

Antimicrobial Resistance in India

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Antimicrobial Resistance in India: Challenges, Impacts, and the Road Ahead

Context:

A recent global study funded by Wellcome and the UK Department of Health and Social Care's Fleming Fund estimates that **bacterial AMR alone could cause 39 million (3.9 crore) deaths between 2025 and 2050** — equivalent to **three deaths every minute**. This alarming projection highlights AMR as a serious global public health threat, especially for countries like India where antibiotic misuse and infectious diseases are prevalent.

What is Antimicrobial Resistance (AMR)?

- **Antimicrobials:** Medications like **antibiotics, antivirals, antifungals, and antiparasitics** used to treat infections in humans, animals, and plants.
- **AMR:** Occurs when microorganisms (bacteria, viruses, fungi, parasites) evolve to resist antimicrobial agents they were previously sensitive to.

AMR in India:

- Resistance has been detected in key pathogens like **E. coli, Klebsiella, Acinetobacter, Staphylococcus aureus, and Enterococcus**, including resistance to **latest-generation antibiotics**.
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Causes of Antimicrobial Resistance

1. **Natural Evolution:** Microbes adapt through genetic mutations over time.
2. **Overuse and Misuse:** Widespread inappropriate use of antibiotics in **humans, livestock, and agriculture**.

3. **Poor Infection Control:** Low hygiene standards in hospitals and communities allow resistant strains to spread.
 4. **Environmental Contamination:** Improper disposal of pharmaceuticals leads to resistant genes in water and soil.
 5. **Global Travel and Trade:** AMR spreads across borders via people, food, and goods.
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Impacts of Antimicrobial Resistance

- **Public Health Threat:**

- Reverses gains made in combating infectious diseases like **TB, typhoid, pneumonia**.
- **30,000 newborn deaths annually** in Indian ICUs due to drug-resistant infections.

- **Increased Mortality:**

- Projected **39 million deaths globally** by 2050.

- **Healthcare Burden:**

- **Longer hospital stays**, expensive treatments, and overloaded health infrastructure.

- **Economic Burden:**

- Potential **\$3.4 trillion GDP loss annually by 2030**.

- **Pandemic Impact:**

- During COVID-19, misuse of steroids led to **mucormycosis (black fungus)** in India.
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Challenges in Tackling AMR in India

1. Over-the-Counter Antibiotics:

- Easy availability promotes **self-medication and incomplete dosage**.

2. High Population Density:

- Cities like **Kolkata (30,097/km²)**, **Mumbai (20,634/km²)** intensify the spread of resistant pathogens.

3. Infectious Disease Prevalence:

- High burden leads to **excessive antibiotic usage**.

4. Multidrug Resistance:

- Diseases like **MDR-TB and XDR-TB** are increasingly difficult to treat.

5. Low Awareness:

- Public and practitioners often unaware of AMR risks and rational drug use.

6. Weak Regulation:

- Poor enforcement of rules like **Schedule H1** of the Drugs and Cosmetics Act.

7. Inadequate Genomic Tools:

- Genomic tracking is not yet available at the clinical point-of-care.

Global and National Efforts Against AMR

Global Initiatives:

- **UNGA High-Level Meetings (2016 & 2024):**

- Promote national action plans, R&D, and policy coordination.

- **Global AMR Surveillance System (GLASS):**

- Facilitates data sharing and global monitoring.

India's Response:

- **National Action Plan on AMR (2017):**

- Aims at awareness, surveillance, infection prevention, and optimized use.

- **Delhi Declaration (2017):**

- Inter-ministerial commitment to the **One Health** approach.

- **Schedule H1 Rule (2011):**

- Restricts over-the-counter antibiotic sales (modified later for first-line drugs).

- **Institutional Surveillance:**

- **ICMR, NCDC, ICAR** running pathogen surveillance programs.

- **CMC Vellore:**

- Reference center for genomic sequencing and AMR data.

- **New Antibiotics Developed in India:**

- Examples: **cefepime-enmetazobactam, levodifloxacin** — alternatives to last-resort drugs.

- **AI-Driven Tools:**

- **AMRSense** uses hospital data to predict AMR trends.

- **Kerala's Policy Innovation (2024):**

- First Indian state to **ban OTC sale of antibiotics** without prescriptions.
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What Lies Ahead? Recommendations and Way Forward

1. Strengthen Hospital Surveillance:

- Publicize infection data to promote transparency.

2. Monitor Environmental Pollution:

- Analyse effluents from hospitals and pharma industries.

3. Leverage Genomic Labs (Post-COVID):

- Use existing labs for AMR mapping and prediction.

4. Develop Targeted Diagnostics:

- Tools based on genome markers (e.g., for **Salmonella Typhi**).

5. Promote Antimicrobial Stewardship:

- Train **doctors, pharmacists, and informal providers** in rational antibiotic use.

6. Enhance Communication and Awareness:

- Design **mass campaigns** for public engagement on AMR risks.

7. Strengthen Regulation:

- Uniform implementation of Schedule H1 across all Indian states.
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Conclusion

Antimicrobial Resistance is not just a medical challenge; it is a **socio-economic and governance crisis**. India, being among the countries most affected, must act urgently. While surveillance, research, and innovation have made strides, they must be matched with strong **public health communication, strict regulatory enforcement, and multisectoral coordination**. With the right blend of science, policy, and public participation, **India can lead the global fight against AMR**.



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