Biosecurity in India - Measures and Challenges

Mains: GS III – *Internal Security*

Why in News?

Recently, External Affairs Minister addressed a conference on '50 Years of the Biological Weapons Convention (BWC).

What is biosecurity?

- **Definition** – Biosecurity refers to the set of practices and systems designed to deter the intentional misuse of biological agents, toxins or technologies.
- **Domain** – It covers everything from safeguarding labs handling dangerous pathogens, to detecting and containing an intentional outbreak of a pathogen.
- Biosecurity is not only about protecting human health from pathogens, but extends to agricultural and animal health too.
- **Biosecurity Vs Biosafety** - Biosecurity differs slightly from biosafety, which is a set of practices meant to prevent the accidental leakage of pathogens.
- A robust biosafety protocol feeds into biosecurity.
- **BWC** – After a few instances of bioweapons development, the Biological Weapons Convention came into existence in 1975.
- It became the first international treaty that not only prohibited the use and development of biological weapons of mass destruction, but also asked its signatories to destroy existing stockpiles.
- Over the past many decades, the use of bioweapons has been muted.

Biological Weapons Convention

• The **Biological Weapons Convention (BWC)** is the first multilateral disarmament treaty *to ban an entire category of weapons of mass destruction (WMD).*
• It prohibits the hostile use, development, production, acquisition, transfer, and stockpiling of biological and toxin weapons.
• **Core Prohibition –** States Parties agree not to develop, produce, stockpile, or acquire biological agents or toxins in quantities without justification for peaceful purposes.
• **Status –** The Convention opened for signature on April 10, 1972, and *entered into force on March 26, 1975*.
• It has near-universal membership with *189 States Parties as of May 2025*.
• **Purpose –** It prevents the use of disease as a weapon, building upon the 1925 Geneva Protocol, which only banned use but not possession or development.
• **Peaceful Cooperation –** The BWC promotes the exchange of equipment, materials, and information for peaceful purposes in biological science and technology.
• **Review Process –** States Parties hold Review Conferences every five years to evaluate the Convention and strengthen its implementation

Why does India need biosecurity?

- **Geography & Ecology** – India's geography and ecology make it vulnerable to cross-border bio-risks.
- India's dependence on agriculture and large population makes the threat more dangerous.
- **Suspected weapon preparation** – While India has not had any explicitly known biosecurity attack, there have been reports of the alleged preparation of the *toxin Ricin (derived from castor oil)* for potential use in a terror attack.
- This incident underscores how non-state actors are pursuing biological tools, reinforcing the urgency of robust biosecurity.
- **Rapid growth of Biotech** – Further, the rapid spread of biotechnologies have endowed humans with increased control over biology, increasing the chances of malicious actors experimenting with bioweapons development.

What are the agencies and framework of India engaged in bio-risk reduction?

- **Institutional measures** – The Department of Biotechnology oversees research governance and safety frameworks for labs.
- The National Centre for Disease Control manages outbreak surveillance and response.
- The Department of Animal Husbandry and Dairying monitors livestock biosecurity and transboundary diseases.
- The Plant Quarantine Organisation of India regulates agricultural imports and exports.
- **Legal measures** – India's biosafety and biosecurity laws include the *Environment (Protection) Act, 1986*, which governs hazardous microorganisms and genetically modified organisms (GMOs).
- *The Weapons of Mass Destruction and their Delivery Systems (Prohibition of Unlawful Activities) Act, 2005,* which criminalises biological weapons.
- **Rules & Guidelines** – India has also developed *Biosafety Rules (1989)* and specific guidelines were released in 2017 for the purposes of Recombinant DNA Research and Biocontainment.
- The National Disaster Management Authority has a detailed guideline on the

management of biological disasters.

- **International treaty** – India is also part of international platforms that emphasise biosecurity, such as the *Biological Weapons Convention and Australia Group.*
- **Challenges** – Lab regulation, public-health surveillance, agriculture protection, a unified national biosecurity framework is still evolving.
    - **Outdated Laws & Policies** – Most of the current policies and laws have to be also updated to keep pace with new forms of biothreats that are emerging.
    - **Less response mechanisms** – India is currently ranked 66 on the Global Health Security Index, and while its score for detecting biothreats has increased, its score for being able to effectively respond to threats has reduced.

What are other countries doing?

- **US** – The U.S. anchors its biosecurity framework under the National Biodefense Strategy (2022-2028) which integrates health, defence, and biotech oversight.
- In 2024, the U.S. further strengthened this system through the Federal Guidance on Synthetic Nucleic Acid Screening, requiring gene synthesis companies to verify DNA orders against pathogen databases to prevent misuse.
- **EU** – The European Union regulates through the EU Health Security Framework (2022) and Horizon Europe's dual-use research guidelines, embedding biosecurity in its One Health model.
- **China –** The Biosecurity Law (2021) of China treats biotechnology and genetic data as matters of national security, mandating centralised control over research and material transfers.
- **Australia** – The Biosecurity Act (2015) of Australia provides a unified legal framework across human, animal, and plant sectors, now extending to synthetic biology.
- **UK** – The United Kingdom's Biological Security Strategy (2023) focuses on biosurveillance and rapid response.

What are the risks ahead?

- The risk of an inadequate biosecurity apparatus is profound.
- It jeopardises the lives of billions of Indians.
- It is therefore necessary that a national biosecurity framework that coordinates actions across various government agencies is developed.
- Such a framework would also be able to identify infrastructure and capability gaps that need to be addressed.
- Use of new-age biodefence technologies such as microbial forensics and new approaches such as social media surveillance could then be appropriately adopted to plug such gaps.

Reference

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