Science & Technology · GS - III

Examine the national security implications of foreign dependence in biotechnology and pharmaceutical supply chains. Suggest measures to strengthen India's strategic capabilities in this sector.

EXAM YEAR	PAPER	SUBJECT
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MARKS	WORD LIMIT
10	~150 words

Answer Hint

Biotechnology security, pharmaceutical supply chains, contract research organisations, strategic dependence, biosecurity, intellectual property, domestic manufacturing, research and development, supply-chain diversification.

Model Answer

Introduction

Biotechnology and pharmaceutical supply chains are increasingly important to public health, economic security and national defence. Dependence on foreign firms for critical research and manufacturing can create strategic vulnerabilities.

National Security Implications

- **Supply-chain disruptions:** Geopolitical tensions can affect access to essential medicines, raw materials and research services.
- **Data security:** Sensitive biological and clinical data may be exposed to unauthorised access.
- **Strategic dependence:** Concentration of manufacturing and research capabilities in a few countries can weaken resilience.
- **Biosecurity risks:** Misuse of biological technologies may create public health and security threats.

Measures for India

- Strengthen domestic pharmaceutical and biotechnology manufacturing.
- Invest in indigenous research, innovation and skilled human resources.
- Diversify international suppliers and establish resilient supply chains.
- Improve data protection, cybersecurity and biosecurity regulations.
- Promote collaboration between industry, academia and government.

Conclusion

India must balance global scientific collaboration with strategic self-reliance. A resilient biotechnology ecosystem is essential for national security and public health preparedness.

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