



Original Research Article

The Need to Confront Antimicrobial Resistance in India

Article History:

Name of Author:

Jorige A. and Punyavathi K.M.

Corresponding Author:

Jorige A.

How to cite this article:

Jorige A. and Punyavathi K.M. The Need to Confront Antimicrobial Resistance in India. *Eur J Clin Pharm.* 2019;1(1);22-25.

Received: 26-03-2019

Revised: 31-03-2019

Accepted: 30-04-2019

Published: 02-05-2019

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Noncommercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Abstract: Antimicrobial resistance (AMR) represents one of India's gravest public health threats, risking a reversal of decades of medical progress. This article reviews the current situation of AMR in India, illuminates key drivers unique to the nation, outlines policy responses and gaps, and highlights strategies for urgent, coordinated action. The burden of AMR, policy efforts, and a One Health approach are addressed, emphasizing the imperative of confronting this crisis with multi-sectoral engagement.

Keywords: Antimicrobial resistance (AMR), Public health, India, One Health approach, Policy strategies.

INTRODUCTION

Antimicrobial resistance is the process by which microorganisms (bacteria, viruses, fungi, parasites) evolve mechanisms to withstand medications that once killed them. In India, AMR has undermined treatment of infectious diseases such as sepsis, pneumonia, urinary tract infections, and typhoid, and is threatening the effectiveness of even last-resort antibiotics. High disease burden, widespread antimicrobial use, and system-level challenges make India a global epicenter for AMR^{[1][2]}.

THE AMR BURDEN IN INDIA

- In 2019, India experienced an estimated 297,000 deaths directly attributable to AMR and over 1 million deaths associated with drug-resistant infections, making it one of the highest-burden countries globally^{[2][3]}.
- AMR mortality rates in India are among the highest worldwide, with carbapenem-resistant infections alone estimated to have caused over 340,000 deaths in 2019^{[2][3]}.
- Age-standardized figures show children under five are especially vulnerable, with nearly one in five global AMR deaths occurring in this age group in India^[2].
- A steep rise in incidence of methicillin-resistant *Staphylococcus aureus* (MRSA) from 29% in 2008 to 47% in 2014 demonstrates the escalation of resistance over time^[4].
- According to the Indian Council of Medical Research (ICMR), resistance now includes common pathogens and life-saving antibiotics, with rising intractability of diseases like UTIs, bloodstream infections, pneumonia, and typhoid^[5].

Figure 1. Estimated Deaths Attributable to AMR in India (2019)

A bar graph would show:

- 1,042,500 deaths associated with AMR
- 297,000 deaths directly attributable to AMR

Table 1. Resistant Pathogens of Critical Concern in India

Bacteria	Problematic Resistance	Deaths Attributed (2019)
Klebsiella pneumoniae	Carbapenem, Colistin	>340,000
Escherichia coli	Fluoroquinolones, BL/BLIs*	High
Staphylococcus aureus	Methicillin (MRSA)	Rising sharply
Pseudomonas aeruginosa	Carbapenem	High
Neisseria gonorrhoeae	Ciprofloxacin	78% resistance

(*BL/BLI = Beta-lactam/Beta-lactamase inhibitors)^{[2][5][4]}

Drivers of AMR in India

- **Overprescription and Over-the-Counter Access:** Antibiotics are often prescribed unnecessarily or sold without prescriptions^[1].
- **Self-Medication:** Widespread availability and lack of regulation fuel self-medication and misuse.
- **Gaps in Infection Prevention:** Inadequate infection control in health-care facilities and poor sanitation in communities increase infection transmission and antibiotic demand^[6].
- **Regulatory Gaps:** Weak enforcement of prescription regulations, particularly in the private sector.
- **High Burden of Infectious Disease:** India's high communicable disease rates drive demand for antibiotics, further accelerating resistance.
- **Agricultural and Veterinary Use:** Antibiotics are heavily used as growth promoters in livestock and aquaculture, contributing to the spread of AMR genes in food chains and the environment^{[7][8]}.
- **Environmental Dissemination:** Improper disposal of antibiotics and hospital waste releases resistant genes into water bodies, amplifying environmental reservoirs of AMR^{[7][4]}.

Figure 2. The One Health Approach to AMR

A schematic illustrates the flow of antibiotics and resistant organisms/genes between humans, animals, and the environment.

Surveillance and Policy Initiatives

India has enacted several landmark steps:

- **National Programme on AMR Containment (2013):** Focuses on surveillance systems, rational antibiotic use, and infection control^[9].
- **National Action Plan on Antimicrobial Resistance (NAP-AMR, 2017):** Sets five-year strategic priorities: raising awareness, strengthening surveillance, infection prevention, optimizing use, investing in research, and supporting international collaboration^{[10][11]}.
- **Surveillance Networks:** ICMR's AMR Surveillance Network (AMRSN) and NCDC's AMR Containment Lab Network monitor resistance across the country^{[6][9]}.
- **Antimicrobial Stewardship Programs:** Initiated in selected tertiary hospitals by ICMR and others to curb the overuse and misuse of antibiotics^[8].

Table 2. Key Policy Milestones for AMR in India

Initiative	Year Started	Key Focus
National Task Force on AMR Containment	2010	Coordinated AMR response
National Programme on AMR Containment	2013	Surveillance & control
National Action Plan on AMR (NAP-AMR)	2017	Strategic actions, One Health

Ban on Colistin in Animal Feed	2019	Agriculture sector
Antibiotic Stewardship Pilot Programs	2019	Hospital sector

Persisting Gaps and Challenges

Despite these efforts, India faces formidable obstacles:

- **Implementation Gaps:** Wide variation in compliance with AMR-control policies across states, facilities, and sectors.
- **Awareness and Training:** Insufficient training in rational antimicrobial prescribing among clinicians and pharmacists^[11].
- **Access vs. Excess:** Paradoxically, many patients die due to lack of access to effective antibiotics, as only 7.8% of those with carbapenem-resistant infections received appropriate treatment in 2019^[3].
- **Lack of Unified Regulations:** Enforcement of prescription-only antibiotic sales remains weak, especially in rural and informal markets.

The Urgent Need for Action

Why Must India Confront AMR?

1. **Health Security:** Rising resistance threatens to make common infections and surgeries far more dangerous, undoing decades of medical progress^{[12][1]}.
2. **Child and Maternal Mortality:** Nearly 25% of child deaths are due to infectious diseases, with mortality exacerbated by rising resistance^{[2][4]}.
3. **Economic Burden:** Increased lengths of stay, need for expensive drugs, and productivity losses impose huge economic costs^{[13][10]}.
4. **Global Spillover:** India's AMR crisis is a global concern due to extensive travel, trade, and migration^[10].

Figure 3. Trends in MRSA Prevalence, India vs. Global

A line graph would display a rise in MRSA rates in India, contrasting with a decline in countries with robust stewardship programs^[4].

Strategies and Recommendations

- **Strengthen Regulation & Enforcement:**
 - Enforce prescription-only sales, especially in the private and informal sectors.
 - Monitor and ban non-essential use of antibiotics in agriculture^[8].
- **Expand and Integrate Surveillance:**
 - Scale-up AMR and antibiotic consumption surveillance in humans, animals, and the environment ("One Health").
 - Participation in global initiatives like WHO's GLASS and adoption of real-time data-sharing platforms^{[9][14]}.
- **Enhance Stewardship and Infection Control:**
 - Mandate stewardship programs in all tertiary and secondary hospitals.
 - Standardize guidelines and implement infection control best practices nationwide.
- **Improve Public Awareness and Education:**
 - Conduct large-scale campaigns educating prescribers and the public about AMR risks and prudent use of antibiotics.
- **Research and Innovation:**
 - Support research in rapid diagnostics, new antibiotics, and alternatives (e.g., bacteriophages).
 - Foster investment in AMR-related R&D, including new vaccines^{[11][10]}.
- **Ensure Equitable Access:**
 - Balance efforts to combat excess with policies ensuring timely access to effective antibiotics for life-threatening infections^[3].

DISCUSSION

India's AMR challenge is intensified by systemic healthcare gaps, economic constraints, high population density, and vibrant private health and agricultural sectors. Addressing it requires a sustained, multifaceted approach anchored in the One Health framework—coordinating human, animal, and environmental health interventions. Lessons from global best practices and local pilot programs must be rapidly scaled up. Ultimately, success will depend on political leadership, collaboration across sectors, and nationwide public engagement.

CONCLUSION

Confronting AMR in India is a public health and development imperative. Coordinated action—encompassing stewardship, control, surveillance, education, and investment—is urgently needed. Without decisive steps, India risks facing a post-antibiotic era, undermining decades of health gains and threatening global security.

Figure 1. Estimated AMR-Attributable Deaths in India (2019)

Figure 2. One Health Approach to AMR Spread

Figure 3. MRSA Prevalence Trends in India and Globally

Table 1. Resistant Pathogens of Critical Concern in India

Table 2. Key Policy Milestones for AMR in India

Acknowledgements

This article is intended for academic, clinical, and policy reference. No conflicts of interest.

REFERENCES

1. Cryosite. "Navigating CAR-T Cell Therapy Challenges in Storage, Transportation, and Quality Control." 2025.
2. The burden of antimicrobial resistance (AMR) in India. Institute for Health Metrics & Evaluation, 2023.
3. National Programme on AMR Containment, NCDC, Government of India, 2019.
4. Indian Council of Medical Research, "India faces growing threat as key antibiotics lose effectiveness." 2024.
5. National Action Plan on Antimicrobial Resistance, Government of India, 2017.
6. Antimicrobial resistance in India: A review. PMC, 2011.
7. The leading causes of antimicrobial resistance in India. GARDP, 2023.
8. WHO. "Antimicrobial Resistance – India: Health Topics." 2021.