RAMAIAH UNIVERSITY OF APPLIED SCIENCES | CENTRE FOR NATIONAL SECURITY STUDIES

VANTAGE POINT

A Newsletter on Non-Traditional Security

September 2025

Contents

Eggs for Export: Reproductive Trafficking and the Global Bioeconomy

Malavika N T

In fiction and in fact, the line between medical innovation and exploitation is blurring. The Telugu film *Yashoda* (2022)[1] depicted a dystopian surrogacy racket, and recent events have alarmingly mirrored this scenario. In early 2025, authorities uncovered a cross-border syndicate preying on Thai women with false promises of legitimate surrogate work. This case exposes not only a grave human trafficking crime but also the deeper currents of a global bioeconomy that commodifies human reproduction.

Investigations in Georgia revealed a criminal network operating under the façade of surrogacy. In February 2025, police announced they were investigating a human trafficking ring harvesting eggs from Thai women who were brought to Georgia under the guise of being surrogate mothers[2]. Three Thai victims were eventually rescued and deported after escaping captivity. They described horrendous conditions. One survivor recounted responding to a social media advertisement that promised surrogate mothers who would live with families and be paid about $1,182 a month. Instead of such an arrangement, the women were taken abroad and held in a house with dozens of other Thai victims.

Once seized, the women were subjected to repeated medical procedures without their consent. Survivors report being injected with hormones, anaesthetised, and then their eggs would be extracted with a machine. When some women protested or tried to escape, the traffickers responded by confiscating their passports and threatening them with arrest back home. According to the Pavena Foundation, a Thai NGO aiding the victims, about 100 women are still believed to be held captive in Georgia, and Georgian authorities report they have questioned four foreign nationals in connection with the case.

These accounts paint a chilling picture where vulnerable women, lured by economic desperation, are transported abroad under false pretences, then physically and psychologically exploited. Each trafficker's promise was of a safe job caring for a child in a foreign home, all of which was a lie. Instead, these women lost control of their bodies and risked their health for the illegal harvest of their reproductive material.

Viewed through the lens of human security, the case becomes even more troubling. Traditional security frameworks focus on threats between states, such as military aggression. In contrast, human security emphasises protecting individuals' safety, rights, and dignity. The UN Development Programme's landmark report argued that security policy had long ignored "the legitimate concerns of ordinary people who sought security in their daily lives"[3]. The Thai

[1] *Sridevi Movies*. (Producer). (2022). *Yashoda* [Film].

[2] https://www.abc.net.au/news/2025-02-08/georgia-and-thailand-investigate-human-egg-trafficking-ring/104912976

[3] United Nations Development Programme. (1994). *Human development*

victim's ordeal directly violated those concerns: their personal security was shattered by being held captive and threatened; their health security was compromised by forced medical interventions; and their bodily integrity and autonomy were stripped away by non-consensual egg extraction.

This perspective highlights that combating this crime requires more than law enforcement; it is a matter of social justice and human rights. As Acharya notes, effective security strategies must address basic needs and reduce the "inequities of globalisation" that make people vulnerable. In other words, we must ask why these women felt compelled to take deadly risks in the first place. Human security scholars would argue that eradicating poverty, improving education and healthcare, and empowering communities are as integral to preventing trafficking as busting criminal rings.

To fully understand this crisis, we must see it as part of the 21st-century global bioeconomy. Modern biotechnology and fertility industries have created booming markets for human biological materials. As one analysis observes, "thanks to current technologies we can now market the human reproductive cells". Sperm, eggs, embryos, and even surrogacy services have become international trade goods. In this system, bodies, especially women's bodies, are treated as reservoirs of economic value.

This commodification follows plain economic lines. Wealthy clients, often from countries with restrictive fertility laws or long waiting lists, are willing to pay premium prices for assisted reproduction. Meanwhile, women in poorer regions may see egg donation or surrogacy as a path to income. The result is a global supply chain of reproductive material. The Georgian case is an extreme example where, instead of a regulated clinic recruiting voluntary donors, a criminal enterprise essentially built as a hidden "surrogacy farm", harvests eggs illegally. Georgia's situation indicates that it permits commercial surrogacy for foreigners, attracting clinics and agencies from outside. Unfortunately, this permissive environment created openings for illicit schemes, turning Georgia into a low-cost platform for surrogacy that traffickers exploited.

Scholars describe this as the extension of capitalism into 'clinical labour', where the medical use of bodies as a form of labour is often gendered and precarious. Reproductive services like egg donation and surrogacy exemplify such labour. The Thai egg trafficking ring took this dynamic to a dark extreme. Women's reproductive capacity was literally extracted as raw material, with no regard for their health or consent. In the words of scholars like Waldby and Cooper (2008)[4], life sciences have entered a bio-political era where human bodies are increasingly caught in supply chains. The case underscores a chilling truth that is, once biology enters the market then the suffering of the vulnerable can become the cost of profit.

Policy Recommendations

This intersection of human security and bio-economics means the response must be multidimensional. Criminal investigations are

Report 1994: New dimensions of human security. Oxford University Press.

[4] Waldby, C., & Cooper, M. (2008). The biopolitics of reproduction: Post-Fordist biotechnology and women's clinical labour. *Australian Feminist Studies*, 23(55), 57–73. https://doi.org/10.1080/08164640701816223

already underway. The Georgian and Thai authorities, aided by Interpol and NGOs, are working to rescue victims and prosecute suspects. Yet prevention and protection demand broader action. Some of the recommendations may include the following.

1. Strengthen Legal Protections: Most countries still have gaps in laws regarding reproductive exploitation. Existing trafficking conventions ban forced labour broadly, but do not explicitly cover coercive surrogacy or egg harvesting. Legislatures should close this loophole by defining and criminalising non-consensual reproductive services. International bodies such as the Hague Convention should develop guidelines or treaties to regulate cross-border surrogacy and egg donation, so that surrogacy job ads cannot hide trafficking.
2. Coordinate Internationally: Traffickers and victims in this case crossed multiple borders. Intelligence sharing between nations and rapid-response law-enforcement cooperation are essential. Organisations like Interpol and regional coalitions should treat reproductive trafficking as a serious transnational crime. Embassies and community groups can issue warnings about fraudulent overseas job offers to disrupt recruiters' tactics.
3. Regulate Fertility Tourism: Destination countries must enforce strict oversight of fertility clinics and agencies. Even where surrogacy is legal, operations should be licensed, inspected, and held accountable. Clinics must verify that all donors and surrogates give free, informed consent and provide full medical and psychological support. Some experts propose international accreditation standards for fertility clinics which are similar to standards in hospitals, in order to enforce ethical and safety norms across borders.
4. Economic and Social Support: Preventing trafficking also means reducing economic desperation. Governments and NGOs should promote safe, well-paid employment opportunities for women and run educational campaigns about health and rights. Communities need to be informed about the dangers of fraudulent overseas work schemes. When people have viable livelihoods and social protections at home, they are far less likely to take life-threatening risks abroad.
5. Protect and Empower Victims: Women rescued from such networks need comprehensive support. This includes medical treatment for any health consequences of egg extraction, psychological counselling for trauma, and legal assistance to obtain compensation or rights. Crucially, survivors must be treated as victims, not criminals. Community programs can help them rebuild their lives and reduce any stigma. Ensuring their human security and dignity is a litmus test of our response.

Human security in the biotech era means safeguarding individuals from both violence and economic exploitation. As the UNDP warned, security defined solely by territory and

weapons forgot the daily concerns of people[5]. Acharya and other scholars stress that true security policy must uplift people's well-being, not just deter armies[6]. Protecting people's rights, health, and dignity in the age of biotechnology is as much a security imperative as guarding borders or counting missiles.

The Georgian egg-trafficking ring is a stark warning which reiterates that globalisation and technology can amplify old dangers in new forms. The nightmare scenario of the Telugu film *Yashoda* which depicts the female bodies treated as commodities, has manifested in reality. This case shows the limits of conventional security thinking. Simply deterring cross-border crime is not enough if structural forces keep people vulnerable. Only by combining legal action, social justice, and ethical oversight can we ensure that advances in human biotechnology benefit society rather than exploit its most vulnerable members.

Malavika N. T. *is an undergraduate student at the School of Law, M. S. Ramaiah University of Applied Sciences, Bengaluru. Her academic interests lie at the intersection of law, technology, and human rights.*

*****

[5] United Nations Development Programme. (1994). *Human development report 1994: New dimensions of human security*. Oxford University Press.

[6] Acharya, A. (2001). Human security: East versus West. *International Journal*, 56(3), 442–460. https://doi.org/10.2307/40295682

When Vaccines Aren't Enough: Biosecurity in the Age of Synthetic Pathogens

Kashvi A

In the aftermath of global outbreaks like Covid-19 and recurring threats of Nipah virus, we have developed vaccines at an exceptional speed, but what if these viruses mutate, not naturally, but deliberately is a matter of grave concern. With the rise of synthetic biology, gene-editing tools and increasingly accessible DNA synthesis technologies, the possibility of artificially modifying a virus for enhanced immune evasion increases. Such capabilities could spark a new biological threat that vaccines weren't engineered to fight.

Modern vaccines train the immune system to recognise specific parts of a virus, like antigens (surface proteins). For example, Covid-19 mRNA vaccines train the body to target the spike proteins on the virus, neutralising it before it enters the cells. However, if the target changes through mutation or deliberate modification, the immune system will no longer be able to recognise the virus effectively. This phenomenon is known as antigenic escape. It has been seen in viruses like influenza, which mutates rapidly and requires annual vaccine updates. The SARS-CoV-2 has also shown signs of immune evasion with variants like Omicron, which partially reduces the efficiency of the vaccine. These were natural changes, but what if these changes were made deliberately?

Synthetic biology not only allows scientists to edit, but completely rewrite the genetic code. In 2017, a team of Canadian scientists synthesised horsepox virus from mail-order DNA[1][2]. This achievement raised concerns about potential misuse of synthetic biology, particularly in the context of recreating smallpox.

Tools like CRISPR-Cas9 and AI-guided gene design enable editing viral genomes. Any malicious actor could modify a virus to mask key epitomes making it invisible to vaccine trained antibodies, enhance its ability to infect human cells, resist antiviral drugs or combine traits of multiple viruses via a process called chimeric recombination.

In 2022, a research team from Boston School of Medicine created a SARS-Cov-2 variant combining Wuhan backbone with an Omicron spike protein showing increased infectivity in mice. This study aimed to understand immune escape and raised a debate about gain-of-function (GoF) research. Certain vaccine platforms like mRNA technology can be rapidly updated to match new variants, however this process requires regulatory approval and distribution logistics which takes time. If a virus is engineered to spread quickly and evade the current immune system, the delay would be harmful. Moreover, a deliberate release could be designed to mask symptoms, alter transmission patterns or target specific populations based on genetic profiles. Hence, there is no guarantee that a novel engineered virus would be detected and responded to, by the public health system fast enough.

At the center of this issue is the dual-use dilemma. Technologies with legitimate uses like vaccine development and diagnostics can also be weaponised. DNA synthesis companies screen

[1] https://www.wired.com/story/synthetic-biology-vaccines-viruses-horsepox/#:~:text=As%20one%20of%20the%20world's,and%20commercially%20available%20DNA%20fragments.

orders to prevent pathogen sequences from being printed, but as AI develops these measures are not foolproof. The field of Dual-Use Research of Concern (DURC) highlight the experiments that are anticipated to be a threat to public health and national security, unfortunately these enforcements vary across countries.

There are global initiatives to monitor emerging infectious diseases like WHOs pandemic preparedness program, they mostly lean towards naturally occurring outbreaks. Early warning systems for synthetically engineered threats are still at their early stages. To prepare for this emerging frontier we need to take a few critical steps such as

1. Stronger regulation on DNA synthesis services, including AI-assisted screening for functional threat potential and not just pathogens.

2. Transparent global standards for synthetic biology research including DURC review boards, open-access registries and audit trails.

3. Faster and adaptable vaccine platforms that can be updated within days.

4. Improved biosurveillance combining epidemiology, genomics and cyber security.

5. Ethical education for researchers and bioengineers to recognize dual-use risks in their work.

The next pandemic could emerge from a laboratory either through carelessness or through malice as the ability to engineer viruses that can evade vaccines is just within scientific reach. As we strive to build faster and smarter vaccines, we must also invest in safeguards that ensure that science is used to protect us doesn't turn against us. In a world where biology is programmable, biosecurity must become just as critical as cyberbiosecurity, as the future of vaccines and global heath depends on it.

Kashvi A *is a B.Sc. (Hons) Biotechnology student currently interning at the Emerging Technologies vertical of CNSS. Her work focuses on research and writing related to bio-warfare, emerging biothreats, and their national security implications.*

*****

What's Holding India Back from Leading Global Biosecurity?

Krithika V

In today's world, where a virus in one corner of the globe can travel across continents in just hours, biosecurity has quietly become one of the most critical pillars of both national safety and international stability. It is no longer just a health issue tucked under public policy, it is security. And some countries have recognized the importance of biosecurity sooner and more clearly than others did.

Take the United States and the United Kingdom, for instance. These nations did not wait for crises to knock on their door. They have built strong biosecurity systems grounded in clear governance, early detection technologies, and serious, sustained investment in identifying biological threats before they spiral[1]. It is not just about labs and data but rather about vision, political will, and readiness.

Contrast that with India, a country that is undeniably a rising force in biotechnology and pharmaceuticals, with scientists doing incredible work across sectors. And yet, when it comes to biosecurity, our country is still catching up. The gap is not due to a lack of ambition. It is about structural challenges that haven't been fully addressed. To understand why India has not yet taken the global lead in this space, we need to step back and look closely at the practical hurdles we face on the ground and where the biggest opportunities for change lie.

When we discuss biosecurity in India, it is not just about public health systems or policy gaps. It is a story shaped by the country's environmental variety, social complexity, and governance issues. Each element is both a strength and a weakness. India's vast and diverse landscape, ranging from dense tropical forests to arid deserts and busy river basins, supports an impressive array of plants, animals, and climates. However, this ecological richness also makes the country a hotspot for zoonotic diseases, where infections can transfer from animals to humans. With climate change worsening these conditions, we face outbreaks that can spread quickly and unpredictably.

Next is the human aspect. India's population is not only one of the largest globally but also one of the most genetically and culturally diverse. A public health strategy that succeeds in one area may fail in another. This diversity, while something to celebrate, requires a level of customisation and care in biosecurity planning that few countries need to consider. The bureaucratic system adds its own challenges. The division of responsibilities between the central and state governments often leads to coordination issues. We have seen this repeatedly, especially during crises like COVID-19. Rapid, unified action can get lost in layers of red tape and jurisdiction debates, costing precious time when every second counts. Preparedness for outbreaks also relies heavily on disease surveillance, and here, India has a significant gap[2]. In rural areas and along porous international

1 https://www.gov.uk/government/publications/biological-security-strategy

2 What will prepare India for another pandemic?

borders, early warning systems are often unreliable. Without accurate, real-time data, many outbreaks are only identified after they have already spread too widely to control effectively.

Another major issue is the shortage of trained personnel. From virologists and epidemiologists to biosecurity officers and veterinarians working at the animal-human interface, there are not enough skilled people available. The expertise needed to handle the next outbreak may already exist in India, but it is spread too thin. Infrastructure is critical as well. India has a limited number of BSL-3 and BSL-4 labs, which are necessary to safely manage and study dangerous pathogens[3]. This shortage significantly limits advanced diagnostics, vaccine research, and quick containment responses. While the world is steadily advancing in synthetic bio engineering organisms at the genetic level, India still lacks robust oversight in areas like DNA synthesis and gene editing. As these technologies evolve, so do the risks, and without clear regulation, we remain exposed to biosecurity threats that may not even need a natural origin.

The Road Ahead: Strategic Actions for India

Addressing India's biosecurity gaps needs more than patchwork it calls for a unified, system-wide overhaul across policy, people, and infrastructure. Some of the key recommendations are as follows.

1. Establish a Central Biosecurity Nerve Centre : India needs a National Biosecurity Advisory and Coordinating Body , that is an empowered, all-weather institution that doesn't just react during crises but anticipates them. It should lead emergency protocols, risk assessments, and coordinate efforts across sectors and states.
2. Strengthen Oversight on Synthetic Biology: As gene editing and DNA synthesis tools become more accessible, so do risks. Institutions must establish robust safeguards, including Institutional Biosafety Committees (IBSCs) and close monitoring by national regulators like the Review Committee on Genetic Manipulation (RCGM). Enforceable, clear policies are essential to prevent misuse while enabling innovation.
3. Invest in Skilled Human Resources: No biosecurity plan can succeed without trained personnel. India must initiate continuous training programs for scientists, healthcare professionals, technicians, and responders. These experts should be equipped not just technically but also in crisis response tailored to local realities.
4. Upgrade Disease Surveillance Systems: Surveillance must extend beyond hospitals to include farms, forests, ports, and airports. A robust system should monitor health signals across humans, animals, and ecosystems, especially in rural and border areas where early warnings are often missed.
5. Use Technology for Proactive Preparedness: India must utilise AI, data modeling, and real-time simulation tools to anticipate and respond to biological threats. Predictive analytics can help detect patterns, prioritize action, and design faster, more intelligent responses.
6. Monitor DIY and Grey-Lab Biotech: With biotechnology becoming more accessible through home kits and garage labs, there's a need to monitor high-risk, unregulated experimentation. Policies should allow

[3] https://www.indiatoday.in/science/story/biosafety-level-3-labs-why-india-needs-more-of-them-to-brace-for-future-pandemics-1805831-2021-05-24

innovation while putting checks in place to prevent potential misuse.

7. Collaborate Globally for Harmonised Action: Biosecurity knows no borders. India must align with global frameworks, improve international data sharing, and actively participate in joint research and standard-setting. Shared intelligence will make our response faster and more coordinated.

If India is to lead in global security, it must begin by securing its own biological frontiers, comprehensively, cohesively, and urgently.

Krithika V *is a B.Sc. Biotechnology student at Ramaiah University of Applied Sciences, currently interning at the Emerging Technology vertical of CNSS. Her interests lie in biosecurity, cyber-biosecurity, and the science–policy interface, through which she brings a life sciences perspective to national security research.*

The author expresses gratitude to Dr Suryesh K Namdeo, Senior Policy Analyst, Indian Institute of Science, Bengaluru. Insights adapted from his talk on the Emerging Biosecurity Challenges at National Institute of Advanced Studies (NIAS) were combined with the author's own analysis to develop the perspectives presented in this article.

*****

Global Surveillance of AI-Engineered Bio-threats

Nikhita Nandakumar

While AI holds immense promise in the field of biotechnology, be it through accelerating drug discovery, genomic analysis, or disease prediction, its dual-use potential raises urgent concerns in the domain of biosecurity. The possibility of AI systems being exploited to design biological agents presents a new generation of bio-threats that could transcend traditional frameworks of detection and response.

The global governance of biotechnology and AI, however, rests on a fragmented patchwork of treaties and multilateral norms. While these frameworks provide important guardrails, they remain insufficient to address the emerging risks posed by AI-engineered biothreats. The Biological Weapons Convention (BWC)[1], for instance, prohibits the development, production, and stockpiling of microbial or other biological agents for hostile purposes. Yet the BWC lacks a permanent verification or enforcement mechanism, relying instead on voluntary confidence-building measures and periodic diplomatic engagement through the UN Security Council. In contrast, the Chemical Weapons Convention (CWC) benefits from the Organisation for the Prohibition of Chemical Weapons (OPCW), which actively monitors compliance through inspections and verification procedures. The BWC's absence of an equivalent institutional body creates persistent vulnerabilities in global biosecurity governance. While Article X of the BWC encourages collaborative research for peaceful purposes, inadequate oversight risks enabling dual-use applications that blur the line between legitimate science and weaponisation. The UN Security Council Resolution 1540 (2004) also prohibits the development, production, stockpiling, or acquisition of biological weapons. Its focus, however, is primarily on state actors, leaving gaps in addressing non-state entities with access to advanced technologies.

Neither the UNSCR 1540 nor the BWC provides a robust verification architecture to detect or deter covert misuse of biological agents. There are certain health governance frameworks that provide some indirect provisions. The WHO's International Health Regulations (2005) and the 2023 Pandemic Agreement establish mechanisms for global disease surveillance, data-sharing, and emergency response. However, they are designed to address natural outbreaks and vaccine equity rather than deliberate or AI-assisted biological threats. On the AI governance front, progress is even more limited. UNESCO's 2021 Recommendation on the Ethics of Artificial Intelligence and the 2023 UN AI Safety Summit call for transparency, fairness, and cooperation, but remain voluntary and largely disconnected from biosafety concerns. Data protection regimes such as the EU's General Data Protection Regulation (GDPR) complicate matters further, as AI-driven biosurveillance inevitably involves

[1] Biological Weapons Convention (BWC) Compliance Protocol https://www.nti.org/analysis/articles/biological-weapons-convention-bwc/

sensitive health data, raising unresolved questions of ownership, privacy, and trust.

There is a notable gap in addressing the convergence of AI and synthetic biology as a biothreat. Most governance instruments treat biotechnology and AI as separate domains. For example, the US reforms on DURC and pandemic pathogens expand scrutiny of wet-lab experiments, but they say little about algorithmic tools that design pathogens[2]. The EU's AI Act explicitly exempts scientific research models from regulation, implying cutting-edge "biological AI" models used in labs would escape scrutiny under that law[3]. Consequently, current policies generally fail to anticipate fully autonomous AI-driven pathogen engineering. Oversight bodies such as bio-containment committees and biosecurity institutes have been criticised for lagging behind rapid innovation.

Experts argue that surveillance and threat detection will need new approaches. For instance, a 2024 literature review calls for adaptive, interactive early-warning systems that span laboratory accidents to deliberate misuse, acknowledging that "even legitimate use by scientists could lead to unexpected developments" in an AI-enabled era[4]. This "whack-a-mole" challenge implies that traditional surveillance, such as pathogen sequencing and symptom monitoring, must be augmented by AI tools that flag suspicious genetic sequences or unusual patterns. Some scholars recommend capability-based oversight rather than pathogen lists, reflecting the fact that AI could create threats not on any banned list. In practice, the US Screening Framework for gene synthesis (2020)[5] has begun to require DNA providers to use public databases plus intelligence inputs to flag dangerous sequences, which is a step toward AI-supported screening. But national strategies have not yet mandated AI-enhanced biosurveillance networks. Instead, policy rhetoric has so far emphasised layered surveillance and collaboration, without specifying the role of AI or next-generation biotechnology.

We therefore see that the policy landscape is evolving but currently uneven. UN treaties and WHO regulations establish norms for disease reporting and dual-use, while major states are strengthening biosecurity and AI regulations separately. However, these measures only tangentially touch on AI-synthetic biology overlap. The risk that generative AI could automate novel pathogen creation, and that powerful bioreactors could mass-produce such agents, remains largely unaddressed in law. Moving forward, analysts suggest that closing this gap will require bridging the biosecurity and AI policy communities. For instance, by incorporating AI risk assessment into DURC reviews and by updating disease surveillance criteria to include anomalies suggestive of engineering. Some concrete proposals such as employing federated AI platforms to scan global genetic databases for engineered patterns are being discussed in academic and technical forums, but as of 2025 they have not yet coalesced into formal policy.

[2] https://osp.od.nih.gov/us-government-releases-policy-for-oversight-of-dual-use-research-of-concern-and-pathogens-with%20-enhanced-pandemic-potential/

[3] https://www.eu-biotech-act.com/

[4] Undheim, T. A. (2024). The whack-a-mole governance challenge for AI-enabled synthetic biology: Literature review and emerging frameworks. Frontiers in Bioengineering and Biotechnology, 12. https://doi.org/10.3389/fbioe.2024.1359768

[5] https://www.federalregister.gov/documents/2023/10/13/2023-22540/screening-framework-guidance-for-providers-and-users-of-synthetic-nucleic-acids

Policymakers thus face the challenge of making vague strategic ambitions into operational rules and institutions that keep pace with both AI and synthetic biology. The task before policymakers is to operationalize enforceable, adaptive institutions that can bridges the biosecurity and AI policy communities while responding to the transnational nature of these evolving biothreats.

Nikhita Nandakumar *is a B.Sc. (Hons) Biotechnology student at the Department of Biotechnology, Faculty of Life and Allied Health Sciences, MS Ramaiah University of Applied Sciences, Bengaluru.*

*****