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Avinash Kumar

Avinash Kumar has completed his Ph.D. in International Investment Law from the Dept. of Law & Governance, Central University of South Bihar. His research work is on "International Investment Agreement and State's right to regulate Foreign Investment." He qualified UGC-NET and has been selected for the prestigious ICSSR Doctoral Fellowship. He is an alumnus of the Faculty of Law, University of Delhi. Formerly he has been elected as Students Union President of Law Centre-1, University of Delhi. Moreover, he completed his LL.M. from the University of Delhi (2014-16), dissertation on "Cross-border Merger & Acquisition"; LL.B. from the University of Delhi (2011-14), and B.A. (Hons.) from Maharaja Agrasen College, University of Delhi. He has also obtained P.G. Diploma in IPR from the Indian Society of International Law, New Delhi. He has qualified UGC – NET examination and has been awarded ICSSR – Doctoral Fellowship. He has published six-plus articles and presented 9 plus papers in national and international seminars/conferences. He participated in several workshops on research methodology and teaching and learning.

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BIOLOGICAL WEAPONS AND BIOTERRORISM IN INDIA – A LEGAL PERSPECTIVE

AUTHORED BY - BANVEER KAUR JHINGER

ABSTRACT

Biological weapons and bioterrorism are among the most insidious threats to contemporary societies, combined with the destruction caused by pathogenic agents and the secrecy and unpredictable nature of terrorism. In the Indian context, a nuanced framework that considers biotechnology, national security, and legal obligations must be present, while maintaining public safety and constitutional guarantees. In this paper, he discusses the complex legal response to biological threats, placing India'S approach within international and also in country contexts. The Biological Weapons Convention (BWC) has India as one of its State Parties worldwide, which forbids the creation, storage, and distribution of biological agents for combat purposes, while enforcing legislative and administrative procedures to ensure compliance. India's responsibilities in terms of biosafety, surveillance, and international cooperation are further articulated by additional resolutions such as United Nations Security Council Resolutions and the World Health Organization' International Health Regulations ((2005)). Several statutes serve as the basis for domestic law.) While the Epidemic Diseases Act, 1897 is historically significant in terms of bioterrorism and the deliberate use of pathogens, it offers limited remedies to address these issues. The Disaster Management Act, 2005, enacts the National Disaster management Authority (NDMA) and State-level establishments, which explicitly acknowledge biological disasters within its scope. The Unlawful Activities (Prevention) Act, 1967 (UAPA) provides a legal mechanism for prosecuting bioterrorism by including biological agents in the definition of terrorism. Evidence-based frameworks for forensics and additional provisions under the new Bharatiya Nyayata, 2023 (BNS) contribute to an expanded legal scope. By utilizing biosafety guidelines from the Department of Biotechnology, Institutional Biosafeties Committees, and recombinant DNA rules, the regulatory structure is designed to oversee dual-use research and ensure safe handling of pathogens. Nonetheless, discrepancies persist in the coordination of inter-agency activities, enforcement of biosafety standards, and judicial clarity regarding proportionality for restrictions in relation to fundamental rights under Article 21 of the Constitution. Judicial pronouncements during the COVID-19 pandemic highlight the judiciary's significant role in

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examining emergency measures, data protection, and state accountability. A legal-analytical perspective is employed in this paper to emphasize the pressing need for a framework that is both technologically adaptable, preventive, and sensitive to human rights. India can enhance its defense of democratic and constitutional principles by implementing stringent domestic laws and international commitments, which will strengthen its ability to combat biological weapons and bioterrorism.

Keywords: Biological Weapons, Bioterrorism, Biosafety, Constitutional Rights, Disaster Management

1. INTRODUCTION

To accurately define biological weapons, the term is used to describe any substances that are intentionally created, produced or stored for the purpose of causing disease/incapacitation/death to humans. This contrast is in line with the authoritative descriptions of public-health and disarmament that biological agents become "weapons" through their intentional misuse, dissemination mechanisms (aerosols, contamination of food/water, vectors) and their potential for rapid deployment over extended periods.[1]

The intentional use or threat of biological agents by non-state actors (terrorist organizations, criminal enterprises and lone actors) to coerce, intimidate or cause mass casualties for political, ideological or criminal purposes is known as bioterrorism.

International law, the BWC provides the central normative ban on biological agents, toxins, and delivery systems that are not used for peaceful purposes. The BUC's first two articles mandated that States parties must take national measures to prevent and punish violations of this law while simultaneously recognising the legality of peaceful biological science in their respective countries (the second article also specifies conditions under international laws that require domestic law to respect these rules).[2]

Rather than having a sole biosecurity statute, the Indian domestic legal framework

[1] "Chemical and Biological Warfare: Medical Effects and Consequences," McGill Law Journal, 2018 *available at*: https://lawjournal.mcgill.ca/article/chemical-and-biological-warfare-medical-effects-and-consequences/ (last visited September 5, 2025).
[2] "National Implementation of the Biological Weapons Convention – UNODA," *available at*: https://disarmament.unoda.org/biological-weapons/national-implementation/ (last visited September 5, 2025).

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encompasses public-health, disaster-management and criminal statutes for prevention and response to biological threats. In 1897, the Epidemic Diseases Act was passed, which grants the executive with emergency powers to take special measures and prescribe regulations for preventing the spread of dangerous epidemic diseases, as well as penalize violence against healthcare personnel. In 2005, the Disaster Management Act was passed, which establishes a national disaster governance framework, including the National Disaster management authority (Section 6), an executive committee in Section 10, and administrative powers for district/central authorities. Furthermore, Section 51-60 includes penal provisions to deal with obstruction, false warnings or other offense that may arise during biological incidents. At the same time, UAPA provides counter-terrorism measures (punitive provisions) and statutory definitions of terrorist acts that can be used when a deliberate biological release meets the legislative criteria for terrorism; criminal law provisions in this section are Sections 269 and 271, which cover all negligent and malignant acts likely to occur within the scope of armed conflict.

1.1 Objectives of the Study

(1) To analyse India's international obligations under the BWC and UNSCR 1540 and how they require domestic implementation;
(2) To critically examine the adequacy of domestic law — notably the Epidemic Diseases Act (Secs. 2, 2A, 2B, 3), the Disaster Management Act (Secs. 6, 11, 34–37, 51–60), UAPA (Sec. 15) and the Rules, 1989 — for preventing and prosecuting bioterrorism;
(3) To evaluate biosafety/biosecurity governance (DBT/RCGM, IBSCs, SCOMET controls) and forensic readiness for attribution; and
(4) To formulate rights-sensitive, operational legal reforms and model clauses to strengthen India's biosecurity framework.

1.2 Research Methodology

The study employs a legal methodology that involves thorough textual scrutiny of primary sources, including treaties, statutes, rules, and official regulations, as well as the interpretation of relevant sections by statute or law, along with combining secondary literature and policy reports. Legislative reforms and model drafting are informed by comparative statutory review and normative legal analysis; the emphasis is on: constitutional safeguards (Article 21); data-protection norms, including those related to construction law, privacy or other guarantees of

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equal value under contract.

1.3. Review of Literature

Goyal, P. (2020)[3] denies that the Epidemic Diseases Act, 1897 was a good fit for current public-health and biosecurity concerns. According to the article, there is a push for modernization in laws with clearer definitions, procedural safeguards and reporting obligations under lab-reporting standards, as well as alignment with disaster/data laws to ensure adequate emergency powers and pandemic/biothreat governance.

Ahuja, Vibha (2018)[4] investigates the regulatory framework for gene technologies in India, with a particular emphasis on DBT/RCGM guidelines, recombinant-DNA monitoring, and IBSC practice. The document identifies regulatory shortcomings for innovative tools (such as CRISPR and synthetic constructs), promotes the development of modern risk-assessment frameworks, mandatory reporting and export controls, and advocate for capacity building to handle dual-use risks in research and industry.

Carnegie Endowment for International Peace (2020)[5] the policy report in India combines public-health, biodefense, and governance analysis to map the country's bio-risk landscape. The document recognizes institutional fragmentation, surveillance and laboratory shortcomings as issues, and suggests legal reforming measures to meet BWC and UNSCR-1540 obligations, as well as strengthening export-control measures.

Johns Hopkins Center for Health Security (2019)[6] U.S.-India experts offer a summary of their recommendations for biosecurity cooperation, including joint capacity building and interoperability in laboratory networks as well as export-control best practices such as microbial forensics, in this dialogue report. The statement advocates for legal harmonisation, better employment opportunities, and swift mutual aid during biological emergencies and suspected deliberate incidents.

[3] Goyal, P. (2020), "The Epidemic Diseases Act, 1897 needs an urgent overhaul", Economic & Political Weekly (EPW) — Engage (Nov. 2020). https://www.epw.in/engage/article/epidemic-diseases-act-1897-needs-urgent-overhaul

[4] Ahuja, Vibha (2018), "Regulation of emerging gene technologies in India", conference paper / proceedings (2018). https://pmc.ncbi.nlm.nih.gov/articles/PMC6069684/

[5] Carnegie Endowment for International Peace (2020), "Biological Risks in India: Perspectives and Analysis" (policy report). https://carnegieendowment.org/research/2020/12/biological-risks-in-india-perspectives-and-analysis-pub-83320

[6] Johns Hopkins Center for Health Security (2019), "US–India Strategic Dialogue on Biosecurity" (report). https://centerforhealthsecurity.org/sites/default/files/2022-11/190619-us-india-report.pdf

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Schmedes, S.; et al. (2019)[7] This appraisal delineates the methods employed in microbial-forensics (genomic sequencing, phylogenetics, metagenomics), along with the obstacles to their validation and the criteria for legal acceptance. The BNS/UAPA/NIA frameworks prioritize QA, population baselines, chain-of-custody, and inter-lab comparability as the key requirements for deliberate release and prosecution support.

Castro, A. E.; et al. (2022)[8] Through the comparison of epidemiological and forensic genomics techniques, Castro et al. propose integrated pipelines that are suitable for both public-health and legal purposes (PDF). India's review highlights the need for standardized protocols, accreditation, metadata governance, and statistical frameworks to differentiate between natural outbreaks and intentional releases. These elements are crucial for evidence and statutory reform.

Schutzer, S. E. (2005)[9] In his early work, Schutzer provides an initial overview of biocrimes and the physician's responsibilities in identifying and reporting them. The paper explores microbial-forensic concepts, medico-legal responsibilities, and the ethical- legal balance between patient care, public safety, or law-enforcement cooperation, which are relevant to designing statutory duties for clinicians and labs.

IDSA / CBW Magazine (2021/2022)[10] This policy note suggests a coordinated national biosecurity framework that incorporates legal reforms, IBSC reporting, accreditation, export controls, and establishing specialized microbial-forensics networks. It stresses the importance of harmonising DBT/ICMR or NDMA/MHA roles and aligning domestic law with BWC/UNSCR-1540. Practitioners are responsible for drafting laws in the recommendation suite.

McMaster University Journal / policy note (2024)[11] A modern Public Health Emergency Act is being advocated in this note to replace the outdated 1897 act. Act. The approach highlights the importance of ensuring that outbreak and biothreat responses are constitutionally proportional, through the use of clear statutory powers for effective response, review

[7] Schmedes, S.; et al. (2019), "The field of microbial forensics: techniques and challenges", Forensic Science International / Review. https://pmc.ncbi.nlm.nih.gov/articles/PMC7149751/

[8] Castro, A. E.; et al. (2022), "Methods used in microbial forensics and epidemiological investigations", Frontiers (review). https://pmc.ncbi.nlm.nih.gov/articles/PMC9930754/

[9] Schutzer, S. E. (2005), "Biocrimes, Microbial Forensics, and the Physician", Clinical Infectious Diseases. https://pmc.ncbi.nlm.nih.gov/articles/PMC1236212/

[10] IDSA / CBW Magazine (2021/2022), "A proposal for a biosecurity framework in India" (policy note). https://www.idsa.in/publisher/cbw-magazine/a-proposal-for-biosecurity-framework-in-india

[11] McMaster University Journal / policy note (2024), "The need for a public health emergency law in India". https://journals.mcmaster.ca/mujph/article/download/3101/2364/16479

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mechanisms, compensation provisions, data-protection protections, and interoperability with disaster and criminal laws.

ELP / trade law update (2024)[12] This update provides a comprehensive overview of the most recent SCOMET Appendix-3 amendments, which include those related to biological/dual-use exports and compliance requirements, as well as information on licensing procedures and denial grounds. Legal professionals and institutions find it useful when dealing with the implementation of export controls related to criminal sanctions, DGFT regulations or BWC/UNSCR-1540.

1.4. Research Gap

While India has a variety of statutory instruments and administrative rules related to epidemics, disaster response efforts on the ground or counter-terrorism activities in progress, there are still significant gaps in doctrine and operations. The Epidemic Diseases Act, 1897, has outdated public-health laws that grant executive containment powers without modern definitions such as biological weapons, procedural safeguards, and reporting/forensics mandates for deliberate-release attribution. Despite providing coordination architecture (Sections 6, 11, 34–37), the Disaster Management Act, 2005, is not a specialized biosecurity statute and does not mandate mandatory laboratory accreditation, microbial-forensics standards, or clear guidelines for lead agency in criminal investigations. Despite the fact that UAPA and other NIA frameworks can prosecute deliberate releases related to terrorism, they require legal capacity that the law cannot establish directly. India also lacks a legislated national microbial-forensics standard, chain-of-custody regime, and accreditation requirement to make genomic attribution legally robust. Regulations for recombinant DNA work and IBSCs, as well as the DBT/RCGM guidance that apply to these areas predate advances in synthetic biology. SCOMET Appendix 3 includes the fifth mechanism for export-control lists and directed foreign passport (DGFT) mechanisms, but it also requires more explicit criminal-law enforcement links and updated coverage for new delivery technologies. Data-sharing and privacy issues, necessitating narrow statutory exceptions for emergency public health use, are not resolved by the DPDP Act and require uniform procedural safeguards. (DPPP Act) The deficiencies in the dataset demonstrate the necessity for a comprehensive National Biosecurity law that respects human rights and establisheth standards for weaponisation, accreditation, evidence, export controls, data sharing

[12] ELP / trade law update (2024), "SCOMET Update 2024 – amendments to Appendix-3 and export controls for biological/dual-use items (India)" (practitioner update). https://elplaw.in/wp-content/uploads/2024/09/SCOMET-Update-2024-SCOMET-Updates-2024-Amendment-in-Appendix-3-SCOMET-items-to-Schedule-2-of-ITC-HS-Classification-of-Export-and-Import-Items-2018.pdf

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exception/exemption provisions, and accountable reporting.

2. INTERNATIONAL LEGAL FRAMEWORK.

2.1. The obligations and India's position in relation to the Biological Weapons Convention (BWC).

According to Article I of the BWC, States Parties are prohibited from developing, producing or stockpiling biological agents and toxins for peaceful purposes without justification. Due to its almost universal normative force, the BWC imposes on States Partie parties the primary responsibility of implementing its prohibitions through domestic legislation, administrative controls, and export safeguards.

The formal and public position of India under the BWC is a commitment to the prohibitions of the Convention and the universalisation principle. After signing the Convention in January 1973, India became a State Party on 15 October 1973. In July 1974, the Ministry of External Affairs consistently affirmed its commitment to implementing treaty obligations and supporting measures that prioritize security and cooperation, while India's experience highlights the difficulty of translating treatych laws into practical domestic statutes that criminalize the creation or transfer of biological weapons and provide specific enabling or enforcement regulations. This was highlighted in the recent statements of the External Relations Commission and the European Commission. The accession and diplomatic concessions of India establish international obligations to adopt and maintain national measures, but they do not specify the specific domestic sections or institutional structures for enforcement. [13]

2.2. Additional relevant global regulations and guidelines, such as those established by the UN Security Council and published in the WHO International Health Regulations (IHR).

Soft-law instruments that address the public-health aspects of biological events and proliferation by non-State actors are included in the BWC's treaty obligations. The legal framework is significantly impacted by UN Security Council Resolution 1540 (2004), which mandates that all UN Member States take binding obligations to prevent non-State actors from obtaining or developing nuclear, chemically or biological weapons and their means of delivery.

[13] "The Biological and Toxin Weapons Convention," *available at*: https://2009-2017.state.gov/t/isn/bw/c48737.htm (last visited September 5, 2025).

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UNSCR 1540 reinforces the necessity of implementing concrete statutory controls, such as criminal penalties, licensing procedures and customs and border measures, to enforce the BWC's prohibitions against abuse.[14]

International laws for the prevention, detection, and coordinated response to public health emergencies of international significance, such as the International Health Regulations (IHR (2005), were established by the World Health Organization. These regulations serve as a central legal instrument. States Parties are required by the IHR to establish minimum surveillance and response capacities, notify the WHO promptly of events that could result in a PHEIC, as stated in Article 6, and provide appropriate assistance (Article 44). While the IHR does not regulate weaponization, it imposes legally binding public-health duties that intersect with the BWC. States are required to report unusual disease events and collaborate internationally in detection and response, which is crucial for early identification of deliberate releases and preventing transnational spread. In practice, it is the responsibility of States to create domestic laws and administrative rules that comply with IHR Articles 5–12 and Article 44 while maintaining necessary safeguards against misuse of bioscience.[15]

Table 1 — Key instrument membership and coverage)

Instrument	Number (most recent)	Percent (of relevant membership)	Source
BWC States Parties	189	97.93% of UN Member States (189/193)	UNODA / BWC status. (UNODA)
IHR (2005) States Parties	196	~100% of WHO Member States (196 covers 194 WHO members + 2 observers)	WHO / IHR status. (World Health Organization)
Australia Group (export-control forum) members	43	22.28% of UN Member States (43/193)	Australia Group / membership. (DFAT)

(Source: (UNODA, World Health Organization, DFAT)

[14] "SECURITY COUNCIL DECIDES ALL STATES SHALL ACT TO PREVENT PROLIFERATION OF MASS DESTRUCTION WEAPONS," Meetings Coverage and Press Releases *available at*: https://press.un.org/en/2004/sc8076.doc.htm (last visited September 5, 2025).
[15] World Health Organization: WHO, "International health regulations" World Health Organization: WHO, 11 December 2019.

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2.3 International cooperation, aid and export-control policies (dual-use technologies).

Because biological research and industry are interdependent on a global scale, the international legal response to biothreats is heavily reliant on cooperative frameworks, dual-use controls, and harmonised export-control lists. Article X of the BWC requires States Parties to facilitate the exchange of equipment, materials, and information for peaceful purposes and to provide assistance and cooperation in times of need. This obligation must be considered alongside export-control regimes that restrict the transfer of specific pathogens, toxins, or specialized equipment that could enable weaponisation through voluntary multilateral fora like the Australia Group. The Australia Group develops standardized lists for human, animal, and plant pathogens as well as dual-use equipment and related technologies. These lists are used by member States to establish national licensing and denial criteria that prevent diversion while allowing legitimate trade in goods for public health and research. Having joined the Australia Group in 1939, India is now a member of the group. In January 18th, the Group's guidelines and best practices offer practical solutions for national export controls in addition to UNSCR 1540' imposed binding obligations and BWC preventive objectives. These methods include customs enforcement and licensing regimes as well as lists.

As there are no single treaties that regulate both public-health emergencies and security risks from deliberate misuse of biology, the international legal architecture is a composite. To ensure compliance with international obligations and rights, Indian law requires a comprehensive set of laws that aligns with domestic statutes, administrative regulations, and institutional mandates.[16]

3. STATUTES AND OPINIONS IN A DOMESTIC LEGAL FRAMEWORK.

3.1. Scope, authority and restrictions of the Epidemic Diseases Act, 1897....

Indian authorities are granted special public-health powers during outbreaks and biological emergencies, which were established by the Epidemic Diseases Act, 1897. The Act's text is composed of Sections 1 and 2A, which grants the State Government the authority to take special steps and prescribe regulations for dangerous epidemics, as well as Section 3A that grants specific powers to the Central Government. Recent legislative amendments and

[16] "The Biological Weapons Convention – UNODA," *available at*: https://disarmament.unoda.org/publications/the-biological-weapons-convention/ (last visited September 5, 2025).

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subordinate rules also contain provisions such as a second section on violence against healthcare personnel and property damage, Section 3, where penalties are levied, and sections 3–3C on cognizance, composition, or presumptions in prosecutions. The statute has a prophylactic and administrative nature, providing executive powers to order quarantine, close markets or regulate gatherings. Additionally, it establishes summary sanctions for violations that are necessary in addressing public health emergencies but not intended to criminalize the development, production, or sharing of biological weapons per se. Furthermore, the Act provides summary penal penalties for acts committed in response. The Epidemic Diseases Act's central role in containment and public-health enforcement is compromised by its outdated design, lack of legislative detail, and the absence of procedural safeguards and accreditation requirements. [17]

3.2. The role of NDMA/SDMA, and biological disasters as per Disaster Management Act, 2005.

The Disaster Management Act, 2005 establishes a national institutional framework for disaster management, response, and preparation, with an emphasis on biological disasters. This framework is mandatory in the country. Section 6 of the Act defines the National Disaster Management Authority (NDMA), Section 10, establishes the NEC to manage emergency responses, and Section 11 neceses the creation of a National Plan. Sections 34-37 of the statute provide specific operational powers for action at the national, state and district levels, while Section 51-60 includes penal provisions addressing issues of obstruction, false alarms, and offences in disaster scenarios.[18]

3.3 UAPA's provision for preventing biological attacks and the definition of terrorism are both relevant. What does this provision cover?

India's primary penal system for terrorism is the Unlawful Activities (Prevention) Act (UAPA), which regulates deliberate biological attacks that meet specific statutory criteria of a terrorist act. This law is responsible for prosecuting these acts. Section 15 of the Act defines a terrorist act and establishes powers, penalties, and mechanisms for group selection (Chapters VI–VII), with additional sections 16 giving specific punishments for terrorist acts, 18/18A for raising

[17] Pritesh Sheth, "The Epidemic Diseases Act (1897): A study of international and domestic pressures on British epidemic policy formation in India," 37 The National Medical Journal of India 101–8 (2024).
[18] Manindra Singh Hanspal and Bijayananda Behera, "The Disaster Management Act, 2005: A Critical Review" *available at*: https://papers.ssrn.com/sol3/Delivery.cfm/4920160.pdf?abstractid=4920160&mirid=1 (last visited September 5, 2025).

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funds or conspiring,and related provisions providing extensive prosecutorial power. In cases where the spread of a biological agent is motivated by terrorism and meets the requirements of Section 15, UAPA's provisions grant state and central authorities the ability to employ counter-terrorism investigatory powers, prevention-oriented measures (including the invocation of special trial mechanisms) and special trials courts. Despite its broad scope, UAPA is subject to extensive legal and policy calibration to ensure its powers, such as extended detention and designation regimes, are appropriately applied in accordance with public-health imperatives that require investigation and containment. However, it remains generic because of its general nature.[19]

3.4. Criminal and regulatory provisions, including BNS, Arms/Explosives analogies, and evidence/forensics.

Acts that lead to biological harm can be addressed through a range of criminal and regulatory provisions in Indian law, beyond the Epidemic Diseases Act, Disaster Management Act and UAPA. Under the National Investigation Agency (NIA) Act, 2008 and its Schedule of Scheduled Offences, the NIA has the power to investigate and prosecute serious crimes that could affect national security. However, successful prosecution can cause significant evidentiary and forensic challenges, such as the need for evidence from multiple sources in order to support claims of chain-breaking or intentional biological dissemination offenses.

3.5. The Ministry of Health & Family Welfare, Ministry Home Affairs, NCDC, ICMR, DBT, and other administrative and institutional architecture are part of the latter.

The management of operational biosecurity in India is dependent on a dispersed administrative structure, with the NCDC serving as the primary authority for surveillance and outbreak investigation, while the Indian Council of Medical Research (ICMR) coordinates research priorities. Additionally, the DBT and RCGM regulate recombinant-DNA research, which requires the Institutional Biosafety Committee to oversee it.

[19] "Designation of Organisations/individuals as 'Terrorist Organization'/ 'Terrorist' under the Unlawful Activities (Prevention) Act, 1967 (UAPA)," *available at*: https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=1900222 (last visited September 5, 2025).

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Table 2— The growth in formal biosafety infrastructure and the accreditation gap that affects laboratory reliability for investigation and forensic attribution

Indicator	Number	Percent	Source
Bio-safety laboratories approved under VRDL/network scheme	165 (11 BSL-3; 154 BSL-2)	—	MoHFW update (Mar 24, 2025). (Ministry of Health and Family Welfare)
BSL-3 / BSL-4 labs sanctioned/established (various schemes)	44 BSL-3 (incl. 4 mobile units); 4 BSL-4	—	PIB press release (Dec 19, 2023). (Press Information Bureau)
NABL-accredited laboratories in India	~8,588 accredited labs	~3.4% of estimated 250,000 total labs	Express Healthcare / NABL reporting (Jan 2024). (Express Healthcare)

The Epidemic Diseases Act (Sections 1, 1A, 2, 2A, 2B, 3, 3A–3C), the Disaster Management Act, and the statutes and regulations listed above make up the whole. The NIA Act, the UAPA (Section 15 and related penal provisions), the BNS provisions (Sections 269, 270, 221, 61(1)), and (Sections 3, 6, 10, 11, 34–37, 51–60) are all included in the list. India's administrative regulations, which include ICMR mandates and DBT/RCGM guidelines, constitute a disparate but interconnected legal structure that allows the country to both control naturally occurring epidemics and pursue legal action against them. some types of intentional biological injury. But integration—specific legislative provisions for biosecurity/biodefence (definitions of "biological weapon," statutory requirements for IBSC reporting, mandatory laboratory statutory data sharing rules that strike a balance between public health and privacy, calibrated export and dual-use controls, precise assignment of investigative jurisdiction for accreditation and microbial forensics standards), and clear designation of investigatory jurisdiction for purposefully orchestrate biological events to ensure that the criminal investigation and public health response are conducted in a coordinated and rights-respecting manner. Without such synthesis, India's strong sectoral institutions and existing In the era of sophisticated biotechnology, legislation may not be adequately connected to address the dual problems of prevention and attribution.[20]

[20] Pritesh Sheth, "The Epidemic Diseases Act (1897): A study of international and domestic pressures on British epidemic policy formation in India," 37 The National Medical Journal of India 101–8 (2024).

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4. REGULATORY FRAMEWORK, BIO-SAFETY, AND BIO-SECURITY

4. 1 Institutional Biosafety Committees (IBSCs), RCGM, and guidelines from the Department of Biotechnology (DBT).

As the legislative and administrative center of India's biosafety regulatory framework, the Department of Biotechnology (DBT) is responsible for publishing the DBT/RCGM (Review Committee on Genetic Manipulation). Manages the Indian Biosafety Knowledge Portal (IBKP), through which organizations are required to register, and oversees the national "Regulations & Guidelines for Recombinant DNA Research and Biocontainment" (2017 revision). The Rules for the Production, Use, Import, Export, and Storage of Dangerous Microorganisms/Genetically Engineered Organisms are managed by Institutional Biosafety Committees (IBSCs), which seek permissions and report occurrences. Or under the Environment (Protection) Act of 1986, which gives the Ministry/DBT regulatory chain the authority to impose IBSCs, mandate, or the Rules (Cells, 1989), remains the main tool for delegated rulemaking. establish containment and reporting requirements as well as approvals for specific categories of employment. The IBSC is the legally required entity at the institutional level, with its membership, responsibilities, and frequency specified by the DBT/RCGM advice and the IBSC Handbook. registration on IBKP; for preliminary risk evaluation, approval of projects using rDNA or dangerous microorganisms, internal audits, and prompt reporting of biosafety lapses to RCGM/DBT; Institutional governance is the initial line of regulatory oversight for preventing misuse and unintentional release, as required by the DBT Handbook and the Rules, 1989.[21]

The RCGM has a dual secretariat function: (a) it serves as the regulatory and technical licensing body for high-risk transfers, imports, and experiments that go beyond institutional bounds. (a) Competence (e. g., bulk export/import beyond simplified thresholds or transfers of RG3/RG4 agents); and (b) it serves as the escalation point when breaches are detected by IBSCs, In this way, national laws and enforcement are linked to incident management at institutions. The obligatory duties of a Biosafety Officer, DBT-nominated members on IBSCs, and renewal/renewal timelines—mechanisms intended to establish traceability and accountability—are also outlined in DBT's IBKP/handbook system. in organizations that deal with dual-use items.[22]

[21] Shravishtha Ajaykumar, “Laboratory Biosafety in India: In Search of a Sound Regulatory Framework” OBSERVER RESEARCH FOUNDATION (ORF), 8 April 2024.
[22] Ibid.

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4. 2 Regulations governing recombinant DNA, import/export restrictions, containment, and laboratory standards.

The coordinated technical direction from DBT (Guidelines for Establishment of Containment Facilities: BSL2 & BSL3, certification procedures) and the Indian laboratory containment standards are driven by this. The ICMR's laboratory manuals (BSL3 establishment and operation guidance), which are complemented by NCDC operational guides for public health labs, provide instructions on engineering controls, PPE, validation, and more. Medical laboratory SOPs and certification procedures for BSL2/3 facilities, both of which are necessary for handling high-consequence pathogens safely. The Rules, 1989 (which make the import/export/possession of certain hazardous microorganisms contingent upon institutional permissions) and DBT/RCGM 2017/2020 serve as the regulatory basis for these technical standards. operational advice that specifies the procedural criteria for when RCGM-level approvals are necessary.[23]

In terms of import/export control, India regulates strategic biological goods through the SCOMET/Export Control List, which is managed by the DGFT under the Foreign Trade Act. The Trade (Development and Regulation) Act of 1992, Appendix 3 of the SCOMET list, specifically names biological agents, chosen toxins, and dual-use equipment and technologies that need prior approval. The DGFT regulations and the DBT/RCGM guidelines on "Export of SCOMET products" and the DBT/GEAC/RCGM transfer procedures work together to lessen the danger of illegal diversion. The combined outcome is a layered regulatory framework, with DGFT/SCOMET controls governing international transfers, Rules, 1989 and DBT advice governing domestic use and institutional approvals, and Rules, 1989 and DBT guidance regulating home usage and institutional approvals. The quality and forensic dependability of laboratory outputs are supported by technical certification (BSL standards, NABL/ISO accreditations).[24]

4. 3 Institutional coordination, regulatory oversight gaps, and recommendations from expert evaluations

There are still a number of structural flaws in the comprehensive patchwork of technical

[23] Scientific Scholar (PM9), "Certification & validation of biosafety level-2 & biosafety level-3 laboratories in Indian settings & common issues," 146 Indian Journal of Medical Research 459–67 (2025)
[24] "India's Strategic Trade Controls and SCOMET List," Ministry of External Affairs, Government of India *available at*: https://www.mea.gov.in/India-Strategic-Trade-Controls-and-SCOMET-List.htm (last visited September 5, 2025).

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guidance and export restrictions: (i) The Rules, 1989 were created prior to the modern era of (i) inexpensive gene synthesis that may not fully represent synthetic constructs or distributed gene editing platforms; (ii) although the IBSC/RCGM oversight is theoretically robust, it might vary across institutions. (iii) there is little legal clarity on obligatory accreditation (forensic/diagnostic), and practice because registration and compliance are contingent upon institutional capacity and the DBT/RCGM secretariat's resources; on the nationwide norms for microbial forensics and chain of custody procedures that are essential for attribution in a deliberate release inquiry. As a result, expert reviews (NDMA, ICMR, and independent policy analyses) are necessary. introduce required laboratory accreditation, national microbial forensics standards, and statutory modernization, such as a separate national biosecurity law or targeted changes to export controls and Rules, 1989. and more precise timelines for incident reporting that connect security organizations with IBSCs, NCDC/ICMR.

Table 3 — Containment & accreditation snapshot (supports paragraph above)

Indicator	Number / Percentage	Source
Bio-safety laboratories approved under national scheme	165 (11 BSL-3; 154 BSL-2).	MoHFW / PIB (update Mar 21, 2025). (Press Information Bureau)
Viral Research & Diagnostic Laboratories (VRDLs) sanctioned	163 VRDLs (program sanctioned; 38 functional out of recent tranche reported).	DHR / ICMR VRDL scheme (Dec 2024 – Mar 2025 updates). (Ministry of Health and Family Welfare, Press Information Bureau)
NABL-accredited laboratories (testing + medical + calibration)	~8,588 accredited labs (~5,127 testing; 2,165 medical; 1,208 calibration).	NABL reporting / Express Healthcare Jan 2024. (Express Healthcare)

5. MECHANISMS FOR PREPAREDNESS, DETECTION, AND RESPONSE

5. 1 National response framework; NDMA guidelines for managing biological disasters.

The statutory policy foundation for prevention, preparedness, multisectoral response, and NDMA's "Guidelines on Management of Biological Disasters" (2008) is the Disaster Management Act of 2005. international collaboration on biological events; the guidelines

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specifically mandate the creation of a national plan, the definition of the responsibilities of the NDMA, NEC, and SDMA, and the integration of veterinary and agricultural activities the necessity for tabletop drills, surge capacity planning, and legal frameworks to support public health interventions (such as quarantine and movement restrictions) while minimizing rights violations, as well as contingencies (like agroterrorism). The NDMA guidance should be read in conjunction with the National Plan/State Disaster Management Plans and MoHFW operational advisories in order to establish an "allhazard" response framework where NEC/NDMA protocols coordinate health, home, and scientific organizations.[25]

5. 2 Microbial forensics, laboratory networks, and public health surveillance

The Integrated Disease Surveillance Program (IDSP), the NCDC surveillance network, and a growing network of VRDL/diagnostic labs managed by ICMR/DHR serve as the foundation of India's detection infrastructure. Epidemiological early warning is provided by district/state reporting and the NCDC reference labs, while confirmatory diagnostics and genomic surveillance (including WGS pipelines hosted by ICMRNIE and linked to IHIP) are provided by VRDLs and NABLaccredited labs. Nonetheless, microbial forensics, the specialized field required to attribute deliberate releases, is still in its infancy. India has a robust molecular capability for clinical and public health but lacks a comprehensive, accredited national infrastructure. Standardized validation/QA procedures, legally sound chain-of-custody regulations specific to bioevidence, worldwide microbialforensics quality guidelines (CDC/NIJ), and academic reviews that highlight validation and population baselines are all components of the microbialforensics capability. Interagency procedures are a prerequisite for admissible attribution evidence.[26]

To ensure that (a) diagnostic samples may be quickly exchanged between public health and law enforcement, the surveillance-forensics nexus needs a legal framework (statutory evidence rules and agreed SOPs). (a) agencies; (b) laboratories that are accredited and follow a recorded chain of custody protocol; and (c) professional judgments that are accepted in accordance with the Bharatiya Sakshya Adhiniyam (Sections 39–45) are backed by peer-reviewed interpretation frameworks and validated methods—otherwise the scientific results run the danger of being

[25] *available at*: https://ndmindia.mha.gov.in/ndmi/images/The%20Disaster%20Management%20Act,%202005.pdf (last visited September 5, 2025).
[26] K Suresh, "Integrated Diseases Surveillance Project (IDSP) through a consultant's lens," 52 Indian journal of public health 136–43 (2008).

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challenged in court during criminal proceedings [27]

Table 4 — Surveillance & laboratory network metrics

Indicator	Figure	Source
VRDLs sanctioned under national scheme	163 (sanctioned); 38 recently functional in latest tranche.	DHR / ICMR updates (Dec 2024 – Mar 2025). (Ministry of Health and Family Welfare, Press Information Bureau)
IDSP network coverage (states/DPHLs)	IDSP active in all States/UTs; network includes District Public Health Labs and State Referral Labs (100+ labs in network reporting).	NCDC / IDSP portal. (idsp.mohfw.gov.in)

5.3 Interagency coordination between the ministries of health, housing, defense, and science.

The response to biological threats needs to be coordinated between the MoHFW/ICMR/NCDC (public health and surveillance), DBT/RCGM/GEAC (research governance and biosafety), MHA/NDMA/NIA/State police, and intelligence services (security, counterterrorism, intelligence, and law enforcement). defense facilities for national-level surge response and logistics; the Disaster Management Act, NDMA guidelines, and inter-ministerial protocols (including Model State Plans); and law enforcement and investigation). The legislative foundation for horizontal coordination is provided by the NEC coordination role of the NDMA, but India continues to rely heavily on expert committees, ad hoc SOPs, and memoranda to address problems. Because of the technical and legal divides, there have been numerous policy recommendations for formal MoUs, joint accreditation/forensic protocols, and standing national crisis teams that integrate public health scientists with investigative and legal authority.

[27] "Ten Years Later: The Lasting Impact of the 2009 NAS Report," Innocence Project, 2019 *available at*: https://innocenceproject.org/news/lasting-impact-of-2009-nas-report/ (last visited September 5, 2025).

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Table 5 — Accreditation & quality-assurance gap (illustrative)

Indicator	Number	Percent (approx.)	Source
NABL-accredited laboratories (all types)	8,588	—	NABL / Express Healthcare (Jan 2024). (Express Healthcare)
Estimated total laboratories (approx.)	~250,000	NABL-accredited ≈ 3.4%	NABL reporting / Express Healthcare (Jan 2024). (Express Healthcare)

6. JURISDICTIONAL, INVESTIGATIVE, AND ENFORCEMENT PROBLEMS

6. 1 Challenges related to evidence and investigative authority in biological occurrences (chain of custody; scientific proof).

Biological events provide difficult evidence issues from an enforcement standpoint, including proving causation, demonstrating deliberate release (mens rea) as opposed to unintentional contamination, and creating accredited, chain-of-custody-secure data. Laboratory data that can be used in a criminal case. The Bharatiya Nagarik Suraksha Sanhita's investigatory authority (sections 173, 174, and 193 pertain to inspection and investigation powers) and the Bharatiya Sakshya Adhiniyam (sections 173, 174, and 193 pertain to inspection and investigation powers) are the sources of that authority. The admissibility of expert scientific opinion is governed by 45–51, thus successful attribution necessitates (a) prompt sample preservation under documented chain-of-custody and (b) testing in licensed labs using approved methods. (c) Expert interpretation that connects molecular signatures to a source; these standards are only partially covered by India's technical guidelines and DBT/ICMR SOPs. However, it is not yet completely integrated into a comprehensive, legally-backed microbial forensics framework.[28]

6. 2 Which organizations are in charge of intelligence, the NIA, the NDMA, the State Police, the CBI, and problems of cross-border jurisdiction

The nature and jurisdiction of the incident determine whether an investigation is conducted by the local/district police (or CBI in some cases) under BNSS regulations, or by the. When an incident is determined to be terrorism, the lead is taken by the National Investigation Agency

[28] Carol A Gilchrist et al., "Whole-genome sequencing in outbreak analysis," 28 Clinical microbiology reviews 541–63 (2015).

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(NIA) (under the NIA Act and scheduled offences) and central intelligence organizations. (UAPA/NIA thresholds) or as an offense affecting national security; the disaster response coordination layer for public health mitigation is provided by the NDMA/NEC. In addition to the legal remedies available via cross-border attribution, such as SCOMET and DGFT export controls, extradition and mutual legal assistance (Extradition Act / bilateral MLATs), and collaboration in accordance with international law, other legal remedies are also available. (UN mechanisms and help linked to the BWC)—necessitating quick legal diplomatic tools to hold foreign perpetrators accountable and protect transnational evidence.[29]

6. 3 Penalties, company culpability, and criminal culpability

Numerous laws establish criminal responsibility for biological occurrences, including Sections 269–272 of the BNS, which deal with the negligent or intentional spread of infection and disobedience, both of which are related to public health harm. the procedural authorities granted by the BNSS; Sections 277–278, which deal with offenses impacting the public's health and environment; Sections 279–280, which deal with quarantine regulations; and the UAPA/NIA's offenses provisions, which address terrorism thresholds; corporate or institutional responsibility may result from BNS provisions combined with regulatory sanctions and corporate law obligations, and administrative actions such as deregistration and license revocation may be taken. for noncompliance under DGFT export controls or the 1989 Rules. Considering the significant technological inputs involved in biological concerns, the penalties system must be combined with compliance incentives (necessary accreditation, IBSC oversight) and explicit statutory standards. for company culpability so that prosecution is possible, proportionate, and able to obtain remedies (criminal fines, incarceration, regulatory penalties) while protecting the demands of public health.[30]

7. CASE LAWS

***Balu Gopalakrishnan & Anr. v. State of Kerala & Ors*[31].** the Kerala Division Bench's interim directives emphasized the necessity for pandemic response to be prevent a similar "data epidemic": The Court mandated that COVID-19 patient data be made anonymous and shared with third parties (Sprinklr) only with informed consent. before massive data processing, there

[29] Sneha Mahawar, "National Investigation Agency (NIA)" iPleaders, 2022 *available at*: https://blog.ipleaders.in/national-investigation-agency-nia/ (last visited September 5, 2025).
[30] "BNS : Offences Affecting The Public Health, Safety, Convenience, Decency And Morals," A Lawyers Reference *available at*: https://devgan.in/bns/chapter_15.php (last visited September 5, 2025).
[31] Balu Gopalakrishnan & Anr. v. State of Kerala & Ors., W.P.(C).Temp No.84 of 2020

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are legislative safeguards — a choice that is essential to how courts see the exchange of health data during epidemics..

***Anivar A. Aravind v. Ministry of Home Affairs & Ors*[32]. The Karnataka High Court prohibited the Centre/NIC from disclosing Aarogya. The order recognized information privacy as a component of Article 21 when governments use digital contact tracing, and Setu users shared their data with other organizations without informed consent. — immediately applicable to the legal management of data throughout biological incident investigations.

***Halvi K.S. v. State of Kerala*[33]. The proportionality of containment actions and government notifications was questioned in this appeal of state Disaster Management/Epidemic orders, and the Court examined the validity and extent of the limitations imposed. showing judicial oversight over emergency procedures in the context of a biological threat, in accordance with DMA/EDA

Shameer P.S. v. Union of India[34] is one of many cases that are currently examining the conditions surrounding Aarogya Setu and its associated instructions. the voluntary nature of public health technology, privacy concerns, and the legal justification for mandating it—all of which are crucial to any future legislation linking epidemiological data with criminal or security investigations.

***Gaurav Kumar Bansal v. Union of India*[35]. As part of this coordinated set of petitions, the Supreme Court instructed the NDMA/central authorities to establish guidelines on exgratia assistance and national response standards under the Disaster. The Management Act establishes the State's legal obligations and minimum relief frameworks during a biological emergency that occurs throughout the country.

***In Re: Distribution of Essential Supplies and Services During Pandemic*[36]. Concerning the Distribution of Essential Supplies and Services During the Pandemic. The Court took over

[32] Anivar A. Aravind v. Ministry of Home Affairs & Ors., W.P. No. 7483 of 2020
[33] Halvi K.S. v. State of Kerala, W.P.(C) No.16349/2020
[34] Shameer P.S. v. Union of India, WP(C).No.9923 OF 2020(S)
[35] Gaurav Kumar Bansal v. Union of India, W.P.(C) No. 539 of 2021
[36] In Re: Distribution of Essential Supplies and Services During Pandemic, Suo Motu Writ Petition (Civil) No. 3 of 2021

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supervisory authority over the matter. directing the Center to create a national plan — an authoritative template for judicially supervised coordination when public health is at risk — and establishing a national distribution network for oxygen, medications, and vaccinations. Biological occurrences put strain on infrastructure.

***Centre for Public Interest Litigation v. Union of India*[37].** A collection of PILs and the Court's instructions on Section The law requirement to create a National Plan and minimum aid standards were prioritized in the implementation of the 11–12 DMA. These choices will influence how statutory disaster instruments are used. to be used in cases of intentional biological occurrences.

Manohar Lal Sharma v. Union of India & Ors[38] which originated from an alleged unlawful surveillance, progressed to a high level. jurisprudence under Article 21 addressing state surveillance principles, procedural protections, and informational privacy, which courts would use when state intelligence/forensic organizations seek intrusive data during biothreat investigations.

8. CONSIDERATIONS FOR HUMAN RIGHTS AND THE CONSTITUTION

8. 1 Article 21 (right to life) and the State's positive/negative responsibilities in the event of a biological crisis

India's constitutional system puts The core of any legitimate government response to a biological emergency is the right to life and personal freedom, as guaranteed by Article 21. The State is required by Article 21 to take constructive steps to safeguard life, such as preparedness for public health, monitoring, emergency medical treatment, and vaccination initiatives, as well as to respect negative measures. protecting freedoms by making sure that any deprivation of liberty (quarantine, isolation, movement restrictions) is lawful, necessary, and proportionate in accordance with “procedure established by law”. The constitutional obligation to safeguard life is thus reflected in industry-specific legislative obligations, such as the Epidemic Diseases Act of 1897, which includes Sections 2 and 2A, which permit containment. The Disaster Management Act of 2005 includes clauses 6 and 11, which operationalize positive duties by

[37] Centre for Public Interest Litigation v. Union of India, WRIT PETITION (CIVIL) NO.546 OF 2020
[38] Manohar Lal Sharma v. Union of India & Ors. AIR 2021 SC 5396

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allowing for national planning and resource mobilization. The State must guarantee procedural safeguards, such as legal clarity on the duration, review, remedies, and compensation (see modern amendments to the Epidemic Diseases Act adding protection). to ensure that emergency health directives are not used as tools of arbitrary deprivation—that is, based on conjecture and assumptions. In addition, Article 21 mandates that the State oversee private healthcare providers and laboratories in order to ensure capacity and that the State have an efficient medical response system. and minimum rightsprotective thresholds are met by standards (BSL lab governance, IBSC oversight under DBT/RCGM rules).[39]

8. 2 Due process, freedom of movement, privacy (data sharing, contact tracing), and proportionality tests

Measures that limit individual liberties in the interest of public health—such as curfews, travel prohibitions, obligatory testing, isolation, and data-driven contact tracing—must meet certain requirements. the dual tests of legitimacy and proportionality under Article 21 and connected basic rights. Public health limitations need a legal foundation, as stated in the Epidemic Diseases Act of 1897; The Disaster Management Act of 2005 and its administrative regulations mandate that they be, in essence, the least intrusive, most time-bound, and most necessary choice. Data-intensive interventions include central data collection, digital contact tracing, and other measures. The new Digital Personal Data Protection (DPDP) Act, 2023, which places responsibilities on data fiduciaries (notice, limited lawful grounds for accessing health databases), establishes severe privacy concerns. data security duties and limitations on cross-border transfers) that interact with public health needs and must be carefully balanced to allow for crucial processing for maintaining informational privacy during an outbreak response. As a result, any framework for sharing diagnostic or genomic data between law enforcement and public health agencies should be based on legislation. subject to proportionality review to avoid mission creep, and with clear grounds, oversight, audit logs, remedy, and redress. In criminal investigations resulting from suspected deliberate releases, the So that evidence gathering and monitoring adhere to statutory safeguards, courts will mandate compliance with BNSS procedures and the Bharatiya Sakshya Adhiniyam's criteria for expert opinion admissibility. This thirst for investigation does not undermine our constitutional rights. [40]

[39] Academike, "Article 21 of the Constitution of India: Understanding Right to Life and Personal Liberty from Case Laws - Academike" Laxmikant Bhumkar, 2024 *available at*: https://www.lawctopus.com/academike/article-21-of-the-constitution-of-india-right-to-life-and-personal-liberty/ (last visited September 5, 2025).
[40] "REPORT," Social Science Research Council *available at*: https://covid19research.ssrc.org/public-health-surveillance-and-human-rights-network/report/ (last visited September 5, 2025).

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Table 6 — Vulnerability & digital reach (relevant to privacy and proportionality)

Indicator	Figure	Relevance
Adult informal employment rate (India, 2021)	88.9%	High informal employment indicates economic vulnerability to movement restrictions and the need for compensatory social measures when imposing public-health orders. (World Bank)
Households with ≥1 smartphone (MoSPI survey)	85.5%	High smartphone access increases feasibility of digital contact tracing but raises data-protection risks under DPDP Act. (The Economic Times)

8.3 Non-discrimination and safeguards for at-risk populations

In order to address biological crises, constitutional and legislative actions must include nondiscrimination and specific protections for populations that bear disproportionate burdens, such as migrants, the elderly, informal workers, those with disabilities, and marginalized communities. According to Article 21 and directive principles, the State is obligated to provide compensation, access to healthcare, continuity of livelihood assistance, and culturally appropriate communication with emergency orders. In terms of criminal law, enforcement measures should be taken immediately (penalties under Epidemic Diseases Act Section 3; offences under BNS Sections 269–270 for negligent/malignant spread). Administrative powers granted by the Disaster Management Act (sections 34–37) must be used with public standards and supervision to prevent arbitrary actions that unfairly target specific groups. Protect the interests of marginalized communities. Dataprotection safeguards (sectoral regulations and DPDP Act obligations) must also ensure that the sensitive health and socioeconomic data of vulnerable individuals are processed. and not abused for discriminatory administrative behavior, with increased protections.[41]

9. COMPARATIVE VIEWPOINTS

Comparative legal frameworks provide instructive examples for striking a balance between biosecurity, fundamental rights, and public health requirements. The Public Health (Control of Disease) Act of 1984 in the United Kingdom provides Australia's Biosecurity Act 2015 provides a statutory template for notification, isolation, and port health powers, but it also

[41] "BNS : Offences Affecting The Public Health, Safety, Convenience, Decency And Morals," A Lawyers Reference *available at*: https://devgan.in/bns/chapter_15.php (last visited September 5, 2025).

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allows for judicial oversight and local public health officials to take action. offers a contemporary, risk-based legislative framework that integrates regulatory mechanisms for human, animal, and plant biosecurity, unambiguous import/export restrictions, and defined ministerial emergency powers; the United The Biological Weapons Anti-Terrorism Act of 1989, which criminalized the creation and ownership of biological weapons, is complemented by a strong legislative structure for public health. Each model emphasizes institutional aspects that India may replicate, such as the Health Service Act, state quarantine regulations, and particular offenses for the improper usage of agents: (a) a single, contemporary (a) a biosecurity legislation that defines "biological weapon," prohibits weaponization (with extraterritorial authority where applicable), and establishes licencing and export restrictions; (b) legislative data protection exceptions for specific public health goals. (b) accredited microbial forensics frameworks and chain-of-custody procedures that ensure the court accepts scientific evidence with confidence; and (c) protections in the manner of DPDPstyle. These comparative laws demonstrate how Clear administrative procedures for emergency actions (UK's public health orders), integrated regulatory regimes (Australia's risk-based licensing), and focused criminal offenses (BWATAstyle prohibitions) may be combined to attain prevention without compromising civil rights [42]

Table 7 — Selected statutory instruments (jurisdiction / key year / law type)

Jurisdiction	Key statute (year)	Focus / relevance
India	Epidemic Diseases Act (1897); Disaster Management Act (2005); UAPA (1967)	Public-health emergency powers; disaster coordination; counter-terrorism. (India Code, Ministry of Home Affairs)
United Kingdom	Public Health (Control of Disease) Act (1984)	Notification, isolation, port health, local enforcement. (legislation.gov.uk)
Australia	Biosecurity Act (2015)	Integrated human/animal/plant biosecurity; import/export controls; emergency human biosecurity determinations. (legislation.gov.au)
United States	Biological Weapons Anti-Terrorism Act (1989)	Criminalises development/possession of biological weapons; extraterritorial jurisdiction. (biosecurity.fas.org, Congress.gov)

[42] "The Biosecurity Act 2015," DAFF *available at*: https://www.agriculture.gov.au/biosecurity-trade/policy/legislation/biosecurity-legislation (last visited September 5, 2025).

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These comparative lessons are not simply transplanting exercises; rather, they demand specialized legal drafting that takes into account India's socioeconomic environment (high informal employment), federalism, and constitutional structure (Article 21). Combines the preventive transparency of biosecurity criminalization, the technical framework of DBT/RCGM and ICMR accreditation, and the civil rights safeguards of data protection and due process legislation (DPDP Act, 2023). For India, then, the way ahead is through comprehensive legislative reform, including a national biosecurity law that is sensitive to rights, carefully calibrated criminal offenses for weaponization, and clear legislative datasharing. mandatory accreditation/forensics standards and procedures that are informed by US, Australian, and UK tools but adapted to India's constitutional and sociotechnical realities.

10. CONCLUSION

India already has a robust, multi-layered regulatory and administrative system in place that can handle a variety of aspects of biological crises and intentional abuse, including immediate containment. notably Sections 2, 2A, 2B, 3, and related sections dealing with penalties and cognizance) to statutory disaster management authority under the Epidemic Diseases Act, 1897 (notably Sections 2, 2A, 2B, 3, and related sections dealing with penalties and cognizance). the Disaster Management Act, 2005 (which contains Sections 34–37 on operational powers, Section 6 on NDMA functions, and Section 11 on the National Plan, among other things) the Unlawful Activities (Prevention) Act, 1967 (the statutory definition of a "terrorist act" under Section 15), which provides counterterrorism coverage, and the penal clauses in Sections 51–60). and punitive measures such as Sections 16, 18, and 18A). In addition to the criminal clauses of the Bharatiya Nyaya Sanhita (such as Sections 61(1), 221, and 269–270), these tools also include the procedural authority of the BNSS and the regulations governing admissibility. The Bharatiya Sakshya Adhiniyam (expert evidence under Sections 39–45) offers essential prosecutorial, investigative, and emergency tools in a contemporary response framework. However, the law does not address all of the issues that are necessary in a modern response architecture. The legal structure is still fragmented from a doctrinal perspective: emergency public health authorities, disaster coordination, biosafety regulation, and counterterrorism crimes are divided among several legislation and administrative regulations. rather than being logically integrated into a single, technically informed biosecurity framework. This fragmentation makes it more difficult to conduct rapid attribution, coordinated evidence gathering (chain of custody and microbial forensics), and an a binding system of licensing/export control for dual-use commodities.

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In addition, the Rules for the Manufacture, Use, Import, Export, and Storage of Hazardous Microorganisms/Genetically Engineered Organisms, or regulatory instruments that operationalize prevention and oversight, are included. Important institutional responsibilities are provided by DBT/RCGM Regulations & Guidelines for Recombinant DNA Research and Biocontainment (DBT/RCGM, 2017) and Cells, 1989, which cover reporting on biosafety officers, IBSCs, and other topics. Strategic transfers are subject to license under export control systems (DGFT's SCOMET – Appendix 3) and the International Bank for Plant Knowledge (IBKP). However, newer technological realities (synthetic biology, distributed gene editing, cheap gene synthesis) are not covered by these rules. Statutory gaps are revealed by the needs of criminal attribution (accredited microbial forensics, validated WGS pipelines, national chain of custody standards) and biology: the 1989 Regulations predate the majority of modern dual-use applications. export regulations must be linked to contemporary definitions of weaponization, and IBSC compliance varies among organizations. Deliberate acts that meet terrorism thresholds may be addressed by the NIA Act (which grants investigatory jurisdiction over planned offenses) and enhanced UAPA tools, but they work best when used in conjunction with one another. with clear legal definitions, required forensic standards, and data sharing regulations that safeguard basic rights while allowing for quick law enforcement measures.

11. RECOMMENDATIONS

India must pursue comprehensive legislative and administrative reform with the following key components in order to balance national security, constitutional rights, and public health necessities: first, pass a bill that addresses a National Biosecurity/Biodefence Act that is sensitive to rights (or a bundle of related amendments) that (a) defines "biological weapon/weaponisation" and associated crimes, and (b) establishes unambiguous licencing and criminal regulations. (b) penalties for illegal possession/transfer (related to SCOMET/SCOMET-like lists), and (c) extraterritorial jurisdiction as necessary to fulfill international obligations (BWC/UNSCR 1540 implementation). This law should make specific references to and harmonize the powers that are already established in the Epidemic Diseases Act (sections 2, 2A, 2B, and 3), the Disaster Management Act (sections 6, 11, 34–37, and 51–60), and the Section 15 et seq. of the UAPA provides for the legal coordination of emergency public health initiatives and counterterrorism responses.

Second, legislate statutory technical standards and forensic capabilities: establish a legislated national microbialforensics standard and chain of custody; mandate mandatory accreditation

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(NABL/ISO) for labs performing high-consequence diagnostics. establish a stronger legislative foundation for the RCGM/DBT authority (Rules, 1989; DBT/RCGM Guidelines, 2017) and the regime that is acceptable under the Evidence Act (Sections 45–51), which covers biosafety and IBSCs. The timelines for incident reporting and law enforcement officers are consistent. These steps will ensure that laboratory data may be used in court in cases brought under BNS, UAPA, or a future biosecurity legislation, and that it is protected from legal challenges.

Third, strengthen ties between criminal enforcement and export control by operationalizing the DGFT SCOMET (Appendix 3) lists through criminal penalties and denial grounds related to a modernized Rules regime. As a result, the diversion of dual-use goods is punishable by both administrative and criminal penalties; make sure that NIA scheduling and interagency procedures specify the lead investigative authority for intentional biological events. Use the legislative framework of UNSCR 1540 implementation to codify export control offenses and border enforcement duties while maintaining essential public health priority for containment.

Fourth, integrate constitutional protections and data protection by incorporating explicit due process protections, review and compensation procedures for quarantine/isolation orders (in accordance with Article 21), and legal data sharing standards. in accordance with the Digital Personal Data Protection Act, 2023 (DPDP), which regulates the lawful processing of genomic and health data for outbreak response and criminal investigations Additionally, reinforce financing and standing interministerial mechanisms (MoHFW/ICMR/DBT/MHA/NDMA) for shared exercises, formal Memorandums of Understanding, and an authorized national forensic laboratory investigation under strictly regulated, auditable exceptions. a network designed to guarantee that practical capability keeps pace with legislative reform

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