

# PrepAlpine

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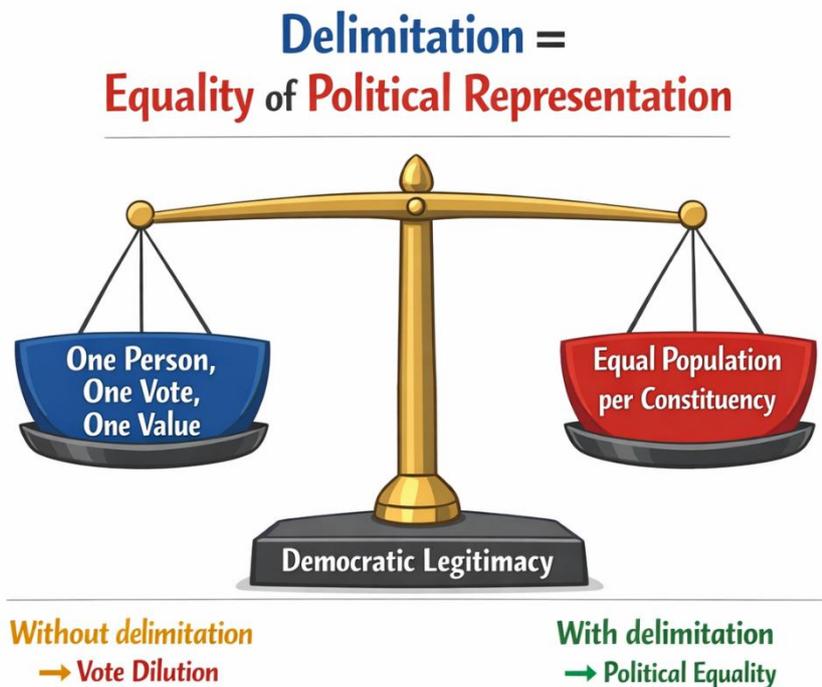
### GS Paper II: Polity

#### 1. Delimitation in India: Representation, Federalism and the Post-2027 Challenge

##### a. Understanding Delimitation: The Basic Idea

Delimitation refers to the periodic redrawing of electoral constituency boundaries and the redistribution of seats in the Lok Sabha and State Legislative Assemblies to reflect changes in population over time. Its core purpose is to preserve equality of political representation in a dynamic and demographically changing society.

In a representative democracy, political equality rests on the principle of “one person, one vote, one value.” This principle requires that each elected representative represents roughly the same number of citizens. Without periodic delimitation, some constituencies become disproportionately large while others remain small, resulting in unequal voting power. Delimitation is therefore not a technical adjustment, but a foundational requirement for democratic legitimacy.



##### b. Constitutional Basis of Delimitation in India

The Constitution of India originally envisaged delimitation as a regular exercise after every Census. To preserve neutrality, this function is entrusted to an independent Delimitation Commission, appointed by the President and insulated from executive influence.

A distinctive constitutional feature is that the orders of the Delimitation Commission have the force of law and:

- Cannot be modified by Parliament
- Cannot be challenged in ordinary courts

This insulation underscores the constitutional commitment to fair and apolitical representation. At a deeper level, the principle of equal representation flows from Article 14, which guarantees equality before the law and forms the moral foundation of democratic political equality.

### **c. The Long Freeze on Delimitation**

#### **i. The Constitutional Freeze**

In 1976, through the Forty-Second Constitutional Amendment, the redistribution of Lok Sabha seats among States was frozen on the basis of the 1971 Census. This freeze was later extended by the Eighty-Fourth Amendment (2001) until the first Census conducted after 2026.

#### **ii. Rationale Behind the Freeze**

The freeze must be understood in its historical and developmental context. During the 1970s, India formally adopted a national population control policy, urging States to reduce fertility rates through education, healthcare expansion, and women's empowerment.

Several southern and western States responded effectively and achieved early demographic stabilisation. The freeze ensured that States which controlled population growth were not politically penalised by losing parliamentary representation.

In this sense, the freeze functioned as a constitutional incentive for responsible governance, aligning political power with long-term national objectives rather than short-term demographic expansion.

### **d. The Post-2027 Constitutional Turning Point**

With the Census expected around 2027, the constitutional freeze on inter-State redistribution of Lok Sabha seats expires automatically. For the first time since 1976, reallocation of parliamentary seats among States becomes constitutionally permissible.

This marks a structural shift in India's representative architecture, as political power will once again be redistributed on the basis of updated population figures. Post-2027 delimitation therefore represents not a routine adjustment, but a national political rebalancing of exceptional significance.

### **e. The Core Dilemma: Population Versus Fairness**

India's States have followed divergent demographic paths. Southern and western States now exhibit low fertility rates and stable populations, while several northern States continue to experience higher population growth.

This divergence raises a fundamental question:

Should States lose political influence because they governed well?

A strictly population-based delimitation rewards higher population growth while effectively penalising States that invested early in human development. This produces a federal paradox, where demographic success translates into political disadvantage.

### **f. Why Population-Based Delimitation Is Not Neutral**

At first glance, allocating seats purely on population appears objective. However, parliamentary power operates through absolute numbers, not just proportional shares.

- Larger States may acquire disproportionate legislative influence
- Coalition formation and government stability may become dependent on a few populous States
- Smaller or demographically stabilised States may lose bargaining power

Even if all States gain seats numerically, relative political influence may shift decisively. Delimitation thus reshapes not only representation, but the geography of political power within the Union.

### **g. Implications for Indian Federalism**

From a federal perspective, post-2027 delimitation carries significant risks:

- Excessive concentration of parliamentary power can weaken cooperative federalism
- National policies may increasingly reflect the preferences of a limited set of States
- Perceptions of regional imbalance may deepen political distrust

Delimitation therefore has the potential to reconfigure Centre–State relations and alter the federal compact that sustains India’s unity.

### **h. Policy Options to Address the Post-2027 Challenge**

No single solution fully resolves the dilemma, but several options are under debate.

#### **Extending the freeze further**

- Preserves federal balance
- Undermines equal representation and democratic principle

#### **Expanding the strength of the Lok Sabha**

- Ensures no State loses seats
- Does not prevent relative dominance of large States

#### **Weighted representation formula**

- Population as primary criterion
- Supplemented by governance indicators (fertility reduction, HDI)
- Normatively attractive but politically contentious

#### **Strengthening the Rajya Sabha as a federal chamber**

- Reducing population dominance
- Exploring more equal State representation
- Enhancing its role as a counter-majoritarian institution

#### **Reorganisation of excessively large States**

- Viewed as a federal correction
- Prevents over-concentration of political power

#### **Phased implementation of delimitation**

- Gradual adjustment
- Allows political and democratic adaptation

### **i. Importance of Process and Institutional Safeguards**

The credibility of delimitation rests on how it is conducted.

- An independent and expert-driven Delimitation Commission
- Transparent criteria and publicly available reasoning
- Meaningful public consultation and inter-State dialogue
- Continued judicial oversight under constitutional principles

Expertise in demography, constitutional law, and federal studies is essential to prevent arbitrariness and preserve trust.

### **j. Reserved Constituencies and Emerging Complexities**

Delimitation also affects Scheduled Caste and Scheduled Tribe reserved constituencies, which are strictly population-based but involve discretion in geographical mapping. This creates risks of gerrymandering if safeguards are weak.

The introduction of women's reservation further complicates delimitation, as rotation of seats must align with new boundaries. This intersection makes procedural fairness and transparency indispensable.

### **Conclusion**

Post-2027 delimitation represents a critical constitutional crossroads. It will reshape political representation, alter coalition dynamics, and test the resilience of India's federal structure.

Handled with dialogue, sensitivity, and institutional integrity, delimitation can modernise Indian democracy while preserving unity. Handled mechanically or majoritarianly, it risks deepening regional distrust and weakening the federal spirit.

Delimitation, therefore, is not a technical recalibration—it is a profound constitutional choice about how India balances democracy, diversity, and federalism.

## **GS Paper II: Current Affairs**

### **2. 'Disturbed Areas Laws and Regulation of Property Transfers**

#### **a. Concept and Rationale of 'Disturbed Areas' Laws**

Disturbed Areas laws refer to state-level legislations that regulate the transfer of immovable property—such as land, houses, or commercial premises—in areas officially notified as communally sensitive. Once an area is declared “disturbed,” property transactions are subjected to prior administrative scrutiny, usually by the District Collector.

The underlying rationale of these laws is preventive rather than punitive. States justify them as tools to prevent distress sales, i.e., transactions where property owners may be compelled to sell at undervalued prices due to fear, intimidation, or repeated communal violence. In this sense, the laws are projected as instruments of protective governance, aimed at safeguarding vulnerable residents and preserving public order, rather than as mechanisms to interfere with normal market functioning.

#### **b. Origin and Evolution of Disturbed Areas Legislation**

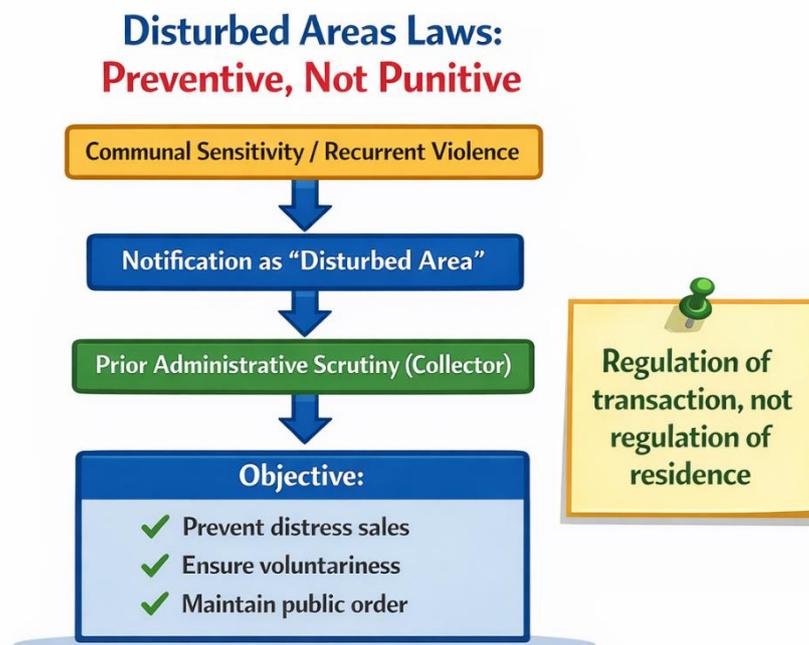
##### **Gujarat Disturbed Areas Act, 1991**

The most prominent example is the Gujarat Disturbed Areas Act, 1991, enacted in the aftermath of repeated communal riots during the late 1980s and early 1990s. At the time of enactment, the law had a limited and narrowly tailored design, focused squarely on protection.

Its original objectives were:

- Protection of vulnerable property owners from coercion or intimidation
- Verification of voluntariness in property transactions
- Prevention of panic-driven displacement from riot-affected localities

Crucially, the Act was not conceived as an instrument of demographic regulation or social segregation. Its scope was confined to ensuring fairness in transactions, not to controlling who could live where.



### c. Core Provisions of Disturbed Areas Laws

At their core, Disturbed Areas laws operate through a structured administrative framework.

- The state government is empowered to notify any area as “disturbed,” usually on the basis of its history of communal violence or recurring law-and-order issues.
- Once notified, any sale, transfer, or exchange of immovable property within that area requires prior permission of the District Collector.

The Collector’s statutory inquiry is strictly limited to two considerations:

- Whether the consent of both parties is free and voluntary, without coercion or intimidation
- Whether the transaction reflects a fair market value, ensuring that the seller is not exploited

Any transaction undertaken without such permission is treated as void in law. Although the statute often declares the Collector’s decision to be “final,” this finality clause does not oust judicial review, particularly under Article 226 of the Constitution.

### d. Expansion of State Control and the Problematic Shift

A decisive shift occurred with later amendments, most notably the Gujarat amendments of 2020. These amendments introduced broad and indeterminate expressions, such as:

- Proper clustering
- Demographic equilibrium
- Polarisation
- Apprehended law-and-order disturbance

The introduction of such vague terminology significantly widened administrative discretion. In practice, it enabled authorities to move beyond verifying consent and value, and instead assess the identity of buyers and the social consequences of transactions.

As a result, the law began to function less as a shield against distress sales and more as a mechanism of spatial and demographic control. Critics argued that this allowed the state to indirectly regulate residential patterns, inhibit organic inter-community interaction, and intrude into private choices under the guise of public order.

## **e. Judicial Intervention and Constitutional Doctrine**

The Gujarat High Court has played a pivotal role in restoring constitutional balance by strictly interpreting the scope of executive power under the Act.

### **i. Key Judicial Principles**

The Court has consistently held that the Collector's powers are narrow, specific, and purpose-bound. The inquiry can only examine:

- Whether the transaction reflects free consent, and
- Whether it is conducted at fair market value

The Court has categorically ruled that the Collector has no authority to consider:

- Communal balance or demographic composition
- Objections raised by neighbours or local groups
- Speculative assessments of future law-and-order issues

Police reports citing potential unrest have also been held to be irrelevant, as they fall outside the legislative intent of preventing distress sales.

### **ii. Illustrative Case: Vadodara (2020)**

In a significant case from Vadodara, Hindu sellers voluntarily agreed to sell a shop to Muslim buyers. The Collector denied permission citing possible law-and-order concerns and objections from the locality.

The High Court quashed the order, holding that once free consent and fair value are established, neighbourhood objections or hypothetical apprehensions cannot invalidate a private transaction. The judgment reaffirmed that the Act cannot be used to police social composition or engineer segregation.

## **f. Interim Constitutional Safeguards**

Following sustained judicial intervention:

- The 2020 amendments were stayed from January 2021 onwards
- The state government was restrained from exercising the expanded powers
- The broader constitutional validity of the Act remains under judicial consideration

This interim arrangement reflects the judiciary's role as a constitutional sentinel, preventing executive excess while preserving legislative intent.

## **g. Constitutional Issues Involved**

Disturbed Areas laws implicate multiple constitutional provisions:

- **Article 14 (Equality before Law):** Risk of arbitrariness due to vague statutory language and unfettered discretion
- **Article 15 (Non-discrimination):** Potential indirect discrimination if property regulation produces community-based outcomes

- **Article 19(1)(e):** Restriction on the right to reside and settle freely in any part of India
- **Article 300A:** Interference with property rights except by narrowly construed authority of law
- **Article 226:** Judicial review as the primary safeguard against misuse of executive power

## **h. Governance and Ethical Dimensions**

From a governance perspective, the evolution of Disturbed Areas laws reflects a deeper ethical dilemma. A statute originally designed for protection risks transforming into an instrument of social control and segregation.

Excessive discretion vested in district administration increases the likelihood of arbitrariness, politicisation, and selective enforcement. Over time, this produces a chilling effect, discouraging lawful transactions, distorting urban development, and undermining economic mobility—particularly in mixed and transitional neighbourhoods.

## **i. Rajasthan's Proposed Law: Emerging Constitutional Concerns**

Rajasthan's proposed legislation closely mirrors the stayed Gujarat amendments, especially in its reliance on concepts such as demographic imbalance and improper clustering.

Given the established judicial record, such provisions are likely to invite constitutional scrutiny, particularly on grounds of:

- Proportionality
- Equality before law
- Unreasonable restrictions on fundamental freedoms

## **j. Way Forward**

A constitutionally sound framework requires a return to the original, narrow objective of preventing distress sales.

- Vague and subjective terminology must be removed
- Clear statutory limits should be placed on administrative discretion
- Decisions must be reasoned, transparent, and time-bound

Concerns of communal harmony are better addressed through urban planning, effective policing, and community engagement, rather than restrictions on property transfers. Governance responses must also align with Sustainable Development Goal 16, which emphasises peace, justice, and strong institutions.

## **Conclusion**

Disturbed Areas laws operate at the sensitive intersection of public order and individual liberty. Judicial interpretation makes it clear that while the state may act to prevent coercion and exploitation, it cannot engineer demographic outcomes through property regulation.

A constitutionally valid approach must preserve security without sacrificing equality, freedom of residence, and the rule of law. In this balance lies the true test of constitutional governance.

## **GS Paper III: Economics**

### **3. Advanced Chemistry Cell (ACC) Manufacturing in India**

#### **a. Understanding Advanced Chemistry Cells (ACC)**

Advanced Chemistry Cells (ACC) are next-generation rechargeable battery cells designed to store electrical energy efficiently, safely, and at high density. They form the technological backbone of electric mobility and renewable energy systems, including electric vehicles (EVs), grid-scale energy storage, and integration of solar and wind power.

Unlike conventional batteries, ACCs rely on advanced electro-chemical technologies, most notably lithium-ion chemistry and its emerging variants such as lithium iron phosphate (LFP) and solid-state batteries. Their key advantage lies in high energy density, which means more energy can be stored in a smaller and lighter package—an essential requirement for EVs and modern power systems.

In contrast, traditional lead-acid batteries use outdated chemistry, are bulky, heavy, and offer limited storage capacity. While they remain suitable for inverters and basic automotive uses, they are inadequate for electric mobility or large-scale renewable integration. For India's clean energy transition, ACC batteries are indispensable rather than optional.



## b. Strategic Importance of ACC Manufacturing for India

India currently imports the overwhelming majority of its battery cells, with heavy dependence on China for finished cells, battery components, and processing technologies. This dependence creates multiple vulnerabilities.

- **Economic vulnerability:** Import dependence increases costs and limits domestic value addition.
- **Strategic vulnerability:** Supply disruptions can directly derail India's EV and renewable energy ambitions.
- **Industrial vulnerability:** Absence of domestic ACC manufacturing excludes India from one of the fastest-growing global manufacturing sectors.

Indigenous ACC manufacturing is therefore essential to:

- Reduce import dependence
- Strengthen energy security
- Enable large-scale EV adoption
- Support the Make in India programme
- Generate high-skill manufacturing employment

Without domestic battery capability, India's clean energy transition remains structurally fragile.

## c. ACC Production Linked Incentive (PLI) Scheme: Design and Objectives

To catalyse domestic battery manufacturing, the Government of India launched the ACC Production Linked Incentive (PLI) Scheme in 2021 under the Ministry of Heavy Industries.

Key design features of the scheme include:

- **Total financial outlay:** ₹18,100 crore
- **Target capacity:** 50 gigawatt-hours (GWh) of battery manufacturing
- **Incentive structure:** Linked to actual production and sales, not investment announcements

The output-linked design was intended to ensure that incentives reward real manufacturing outcomes and prevent the creation of non-performing assets.

#### **d. Operational Mechanism of the ACC-PLI Scheme**

Under the scheme, incentives are disbursed only after battery cells are manufactured and sold, with a maximum incentive ceiling of approximately ₹2,000 per kilowatt-hour.

Participation conditions were deliberately stringent:

- **Minimum investment requirement:** ₹1,100 crore
- **Domestic value addition targets:**
  - 25% within two years
  - 60% within five years
- **High net-worth criteria** per unit of capacity

The policy intent was to attract large, financially strong firms capable of establishing globally competitive giga-factories.

#### **e. Implementation Reality: Outcomes on the Ground**

Despite ambitious targets, actual outcomes have fallen short.

- Against the envisaged 50 GWh capacity, only around 30 GWh was finally allocated.
- Of this, merely about 1.4 GWh is currently operational.
- Around 8.6 GWh remains under delayed development.
- No firm has yet commenced large-scale commercial battery sales, resulting in zero incentive disbursement so far.

This significant gap between policy intent and industrial delivery points to deeper structural challenges beyond fiscal incentives.

#### **f. Structural Constraints Limiting ACC Manufacturing**

Several interlinked structural constraints have impeded progress.

##### **i. Technology Deficit**

The most fundamental limitation is the absence of indigenous battery cell technology. ACC manufacturing requires deep expertise in:

- Cell chemistry
- Precision manufacturing
- Proprietary intellectual property

Many selected firms lacked prior ACC experience and depended heavily on foreign technical partners.

##### **ii. High Entry Barriers**

Stringent net-worth requirements and auction-based capacity allocation excluded mid-sized battery manufacturers who possessed relevant experience and could have scaled up with targeted support.

##### **iii. Weak Battery Ecosystem**

Battery manufacturing depends on a broader ecosystem, including:

- Critical minerals such as lithium, cobalt, and nickel
- Refining and processing capacity
- Cathode, anode, and separator manufacturing

These upstream and midstream capabilities remain underdeveloped in India.

#### **iv. Continued Dependence on China**

China dominates mineral processing, manufacturing equipment, and technical know-how. Delays in visas for Chinese engineers further slowed project execution, exposing the risks of ecosystem dependence.

#### **g. Economic and Strategic Implications**

Slow progress in ACC manufacturing has wide-ranging consequences:

- Slower electric vehicle adoption
- Continued import dependence and trade imbalance
- Limited domestic value addition
- Reduced capacity to integrate renewable energy efficiently into the power grid

India risks missing a critical window to integrate into global battery supply chains, while inadequate storage capacity weakens the reliability of renewable-based power systems.

#### **h. Lessons from Global Battery Manufacturing Models**

International experience shows that successful battery manufacturing rests on ecosystem depth rather than incentives alone.

- **China:** Built an end-to-end ecosystem covering mining, refining, manufacturing, and recycling
- **South Korea:** Invested heavily in R&D and specialised industrial clusters
- **Japan:** Focused on long-term technological leadership and innovation

In contrast, India's approach has relied largely on financial incentives without parallel ecosystem development, limiting the scheme's effectiveness.

#### **i. Way Forward: Building Sustainable ACC Capability**

A sustainable approach to ACC manufacturing requires policy reorientation.

- **Lower entry barriers** to accommodate specialised battery firms with proven technical capability
- **Direct support for R&D**, technology acquisition, and skill development
- **Ecosystem investment** in mineral processing, recycling, and component manufacturing
- **Strategic technology partnerships and joint ventures** to bridge short-term gaps
- **Supply chain diversification** to reduce geopolitical vulnerability

ACC policy must also align with national priorities such as the EV policy, the National Energy Storage Mission, and Sustainable Development Goals 7 and 9, which emphasise clean energy and industrial innovation.

#### **Conclusion**

India's ACC manufacturing push reflects strong strategic intent but limited industrial depth. Battery manufacturing is not merely about capacity targets or fiscal incentives; it requires technology ownership, integrated supply chains, and a skilled ecosystem.

Without these foundations, incentive-driven schemes risk producing delayed projects rather than resilient manufacturing capabilities. A decisive shift from incentive-centric to ecosystem-centric policy is essential if India is to secure its position in the global clean energy and electric mobility landscape.

## GS Paper III: Disaster Management

### 4. Antimicrobial Resistance (AMR): Causes, Consequences and the Antibiotic Pipeline Crisis

#### a. Understanding Antimicrobial Resistance (AMR)

Antimicrobial Resistance (AMR) refers to the ability of microorganisms—primarily bacteria—to survive exposure to drugs that were once effective in killing or controlling them. In practical terms, this means standard antibiotics fail to cure infections, recovery becomes prolonged, complications increase, and the risk of death rises.

AMR poses a direct threat to the foundations of modern medicine. Antibiotics are not limited to treating infections; they enable surgical procedures, cancer chemotherapy, organ transplantation, neonatal care, and intensive care medicine. Without effective antibiotics, even minor injuries or routine infections can once again become life-threatening, reversing decades of medical progress.

#### b. AMR as a Global Public Health Crisis

AMR is often described as a “silent” or slow-moving pandemic. Unlike acute disease outbreaks, resistance spreads gradually, remains invisible in its early stages, and is often detected only when treatments fail.

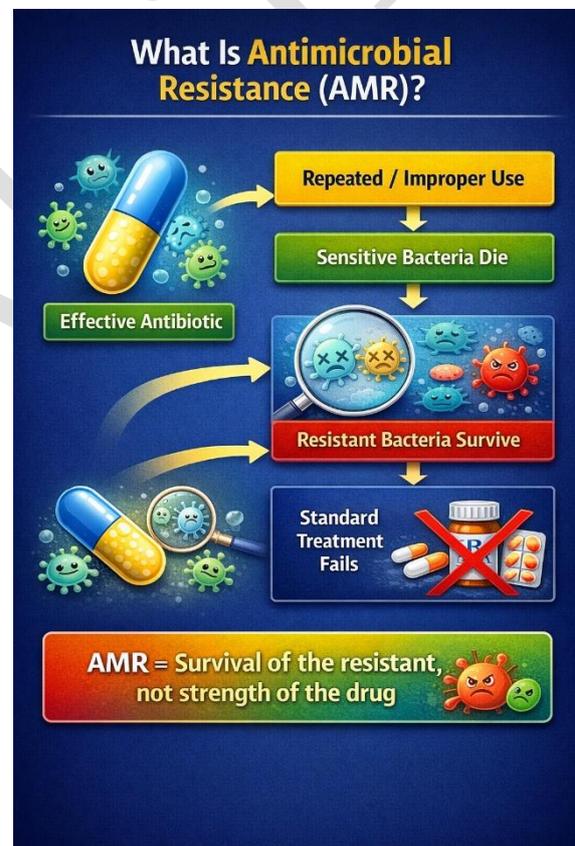
Unchecked AMR has multiple consequences:

- Common infections become untreatable
- Hospital stays become longer and more expensive
- Mortality rates increase
- Healthcare systems face rising financial pressure
- Productivity losses burden national economies

India is particularly vulnerable due to:

- A high infectious disease burden
- Widespread non-prescription access to antibiotics
- Gaps in surveillance and regulatory enforcement

AMR in India is therefore not merely a medical issue, but a governance and systems challenge.



#### c. The Antibiotic Pipeline Crisis

The antibiotic pipeline refers to the process through which new antibiotics are researched, developed, tested, approved, and made available for clinical use. This pipeline is now critically weakened.

Over the past two decades:

- Very few new antibiotics have been approved globally
- Almost none represent new drug classes or novel mechanisms of action
- Most recent drugs are minor modifications of existing antibiotics

This creates a dangerous imbalance. Existing antibiotics are reused repeatedly, accelerating resistance, while reliable replacements are scarce. As bacteria evolve faster than drug development, medicine faces the risk of sliding back into a pre-antibiotic era, where ordinary infections once again become fatal.

#### **d. Extent of Antimicrobial Resistance in India**

##### **i. Hospital-Acquired Infections**

Hospitals are major hotspots for AMR due to:

- High antibiotic consumption
- Intensive selection pressure on bacteria
- Crowded wards and invasive procedures

Studies indicate that around one in ten hospitalised patients in India acquires a drug-resistant infection, many resistant even to last-resort antibiotics. Such infections increase mortality, treatment costs, and strain already overburdened healthcare infrastructure.

##### **ii. Community-Acquired Infections**

AMR has spread beyond hospitals into the community. Rising resistance is observed in:

- Typhoid
- Diarrhoeal diseases
- Pneumonia
- Urinary tract infections

For example, *Salmonella typhi* has developed resistance to fluoroquinolones, while overuse of ceftriaxone and azithromycin is eroding their effectiveness. This community spread marks a dangerous epidemiological phase, affecting even those without hospital exposure.

#### **e. Human Behaviour as the Core Driver of AMR**

The most significant cause of AMR is misuse and overuse of antibiotics by humans.

Common patterns include:

- Using antibiotics for viral infections like colds and influenza
- Self-medication without diagnosis
- Incomplete treatment courses
- Dependence on pharmacists instead of qualified doctors
- Unnecessary preventive or prophylactic use

Every unnecessary antibiotic dose creates selective pressure, allowing resistant bacteria to survive and multiply. Over time, susceptible strains disappear, leaving resistant ones dominant. AMR is therefore as much a behavioural problem as a biomedical one.

#### **f. Livestock, Agriculture and Environmental Dimensions**

Globally, antibiotic use in animals has raised AMR concerns. However, Indian evidence suggests that human and animal resistance patterns show limited overlap. Many antibiotics with high resistance in humans are not widely used in livestock, indicating that human consumption remains the dominant driver in India.

The more serious environmental concern is:

##### **Antibiotic residues in food and water**

These residues persist in the human gut and environment, subtly promoting resistance even without direct antibiotic intake. Thus, while human behaviour is central, food safety and environmental regulation remain essential.

### **g. The Gut Microbiome as a Resistance Reservoir**

The human gut contains trillions of bacteria forming a complex microbiome. Antibiotic misuse kills susceptible bacteria while resistant ones survive.

Over time:

- Resistance genes accumulate in the gut
- Genes transfer between bacteria, even across species
- The gut becomes a silent reservoir of AMR

Repeated antibiotic exposure accelerates this process, making future infections harder to treat—even with unrelated drugs.

### **h. Antibiotic Stewardship and Its Effectiveness**

Antibiotic stewardship refers to rational antibiotic use, involving:

- Accurate diagnosis
- Appropriate drug choice
- Correct dosage
- Adequate treatment duration
- Awareness among doctors and patients

Evidence shows that gradual, sustained stewardship programmes are more effective than sudden prohibitions. Behavioural change takes time, but once internalised, it produces durable reductions in resistance.

Stewardship reframes antibiotics as shared societal resources, not routine consumer goods.

### **i. Challenges in AMR Surveillance and Data**

India lacks a comprehensive national AMR surveillance system. Most available data comes from tertiary hospitals, where patients are already heavily exposed to antibiotics.

This creates:

- Selection bias
- Poor representation of community-level resistance
- Underestimation of true AMR burden

Surveillance from rural and primary healthcare settings remains weak. Fragmented data systems hinder evidence-based policy design and timely intervention.

### **j. Present-Day Treatment Challenges and Cautious Optimism**

Clinicians increasingly encounter infections resistant to multiple drugs, even for previously simple conditions. Past misuse has converted routine infections into complex therapeutic problems.

However, resistance is not always irreversible. When certain antibiotics are withdrawn for long periods, bacterial sensitivity can partially return. Older typhoid drugs, for instance, have regained effectiveness after years of disuse. This demonstrates that disciplined antibiotic use can restore some lost ground.

## **k. Alternatives to Antibiotics**

Emerging alternatives include:

### **i. Phage therapy**, using viruses that selectively kill bacteria

- Promising in some urinary tract infections
- Requires precise pathogen identification

### **ii. Monoclonal antibody therapies**, targeting specific pathogens

- Early-stage development
- Not scalable replacements for antibiotics yet

These approaches should be viewed as supplementary tools, not substitutes for responsible antibiotic use.

## **1. Way Forward**

An effective AMR strategy must be multi-dimensional:

- Strengthen antimicrobial stewardship
- Expand surveillance beyond tertiary hospitals
- Enforce regulation of antibiotic sales
- Promote public awareness on bacterial vs viral infections
- Incentivise new antibiotic research
- Encourage alternative therapies
- Adopt a One Health approach integrating human, animal, and environmental health

Only coordinated action can slow resistance and preserve antibiotic effectiveness.

## **Conclusion**

Antimicrobial resistance is not merely a medical problem. It is a behavioural, institutional, and innovation crisis threatening public health, economic stability, and modern medicine itself.

Without urgent and sustained corrective action, humanity risks losing one of its most powerful life-saving tools. Preserving antibiotic effectiveness is therefore not optional—it is a civilisational imperative.

## Reader's Note — About This Current Affairs Compilation

Dear Aspirant,

This document is part of the PrepAlpine Current Affairs Series — designed to bring clarity, structure, and precision to your daily UPSC learning.

While every effort has been made to balance depth with brevity, please keep the following in mind:

### 1. Orientation & Purpose

This compilation is curated primarily from the UPSC Mains perspective — with emphasis on conceptual clarity, analytical depth, and interlinkages across GS papers.

However, the PrepAlpine team is simultaneously developing a dedicated Prelims-focused Current Affairs Series, designed for:

- factual coverage
- data recall
- Prelims-style MCQs
- objective pattern analysis

This Prelims Edition will be released separately as a standalone publication.

### 2. Content Length

Some sections may feel shorter or longer depending on topic relevance and news density. To fit your personal preference, you may freely resize or summarize sections using any LLM tool (ChatGPT, Gemini, Claude, etc.) at your convenience.

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The formatting combines:

- paragraphs
- lists
- tables
- visual cues

—all optimised for retention.

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### 4. Monthly Current Affairs Release

The complete Monthly Current Affairs Module will be released soon, optimized to a compact 100–150 pages — comprehensive yet concise, exam-ready, and revision-efficient.

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