# Antimicrobial Stewardship Implementation in Low- and Middle-Income Countries: A Multi-Country Synthesis of Barriers, Facilitators, and Implementation Strategies in Bangladesh, Nigeria, and India

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## Background

Antimicrobial resistance is responsible for an estimated 1.27 million deaths annually, with low- and middle-income countries bearing a disproportionate burden [1]. Despite growing recognition, antimicrobial stewardship implementation across LMICs remains fragmented and poorly characterised [2]. **The objectives of this study** are to present the first multi-country synthesis examining AMS implementation across three high-burden nations, Bangladesh, Nigeria, and India, representing a combined population exceeding 1.6 billion and accounting for a substantial share of global antibiotic consumption.

## Method

Three independent systematic reviews were conducted following PRISMA 2020 guidelines across Bangladesh, Nigeria, and India (2015–2025), searching PubMed, Scopus, Web of Science, CINAHL, Cochrane Library, and Google Scholar. The combined dataset comprised 38 studies and 38,903 participants across tertiary, secondary, primary, and dental care settings. Quality appraisal used CASP and MMAT tools with independent dual-reviewer assessment. Thematic synthesis and cross-country comparative analysis identified universal and context-specific patterns in barriers, facilitators, prescribing behaviour, and AMS implementation strategies, mapped against the WHO core elements framework.

## Results

- Across the three countries, antimicrobial stewardship (AMS) is hindered by widespread education and training gaps (≥70% of studies), limited diagnostic capacity (31–40% culture-guided prescribing), and a persistent gap between policy and practice.
- Core AMS structures, such as audit-and-feedback systems and stewardship committees, are largely lacking, while reliance on education and guidelines alone has been insufficient.
- WHO AWaRe, Watch antibiotic use remains high (64–78.7%), with frequent prescribing of amoxicillin/penicillin (58–62%).
- Key enablers include strong leadership (notably 80% in Nigeria), professional expertise, and high willingness to engage in training (>90% in India) (Table 1).

**Table 1.** Cross-Country Comparison of AMS Implementation Metrics and Contextual Features (Bangladesh, Nigeria, and India; 2015–2025)

| Domain | Bangladesh | Nigeria | India |
|---|---|---|---|
| **Studies included (n)** | 10 | 10 | 12 |
| **Participants** | 12,489 | 1,343 | 12,487 |
| **Antibiotic prescribing rate** | 73.5% inpatient | ~65% inpatient | 64–78% inpatient |
| **Watch antibiotic use (AWaRe)** | 70.3% | 78.7% | 64.0% |
| **Culture-guided prescribing** | 31% | ~35% | 40% |
| **Key barrier: Education/training deficit** | ✓✓✓ | ✓✓✓ (70% poor awareness) | ✓✓✓ |
| **Key barrier: Diagnostic infrastructure** | ✓✓✓ | ✓✓✓ | ✓✓ |
| **Core AMS strategies (audit-feedback)** | Largely absent | Largely absent | Largely absent |
| **Key facilitator: Leadership commitment** | ✓✓ | ✓✓✓ (80%) | ✓✓ |
| **Training receptivity (positive)** | >85% | >80% | >90% |
| **National Action Plan** | NAP 2023–2028 | NAP 2024–2028 | NAP 2017–2021 |
| **Context-specific feature** | Highest Rx rate; One Health adoption | Pharmacy-led initiatives | Dental AMS gap; largest global consumer |

*✓✓✓ = major barrier/facilitator identified; ✓✓ = moderate; Rx = antibiotic prescribing; AWaRe = WHO Access, Watch, Reserve classification; NAP = National Action Plan; AMS = antimicrobial stewardship.*

## Conclusion

AMS implementation in South Asian and West African LMICs faces shared structural gaps despite differing contexts. Effective transition from policy to practice requires phased approaches, starting with surveillance and multidisciplinary teams, followed by audit and feedback systems. Strengthening laboratory capacity and ensuring sustained domestic financing are critical. Context-specific AMS models are essential, as high-income country frameworks are not directly transferable. This synthesis supports targeted, globally relevant stewardship scale-up strategies.

## References

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