were adopted by both nations in 2017; however, their implementation approaches were substantially different. Integrating stewardship and prescription control into formal institutional structures proved practicable in the Russian Federation, with centralised governance authority, structured surveillance advancement, and continuous domestic funding. Implementation of AMR in Nigeria operates in a setting of poorly coordinated government, weak enforcement, donor-dependent funding, a dysfunctional medical sector and weak data-to-policy correlation. Implementation performance across domains is more about institutional coherence than policy alignment in isolation. AMR containment is essentially an implementation challenge. Cross-country analysis highlights phased adaptation to institutional capabilities rather than direct replication of external policy models.

Keywords: Antimicrobial resistance, National action plan, Nigeria, Russia, One health, Antimicrobial stewardship

INTRODUCTION

Antimicrobial resistance (AMR) is one of the most pressing threats to global health, compromising the efficacy of antibiotics used in various medical practices.[1] Global estimates from the Global research on antimicrobial resistance (GRAM) study indicate that bacterial AMR had been directly responsible for 1.27 million deaths in 2019.[2] AMR is caused by a broad range of factors that extend beyond improper prescription practices. These factors include widespread self-medication, inadequate pharmaceutical regulation,

ineffective Infection prevention and control (IPC), and the distribution of Substandard and falsified (SF) antibiotics. These factors are especially prevalent in environments with fragmented healthcare systems, inadequate laboratory facilities, and ineffectively regulated pharmaceutical markets, with a significantly higher prevalence in LMICs in Africa.[3]

The WHO Global action plan on AMR and the Global antimicrobial resistance and Use surveillance system (GLASS), which aim to standardise reporting of antimicrobial resistance and antimicrobial use, have been the focus of global policy responses.[1,4] Although participation in GLASS has increased significantly, surveillance capacity is nevertheless uneven, and many LMICs face limitations in laboratory infrastructure, standardisation of antimicrobial susceptibility testing, and data integration, and these limit the ability to transform surveillance data into implementable policy.[5] The primary tool for putting international AMR commitments into practice is National action plans (NAPs). Adopting policy frameworks does not, however, ensure that they are implemented successfully. Policy design and operational execution gaps have been observed in national strategy analyses, especially in environments with weak regulatory authority and limited funding.[6] Finding structural determinants of AMR governance is thus made possible by comparing implementation pathways across various institutional contexts.

Nigeria and the Russian Federation offer a pertinent example of comparison. Under the WHO framework, both nations adopted National action plans on AMR in 2017. In order to strengthen the regulation of prescription-only antibiotics, increase the size of the country's surveillance system, and establish antimicrobial stewardship mechanisms, Russia implemented a centrally planned strategy.[7] Participation in international reporting systems and organised national platforms, such as the Centre for monitoring of antibiotic resistance, is used to coordinate surveillance activities.[8,9] Nigeria enacted a comprehensive NAP in 2017 that centred on One Health. However, considerable accessibility to non-prescription antibiotics, fragmented governance, insufficient laboratory capacity, and a significant reliance on funds from donors have all hindered implementation. The majority of surveillance continues to be sentinel-based and has inconsistent representativeness.[5,10]

Although there is an abundance of literature that systematically describes national policy frameworks and AMR trends, there are still few formal comparative reviews examining implementation mechanisms across nations with varying institutional capacity. In the English-language comparative literature, Russia's post-2017 changes are particularly under-represented. Furthermore, there is a lack of guidance on how policy tools from systems with greater capacity could be contextually modified rather than merely replicated in environments with fewer resources. Therefore, a comparative scoping analysis of AMR policy responses in Nigeria and the Russian Federation is conducted in this study. The goal is to map documented policy instruments, reported trends in antimicrobial use and resistance, and described implementation methods in a systematic approach rather than to assess the efficacy of policies. The study uses structured comparison to find resource-aware, context-sensitive lessons that can be leveraged for improving AMR governance in Nigeria.

METHODS

Study design

An analysis was carried out to map the implementation of AMR policies in Nigeria and the Russian Federation through comparative scoping. The assessment utilised the Preferred reporting items for systematic reviews and meta-analyses extension for Scoping reviews and emphasised governance structures and implementation strategies/determinants rather than intervention effectiveness.

Eligibility criteria

The Population-Concept-Context framework was employed to establish eligibility. The focus was on national-level AMR governance, which encompassed policy frameworks, surveillance systems, antimicrobial stewardship, pharmaceutical regulation, financing, and coordination of One health. This consisted of peer-reviewed articles, national policy documents and surveillance reports, as well as institutional publications published between 2010 and 2025. Those that focused on molecular mechanisms and were not policy-relevant or had complete text were excluded.

Information sources and search strategy

PubMed/MEDLINE, Europe PMC, and Google scholar electronic searches were executed. The identification of grey literature was made possible by institutional websites, such as those used by the World Health Organisation, national public health agencies, and relevant government bodies. Search terms were linked to AMR-related keywords and incorporated Boolean operators with policy and country attributes. Additional records were screened using reference lists of the included sources.

Study selection

Records were screened by title and abstract, with full-text review subject to eligibility criteria. The PRISMA flow diagram for selecting a study is depicted in Figure 1.

Data charting and synthesis

A framework was established to collect data, which included study features, governance mechanisms,

surveillance systems, stewardship activities, regulatory mechanisms, funding, and implementation challenges. The outcomes were summarised in a narrative format and categorised by significant AMR governance domains. The two countries were compared using similarities and differences.

Study selection

The PRISMA Scoping Review flow diagram for inclusion, eligibility assessment, screening, and study identification is shown in Figure 1. The 62 included sources that met the eligibility criteria comprised peer-reviewed journals, national policy documents, institutional reports, and grey literature from 2010 to 2025. These studies offered contextual evidence on the implementation of antimicrobial resistance policies across multiple health system settings.

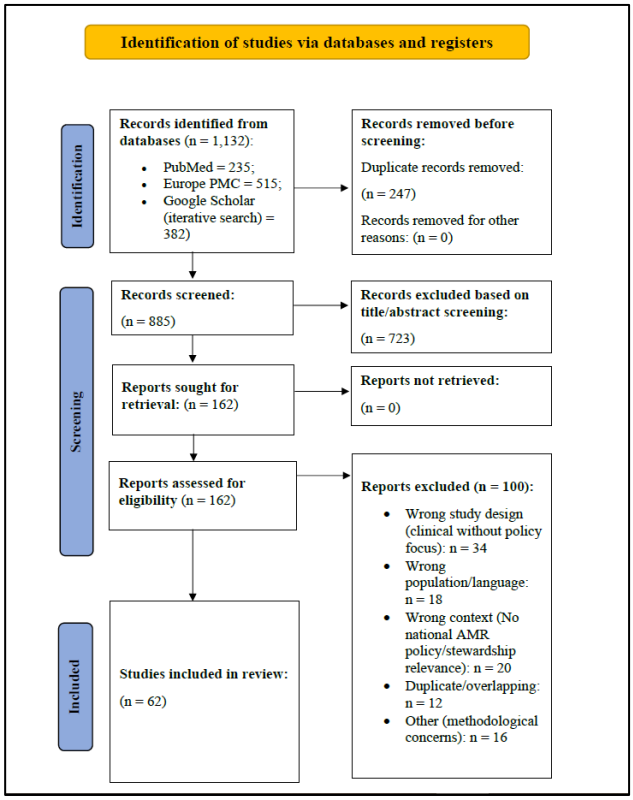

Figure 1: PRISMA flow diagram for the scoping review of AMR policy frameworks in Russia and Nigeria, 2010-2025.

National AMR policy frameworks

National AMR policy frameworks that incorporate One Health principles and are in accordance with the WHO Global action plan have been established by both nations. 2017 commemorated the adoption of the national strategy for the prevention of the Spread of Antimicrobial resistance by the Russian Federation. Nigeria introduced its first National action plan (NAP) in 2017, which was followed by a second version, NAP 2.0, which encompassed 2024-2028.

Thematic synthesis of findings

The literature that was included revealed five key implementation domains.

Governance and policy architecture

The 2017 Russian Federation National AMR Strategy developed a centralised governance structure bolstered by legislative orders. Kamenshchikova et al and Sheveleva et al, explained ministerial accountability and implemented prescription-only antibiotic dispensing through legislative amendments under Federal law No. 61.[7,11] As part of national coordination efforts, participation in WHO GLASS and CAESAR has been reported.[9]

The Nigeria centre for disease control (NCDC) and a National AMR technical working group, which function within a formal One Health framework, coordinate governance structures in Nigeria.[12] Environmental, animal, and human health authorities are involved, and implementation duties are divided between the federal and state levels. Variability in subnational implementation capacity is described in reports.[13,14] Periodic reporting is one of the monitoring processes highlighted in the National action plan framework; nevertheless, the available literature lacks substantial public records about consistent performance metrics.

Surveillance systems

AMR surveillance in the Russian Federation has been integrated into regional reporting systems and consolidated by national reference laboratories. As reported by Kuzmenkov et al, Vinogradova et al, and Zhazykhbayeva et al, participation in WHO GLASS and the Central Asian and Eastern European surveillance of antimicrobial resistance (CAESAR) network has been documented. Hospital-based microbiological reporting, antibiotic consumption analysis using the defined daily dose (DDD) approach, and pathogen-specific resistance monitoring are examples of surveillance efforts.[9,15,16]

According to a number of studies, the Russian surveillance architecture includes laboratory quality assurance procedures and organised data validation processes.[15] There have also been reports of assessments of antimicrobial consumption based on national pharmaceutical sales data.[16] A network of sentinel laboratories is used by the Nigeria centre for disease control to manage AMR surveillance in Nigeria. WHO GLASS standards alignment is outlined in the National Action Plan.[14,17] Studies highlight quality assurance procedures and the growth of laboratory participation.[5] However, the research reviewed reveals limitations pertaining to data completeness, diagnostic availability, and laboratory capacity.

Antimicrobial stewardship

Antimicrobial stewardship (AMS) initiatives have mostly been adopted at major secondary and tertiary institutions in the Russian Federation. The creation of local prescribing guidelines, interdisciplinary stewardship teams, restriction policies for specific antibiotics, and routine audit and feedback systems are all documented in studies.[11,15] Evaluations conducted in hospitals highlight the inclusion of microbiological data into prescription policies. The National action plans in Nigeria include antimicrobial stewardship as a strategic objective.[14,17] Implementation reports outline the creation of national treatment guidelines, the integration of AMR modules into professional training activities, and pilot stewardship programs at a few tertiary hospitals. Variability in institutional management and stewardship structure have been identified in published implementation studies.[5,13]

Pharmaceutical regulation and antibiotic access

Amendments to Federal law No. 61 imposed prescription-only antibiotic dispensing practice in Russia.[7] Various sources cited enforcement strategies related to regulatory inspections and pharmacy licensing. Both statutory healthcare facilities and a substantial unauthorised healthcare sector, including Patent and proprietary medicine vendors (PPMVs), provide access to antibiotics in Nigeria. The Pharmacists council of Nigeria and NAFDAC's regulatory duties are outlined in national policy documents.[14,17] According to implementation studies, there are issues with enforcement capacity, informal dispensing practices, and compliance variability.[18,19]

Financing and implementation capacity

AMR-related initiatives are integrated into more comprehensive health system reimbursement frameworks in the Russian Federation, such as federal and regional health budgets. Initiatives for stewardship, laboratory strengthening, and surveillance are reported to be funded by domestic sources.[20] Funding from external donors, including grants from foreign partners, is integrated with domestic allocations to bolster AMR initiatives in Nigeria. The federal and state budget lines allocated to AMR vary considerably according to the reviewed reports.[13,14]

One health coordination

As part of their national AMR policies, both nations legally embraced a One health concept. The 2017 National strategy in the Russian Federation outlines inter-ministerial coordination between veterinary, agricultural, and human health authorities in policy documents. Using established national laboratory networks, surveillance initiatives include tracking antibiotic resistance in clinical isolates and specific animal health sectors.[9]

One health coordination mechanisms between the Federal ministry of environment, federal ministry of agriculture and rural development, and federal ministry of health Nigeria are specifically included in the National action plans (2017;2024-2028).[14,17] The creation of collaborative planning platforms and multi-sectoral technical working groups is detailed in the published documents. Nonetheless, there are presently limited published articles on the consistent integration of cross-sectoral data.

Monitoring and evaluation mechanisms

Periodic evaluation procedures at the federal level and formal reporting requirements are features of the Russian 2017 National strategy. Performance monitoring through ministerial oversight and the incorporation of surveillance findings into policy reporting frameworks are highlighted in published studies.[20] Monitoring metrics in accordance with the goals of the WHO global action plan are outlined in Nigeria's national action plans.[14,17] Periodic review procedures organised by the Nigeria centre for disease control are among the reporting mechanisms. Variability in implementation monitoring at the subnational level has been reported in available sources.

DISCUSSION

This comparative analysis highlights that the institutional architecture that oversees implementation of national AMR strategies determines their effectiveness more than policy adoption. One key finding is that the implementation of AMR policies is significantly influenced by institutional continuity and legally binding regulation. AMR governance in the Russian Federation is governed by a highly centralised administrative framework that has mandatory federal oversight procedures and clearly defined ministerial accountability. Coordinated data reporting and the organised growth of laboratory networks have been made possible by the incorporation of stewardship requirements and surveillance mandates into official state structures.[15,16] Predictable domestic financing and regulatory enforceability support implementation, even though optimisation challenges persist, especially in harmonising regional data quality.[19] The Russian experience indicates that institutionalising surveillance, prescribing regulation, and stewardship requirements through enforceable administrative authority rather than voluntary compliance strengthens policy coherence.

Nigeria's AMR response operates within a federal system distinguished by fragmented regulatory reach, variable state-level capacity, and decentralised authority. In the national action plan, the Federal ministry of health and the NCDC outline strategic goals; however, enforcement is still uneven among subnational jurisdictions.[14] Sentinel laboratory development and participation in international

reporting mechanisms have advanced surveillance expansion; however, operational impact is limited by gaps in laboratory infrastructure, inconsistent diagnostic capacity, and limited integration of surveillance outputs into prescribing regulation.[5] In this situation, policy alignment exists on paper, but structural limitations impede implementation. The comparative results also highlight the importance of correlating surveillance systems with decision-making procedures. Structured reporting pipelines and feedback systems support clinical guideline updates and regulatory oversight in Russia.[16] Maintaining stewardship engagement depends more on data usability than data generation. Although surveillance capacity has increased in Nigeria, its impact on prescribing behaviour is diminished by lack of laboratory coverage and inadequate data-to-policy translation mechanisms.[5]

The two countries are further distinguished by the regulatory context. Prescription-only regulation operates with administrative coherence in Russia due to its formal pharmaceutical distribution system. In contrast, Nigeria has a sizable informal pharmaceutical sector, especially PPMVs.[18,19] Enforcement-driven strategies alone may be ineffective and may shift antibiotic distribution into less regulated channels. Therefore, adaptive regulatory models that incorporate certification pathways, defined medicine lists, and supervision may be more feasible. Another structural factor that influences implementation is financing stability. Russia's AMR initiatives are integrated into locally funded public health and regulatory frameworks.[20] Initiatives funded by donors continue to play a role in AMR implementation in Nigeria; however, sustainable AMR containment necessitates predictable domestic budgetary integration to guarantee continuity of surveillance, stewardship, and regulatory enforcement. The analysis reveals that addressing AMR cannot be viewed solely as a biomedical challenge. Structural factors including high out-of-pocket costs, limited insurance coverage for diagnostics, deficiencies in water and sanitation, and unequal access to primary care significantly influence antibiotic usage patterns in Nigeria. In settings where patients incur considerable high expenses for consultations and lab tests, empirical antibiotic use becomes a practical choice. Without improvements in healthcare financing and access, stewardship initiatives alone are unlikely to foster sustained behavioural change.

Differences in operationalisation are further demonstrated by the One health dimension. Although both nations formally support a multi-sectoral framework, cross-sectoral data integration is still in different stages of development. Although integrated reporting across sectors is still a developing process, veterinary and sanitary surveillance functions in Russia are institutionally anchored within federal regulatory bodies, facilitating administrative coordination. The NAP in Nigeria formally recognises inter-ministerial cooperation between the federal ministry of health, the federal ministry of agriculture, and environmental authorities; however, additional institutionalisation is needed for data-sharing mechanisms and enforcement coherence.[14] This suggests that multi-sectoral endorsement is inadequate without operational data pathways and clear accountability structures.

The analysis underscores a phased strategy to policy adaptation. Certain initiatives, such as guidelines harmonisation, point prevalence surveys, and structured stewardship education, may be achievable within short planning horizons and only require minor structural changes. On the other hand, nationwide genomic monitoring, extensive prescription enforcement across dispersed markets, and sophisticated digital surveillance platforms necessitate sustained investment and administrative capacity. If these interventions lack implementation in a realistic framework, there is a risk of implementation fatigue and institutional credibility erosion. Strengthening institutional coherence, integrating stewardship into routine governance, and guaranteeing consistent funding are fundamental priorities for long-term AMR containment in Nigeria as well as similar low- and middle-income nations.

Limitations

This scoping review does not assess the effectiveness of interventions or establish causal relationships; rather, it seeks to delineate patterns of policy implementation. The analysis was conducted using publicly accessible policy documents, with the comparative depth potentially constrained by the limited availability of grey literature in Russian. By their nature, cross-national comparisons tend to simplify complex institutional contexts. Future research should prioritise the AMR national action plan (2024-2028) in Nigeria to assess whether recent reforms yield measurable improvements. Additionally, comparative implementation studies in other low- and middle-income countries would further refine transferable policy principles.

CONCLUSION

The implementation challenge in tackling antimicrobial resistance is primarily determined by institutional capacity rather than policy availability. Effective AMR measures require enforceable regulation, effective surveillance systems and sustainable domestic financing as per this comparison.

Nigeria must prioritise the gradual enhancement of existing systems, rather than solely relying on external models. The combination of focusing on viable interventions and building regulatory and institutional capacity provides a more realistic approach to maintaining AMR containment. Strategy can be influenced by comparative analyses, but the integration of AMR control into regular health system governance is crucial to achieve lasting outcomes.

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