The Hindu Important News Articles For UPSC CSE

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Add- 21/B, Om Swati Manor Chs, J.K. Sawant Marg, Opp. Shivaji Natyamandir, Behind Cambridge Showroom, Dadar (West) Mumbai – 400028
Con.- 09820971345, 9619071345, 9223209699
G-mail-lakshyaacademymumbai@gmail.com

Page 02 :GS II : Governance / Prelims Exam

A recent landmark report by **iProbono India**, titled 'Inaccessible by Design: A Disability-Centred Review of State Prison Manuals in India', has shed critical light on the structural exclusion and severe systemic challenges faced by incarcerated persons with disabilities (PwDs) in India.

The report underscores that India's penal architecture and administrative workflows treat disability as an **"afterthought,"** pushing disabled inmates into a state of **"double disadvantage."** They are forced to navigate not only the loss of legal liberty but also an intensely hostile, inaccessible, and ableist environment that fundamentally violates their constitutional and statutory rights.

Key Findings of the iProbono India Report

1. The Concept of "Double Disadvantage" (or "Double Punishment")

In legal theory, this relates to the Doctrine of Unauthorized Hardship. An ordinary prisoner undergoes a legally authorized loss of liberty. However, a disabled inmate suffers a secondary, unauthorized punishment: the loss of basic daily autonomy, health, and human dignity due to an inherently inaccessible carceral environment.

Disabled inmates face 'double disadvantage' in Indian prisons: report

Soibam Rocky Singh
NEW DELHI

India's prison system continues to treat disability as an "afterthought" and denies prisoners with disabilities statutory rights, entitlements and adequate healthcare, according to a report by iProbono India, a women-led social justice organisation.

The report, titled 'Inaccessible by Design: A Disability-Centred Review of State Prison Manuals in India', released in March, found that prison manuals continue to use derogatory and outdated terms such as "lunatic", "filthy", "noisy" and "insane" in official documentation, which reflect an entrenched "ableist framework that dehumanises prisoners with psychosocial disabilities".

The report stated that incarcerated persons with disabilities are disproportionately affected not only by systemic neglect of their disability-related needs, but also by the general harshness of the prison environment. This creates a "double disadvantage" that often results in violations of their fundamental rights to health, reasonable accommodation, security and equal treatment, it said.

'Systemic failure'

The report highlighted a "systemic failure" to identify persons with disabilities at key pre-trial stages, including at the time of arrest, first production before a Magistrate, remand proceedings, or recording of statements under the Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023. It noted that while most prison manuals mandate medical examinations for new inmates, these assessments largely focus on visible injuries or general health conditions, failing to identify psychosocial, intellectual or invisible disabilities.

The report said Tamil Nadu alone mentions the involvement of trained personnel in the intake process. FILE PHOTO

As per the report, only Karnataka provides for standardised disability screening or self-declaration during prison admission while Tamil Nadu alone mentions the involvement of trained personnel such as psychologists or welfare officers in the intake process. The report noted that the National Crime Records Bureau's 'Crime in India' and 'Prison Statistics of India' databases do not record the disability status of accused persons or prisoners, leaving disabled inmates "unnoticed, unidentified and unrecorded within the criminal justice system".

Dearth of professionals

It also highlighted the severe shortage of mental health professionals in Indian prisons. "There is a widely reported nationwide staffing crisis, with only 25 psychiatrists/psychologists employed across 1,330 prisons in 2022," the report said. This translates to one mental health professional for every 23,000 inmates, it said.

"In Delhi's prisons, as of May 2025, 849 inmates with mental illnesses were identified, with severe gaps in mental healthcare despite active civil society oversight and judicial attention," the report said. It added that only 36 inmates had been transferred to psychiatric wards while just four full-time psychiatrists were serving 16 jails against a sanctioned strength of 10.

"The human consequences of these data gaps are starkly evident in cases such as Father Stan Swamy, G.N. Saibaba and L. Muruganantham," the report said. It stated that Swamy, who had Parkinson's disease, died in custody in 2021 after prolonged detention. "He repeatedly requested a simple straw to drink water but was denied access until compelled by a court order, exemplifying the systemic neglect of basic needs for incarcerated persons with disabilities," the report said.

2. Pre-Trial and Entry-Stage Failures

- **Identification Gap:** There is a systemic failure to flag disabilities during key pre-trial operations under the **Bharatiya Nagarik Suraksha Sanhita (BNSS), 2023** (e.g., during arrest, initial remand, or recording of statements).
- **Superficial Screening:** Standard prison admission medical check-ups focus solely on physical injuries, entirely ignoring intellectual, psychosocial, or invisible disabilities.
- **Exceptions:** Only **Karnataka** provides for standardized disability screening or self-declaration at admission, and only **Tamil Nadu** mandates involving trained professionals like psychologists or welfare officers during the intake stage.

3. The "Data Void"

The National Crime Records Bureau (NCRB) publications—namely Crime in India and Prison Statistics of India—**do not record the disability status** of accused persons or prisoners. This administrative gap renders disabled inmates statistically invisible, making targeted welfare policy intervention impossible.

4. Severe Staffing Crisis in Mental Healthcare

- As of recent records, there were only **25 psychiatrists/psychologists across 1,330 prisons** nationwide. This equates to an alarming ratio of **1 mental health professional for every 23,000 inmates**.
- In Delhi's high-profile prisons, despite strict judicial scrutiny, a massive shortfall remains: only 4 full-time psychiatrists operate across 16 jails against a sanctioned strength of 10.

5. Retaining Ableist Frameworks

State prison manuals continue to employ highly archaic, colonial, and derogatory language such as “lunatic,” “filthy,” “noisy,” and “insane.” This reflects a deep-rooted ableist psychology that dehumanizes prisoners with psychosocial and intellectual conditions.

6. Human Consequences of Institutional Neglect

The report highlights high-profile legal cases to show the fatal consequences of this systemic apathy:

- **Father Stan Swamy:** A Parkinson’s disease patient who tragically died in custody in 2021 after being forced to approach the courts just to secure a basic assistive item (a drinking straw).
- **G.N. Saibaba & L. Muruganantham:** Instances where severely disabled individuals faced extreme physical degradation due to a complete lack of basic assistive ecosystems like customized wheelchairs, accessible toilets, and physical therapy.

Legal and Constitutional Frameworks Violations

- **Article 14 (Right to Equality):** Substantive equality demands **reasonable accommodation**. Treating unequals equally by forcing disabled individuals to adapt to able-bodied jail infrastructure constitutes indirect discrimination.
- **Article 21 (Right to Life with Dignity):** The Supreme Court has repeatedly held that prisoners do not shed their fundamental right to life and health at the prison gates. Denying essential healthcare and accessible facilities violates Article 21.
- **Rights of Persons with Disabilities (RPwD) Act, 2016:**
    - **Section 6:** Mandates protection and safety of PwDs in situations of risk, explicitly including custodial settings.
    - **Section 25:** Guarantees equal access to barrier-free healthcare and rehabilitation.
- **International Commitments:** Violates **Article 15 of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD)**, which India ratified in 2007, prohibiting cruel, inhuman, or degrading treatment in detention.

Judicial Interventions

In landmark rulings like **L. Muruganantham v. State of Tamil Nadu**, the Supreme Court issued strict directions to correct this institutional malaise:

1. **Mandatory Admission Audit:** Immediate identification and registration of a prisoner's disability status at the intake stage.
2. **Creation of an Assistive Ecosystem:** Mandating that denial of essential mobility/assistive aids (wheelchairs, hearing aids, communication boards) is a punishable offense under the RPwD Act, 2016.
3. **Universal Accessibility Infrastructure:** Directives to retro-fit old prisons with ramps, tactile cues, and wheelchair-accessible restrooms.

Way Forward

- **Data Reforms:** The NCRB must immediately introduce disaggregated disability indicators in its annual data collection modules to reverse the "invisibility by design."
- **De-colonial Legal Clean-up:** State governments must comprehensively rewrite obsolete State Prison Manuals to align with the dignified nomenclature of the RPwD Act, 2016.
- **Institutional Capacity Expansion:** Fill vacant institutional medical posts. Prison personnel must undergo mandatory, recurring sensitization modules to deal compassionately with psychosocial and physical disabilities.
- **Independent Accessibility Audits:** Periodic, civil-society-led third-party infrastructure audits must be conducted across all central and district jails to ensure adherence to National Building Codes for universal design.

Conclusion

A society's moral progress is measured by how it treats its most vulnerable, and a state's commitment to constitutional values is tested at the periphery of its carceral system. Treating disability as an administrative afterthought directly compromises the foundational principles of reformative justice. To transition from a colonial, punitive system to a modern, rehabilitative framework, India must urgently weave accessibility, institutional empathy, and statutory compliance directly into the design of its criminal justice system.

UPSC Prelims Exam Practice Question

Ques: The term "double disadvantage" in the context of prisoners with disabilities refers to:
(a) Simultaneous trial under two criminal laws
(b) Loss of liberty along with inaccessible prison conditions causing additional hardship
(c) Separate punishments under prison manuals and court orders
(d) Discrimination faced by prison staff and inmates alike
Ans: b)

UPSC Mains Exam Practice Question

Ques: Discuss how the lack of accessibility and reasonable accommodation in prisons violates Articles 14 and 21 of the Constitution. Suggest institutional reforms required to ensure disability-inclusive prison governance.**(150 Words)**

Page 04:GS II : Social Justice / Prelims Exam

The International Labour Organization (ILO) has released a critical update titled 'Employment and Social Trends: May 2026 Update', highlighting how the escalating geopolitical crisis in West Asia is spilling over into the global economy.

The report warns that the conflict is no longer a localized issue; it is actively mutating into a global macroeconomic shock. Through disrupted supply chains, soaring energy costs, and fractured transport routes, the crisis threatens to eliminate millions of jobs, suppress real wages, and destabilize food security in import-dependent nations, including India.

38 million full-time jobs may fall if West Asia war continues, warns ILO

A.M. Jigeesh
NEW DELHI

The crisis in West Asia is increasingly affecting jobs, working conditions and incomes far beyond the region, as higher energy costs, disrupted transport routes, supply chain pressure, weaker tourism and migration constraints weigh on economies, according to a new International Labour Organization (ILO) report.

Released in Geneva on Monday, the report titled 'Employment and Social Trends: May 2026 Update' warned that if fuel or fertilizer prices rise, or shortages persist, the effects could extend beyond farm incomes to food prices, rural livelihoods and food security, in countries that depend on imported fertilizers, including India.

The unemployment rate could rise by 0.1% in 2026 equivalent to an additional five million unemployed people. G.N. RAO

The report pointed out that though the impact of the crisis on global labour market will take time to materialise, the risks are already significant if oil prices remain high. If the oil prices climb by about 50% above their January-February 2026 average, the ILO estimates that the hours worked could fall by 0.5% in 2026 and 1.1% in 2027, equivalent to 14 million and 38 million full-time jobs. "Real labour income could decline by 1.1% and 3%, equivalent to losses of around US$1.1 trillion and US$3 trillion," it said.

The unemployment rate could rise by 0.1% in 2026 and by 0.5% in 2027, equivalent to an additional five million unemployed people in 2026 and 20 million in 2027. "The shock is uneven. Exposure is highest where economies, sectors and workers are most closely linked to Gulf energy flows and energy-intensive supply chains. The Arab States and Asia and the Pacific stand out as the most exposed regions," the report added.

Key Highlights & Projections from the ILO Report

1. The Transmission Channels of the Shock

The West Asia crisis affects global labor markets not through direct conflict, but through economic spillover channels:

- **Energy Costs:** Spikes in crude oil and natural gas prices.
- **Supply Chain & Logistics:** Disrupted maritime transport routes (e.g., Red Sea shipping constraints) and increased freight insurance.
- **Macroeconomic Factors:** Weakened international tourism, migration constraints, and reduced remittance flows.

2. Employment and Income Projections (The Risk Scenarios) : The ILO outlines a severe downside scenario if oil prices climb **50% above their January–February 2026 average**:

Indicator	Impact in 2026	Impact in 2027
Global Hours Worked	Decline of **0.5%**	Decline of **1.1%**
Full-Time Job Equivalents	Loss of **14 million** jobs	Loss of **38 million** jobs
Global Unemployment Rate	Increase of **0.1%** (+5 million people)	Increase of **0.5%** (+20 million people)

Indicator	Impact in 2026	Impact in 2027
Real Labour Income	Decline of **1.1%** (~$1.1 Trillion loss)	Decline of **3.0%** (~$3.0 Trillion loss)

3. Geographically Uneven Exposure : The economic shock is highly asymmetrical. Exposure is highest where economies are structurally reliant on Gulf energy flows or tied to energy-intensive supply chains. The **Arab States** and the **Asia and the Pacific** region have been flagged as the most vulnerable zones.

Specific Vulnerabilities for India

1. Agrarian and Food Security Risks

- **The Fertilizer Connection:** India is heavily dependent on imported fertilizers and raw materials (like rock phosphate and sulphur) from West Asia.
- **The Domino Effect:** Continued shortages or price hikes in fuel and fertilizers will directly compress farm incomes, push up domestic agricultural production costs, and eventually translate into **high food inflation** and rural distress.

2. The Energy Import Bill and Inflation

- India imports over 80% of its crude oil requirements, a significant portion of which originates in West Asia.
- A sustained 50% spike in oil prices would widen India's Current Account Deficit (CAD), weaken the Indian Rupee, and trigger **imported inflation**, forcing the RBI to maintain high interest rates—subsequently slowing down domestic job creation.

3. Impact on the Indian Diaspora and Remittances

- The Gulf Cooperation Council (GCC) countries host over 8.5 million non-resident Indians.
- Economic contraction or localized migration constraints in the Arab states would hurt blue-collar employment, slow down the growth of inbound remittances (of which India is the world's largest recipient), and lead to reverse migration pressure on states like Kerala, Tamil Nadu, and Uttar Pradesh.

Way Forward for India

- **Diversification of Energy and Fertilizer Sourcing:** India must accelerate its strategy to source crude oil and fertilizer components from alternative geographies (e.g., Latin America, Africa, and Central Asia) to insulate its economy from West Asian volatility.
- **Strategic Buffers and Subsidies:** The Government of India may need to bolster its fertilizer subsidy buffer to protect farmers from global price shocks, preventing structural stress in the rural economy.

- **Accelerating Green Transition:** The crisis underscores the urgency of transitioning toward renewable energy, green hydrogen, and natural farming methods to structurally reduce India's structural exposure to hydrocarbon shocks.
- **Skilling for Diversified Global Markets:** Government schemes like *Pravasi Kaushal Vikas Yojana* should pivot toward skilling Indian workers for European, East Asian, and North American markets to reduce over-reliance on Gulf labor markets.

Conclusion : The ILO report highlights that modern conflicts cannot be structurally contained. In a highly globalized world, a security crisis in West Asia rapidly transforms into a livelihood crisis in distant corners of the world. For India, navigating this period requires agile macroeconomic management—balancing inflation control, safeguarding rural productivity, and aggressively diversifying supply chains to protect domestic employment from external geopolitical headwinds.

UPSC Prelims Exam Practice Question

Ques:Which of the following regions were identified by the International Labour Organization (ILO) as among the most vulnerable to the ongoing West Asia-linked economic shock?

(a) Latin America and Europe

(b) North America and Africa

(c) Arab States and Asia-Pacific

(d) Central Asia and Scandinavia

Ans: c)

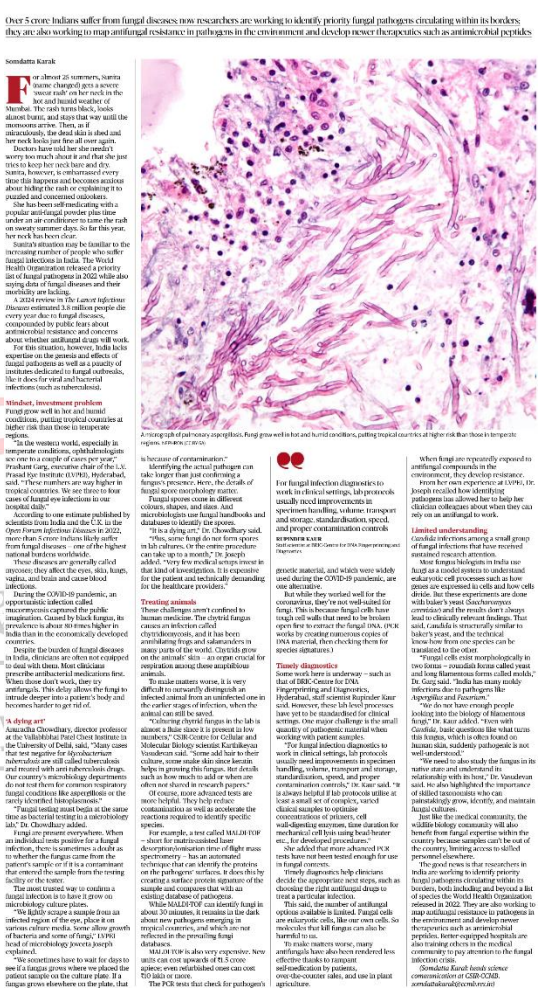
UPSC Mains Exam Practice Question

Ques: Examine how the ongoing West Asia crisis can impact India's macroeconomic stability through energy prices, inflation, and supply-chain disruptions.(**150 Words)**

Page 07: GS II & III : Social Justice and Science & Tech / Prelims Exam

While India has robust institutional frameworks to track viral and bacterial diseases (e.g., Tuberculosis, COVID-19), **mycoses (fungal diseases)** remain a critically neglected public health crisis.

A comprehensive review highlights that **over 5 crore (50 million) Indians** suffer from fungal diseases, marking one of the highest national burdens globally. Propelled by India's tropical, hot, and humid climate, opportunistic fungal infections are rising rapidly. However, the country faces a severe deficit in diagnostic tools, specialized medical expertise, and research investment, leading experts to warn that managing fungal health has become a "dying art."



India still short on expertise, tools to manage fungal health burden

Over 5 crore Indians suffer from fungal diseases; now researchers are working to identify priority fungal pathogens circulating within its borders; they are also working to map antifungal resistance in pathogens in the environment and develop newer therapeutics such as antimicrobial peptides

Somdatta Karak

For almost 25 summers, Sunita (name changed) gets a severe 'sweat rash' on her neck in the hot and humid weather of Mumbai. The rash turns black, looks almost burnt, and stays that way until the monsoon arrives. Then, as if miraculously, the dead skin is shed and her neck looks just fine all over again.

Doctors have told her she needn't worry too much about it and that she just tries to keep her neck bare and dry. Sunita, however, is embarrassed every time this happens and becomes anxious about hiding the rash or explaining it to puzzled and concerned onlookers.

She has been self-medicating with a popular antifungal powder plus time under an air conditioner to tame the rash on sweaty summer days. So far this year, her neck has been clear.

Sunita's situation may be familiar to the increasing number of people who suffer fungal infections in India. The World Health Organization released a priority list of fungal pathogens in 2022 while also saying data of fungal diseases and their morbidity are lacking.

A 2024 review in *The Lancet Infectious Diseases* estimated 3.6 million people die every year due to fungal diseases, compounded by public fears about antimicrobial resistance and concerns about whether antifungal drugs will work.

For this situation, however, India lacks expertise on the genesis and effects of fungal pathogens as well as a paucity of institutes dedicated to fungal outbreaks, like it does for viral and bacterial infections (such as tuberculosis).

Mindset, investment problem

Fungi grow well in hot and humid conditions, putting tropical countries at a higher risk than those in temperate regions.

"In the western world, especially in temperate conditions, ophthalmologists see one to a couple of cases per year," Prashant Garg, executive chair of the L.V. Prasad Eye Institute (LVPEI), Hyderabad, said. "These numbers are way higher in tropical countries. We see three to four cases of fungal eye infection in our hospital daily."

According to one estimate published by scientists from India and the U.K. in the *Open Forum Infectious Diseases* in 2022, more than 5 crore Indians likely suffer from fungal diseases – one of the highest national burdens worldwide.

These diseases are generally called mycoses; they affect the eyes, skin, lungs, vagina, and brain and cause blood infections.

During the COVID-19 pandemic, an opportunistic infection called mucormycosis garnered the public imagination. Caused by black fungus, its prevalence is about 80 times higher in India than in the economically developed countries.

Despite the burden of fungal diseases in India, clinicians are often not equipped to deal with them. Most clinicians prescribe antibacterial medications first. When they don't work, they try antifungals. This delay allows the fungi to invade deeper into a patient's body and becomes harder to get rid of.

'A dying art'

Anuradha Chowdhary, director professor at the Vallabhbhai Patel Chest Institute in the University of Delhi, said, "Many cases that test negative for *Mycobacterium tuberculosis* are still called tuberculosis and treated with anti-tubercular drugs. Our country's microbiology departments do not test them for common respiratory fungal conditions like aspergillosis or the rarely identified histoplasmosis."

"Fungal testing must begin at the same time as bacterial testing in a microbiology lab," Dr. Chowdhary added.

Fungi are present everywhere. When an individual tests positive for a fungal infection, there is sometimes a doubt as to whether the fungus came from the patient's sample or if it is a contaminant that entered the sample from the testing facility or the water.

The most trusted way to confirm a fungal infection is to have it grow on microbiology culture plates.

"We lightly scrape a sample from an infected region of the eye, place it on various culture media. Some allow growth of bacteria and some of fungi," LVPEI head of microbiology Jeseela Joseph explained.

"We sometimes have to wait for days to see if a fungus grows where we placed the patient sample on the culture plate. If a fungus grows elsewhere on the plate, that is because of contamination."

Identifying the actual pathogen can take longer than just confirming a fungus's presence. Here, the details of fungal spore morphology matter.

Fungal spores come in different colours, shapes, and sizes. And microbiologists use fungal handbooks and databases to identify the spores.

"It is a dying art," Dr. Chowdhary said. "Thus, some fungi do not form spores in lab cultures. Or the entire procedure can take up to a month," Dr. Joseph added. "Very few medical setups invest in that kind of investigation. It is expensive for the patient and technically demanding for the healthcare providers."

Treating animals

These challenges aren't confined to human medicine. The chytrid fungus causes an infection called chytridiomycosis, and it has been annihilating frogs and salamanders in many parts of the world. Chytrids grow on the animals' skin – an organ crucial for respiration among these amphibious animals.

To make matters worse, it is very difficult to outwardly distinguish an infected animal from an uninfected one in the earlier stages of infection, when the animal can still be saved.

"Culturing chytrid fungus in the lab is almost a fluke since it is present in low numbers," CSIR-Centre for Cellular and Molecular Biology scientist Karthikeyan Vasudevan said. "Some add hair to their culture, some snake skin since keratin helps in growing this fungus, they details such as how much to add or when are often not shared in research papers."

Of course, more advanced tests are more helpful. They help reduce contamination as well as accelerate the reactions required to identify specific species.

For example, a test called MALDI-TOF – short for matrix-assisted laser desorption/ionisation time-of-flight mass spectrometry – has an automated technique that can identify the proteins on the pathogens' surfaces. It does this by creating a surface protein signature of the sample and compares that with an existing database of pathogens.

While MALDI-TOF can identify fungi in about 30 minutes, it remains in the dark about new pathogens emerging in tropical countries, and which are not reflected in the prevailing fungi databases.

MALDI-TOF is also very expensive. New units can cost upwards of ₹1.5 crore apiece; even refurbished ones can cost ₹50 lakh or more.

The PCR tests that check for pathogen's genetic material, and which were widely used during the COVID-19 pandemic, are one alternative.

But while they worked well for the coronavirus, they're not well-suited for fungi. This is because fungal cells have tough cell walls that need to be broken open first to extract the fungal DNA. (PCR works by creating numerous copies of DNA material, then checking them for species signatures.)

Timely diagnostics

Some work here is underway – such as that of BRIC-Centre for DNA Fingerprinting and Diagnostics, Hyderabad, staff scientist Rupinder Kaur said. However, these lab-level processes have yet to be standardised for clinical settings. One major challenge is the small quantity of pathogenic material when working with patient samples.

"For fungal infection diagnostics to work in clinical settings, lab protocols usually need improvements in specimen handling, volume, transport and storage, standardisation, speed, and proper contamination controls."

SUPRINTH KADE

Staff scientist at BRIC-Centre for DNA Fingerprinting and Diagnostics

For fungal infection diagnostics to work in clinical settings, lab protocols usually need improvements in specimen handling, volume, transport and storage, standardisation, speed, and proper contamination controls

Dr. Kaur said. However, these lab-level processes have yet to be standardised for clinical settings. One major challenge is the small quantity of pathogenic material when working with patient samples.

"For fungal infection diagnostics to work in clinical settings, lab protocols usually need improvements in specimen handling, volume, transport and storage, standardisation, speed, and proper contamination controls," Dr. Kaur said. "It is always helpful if lab protocols utilise at least a small set of complex, varied clinical samples to optimise concentrations of primers, cell wall-digesting enzymes, time duration for mechanical cell lysis using bead-beater etc., for developed procedures."

She added that more advanced PCR tests have not been tested enough for use in fungal contexts.

Timely diagnostics help clinicians decide the appropriate next steps, such as choosing the right antifungal drugs to treat a particular infection.

This said, the number of antifungal options available is limited. Fungal cells are eukaryotic cells, like our own cells. So molecules that kill fungus can also be harmful to us.

To make matters worse, many antifungals have also been rendered less effective thanks to rampant self-medication by patients, over-the-counter sales, and use in plant agriculture.

When fungi are repeatedly exposed to antifungal compounds in the environment, they develop resistance.

From her own experience at LVPEI, Dr. Joseph recalled how identifying pathogens has allowed her to help her clinician colleagues about when they can rely on an antifungal to work.

Limited understanding

Candida infections among a small group of fungal infections that have received sustained research attention.

Most fungus biologists in India use fungi as a model system to understand eukaryotic cell processes such as how genes are expressed in cells and how cells divide. But these experiments are done with baker's yeast (*Saccharomyces cerevisiae*) and the results don't always lead to clinically relevant findings. That said, *Candida* is structurally similar to baker's yeast, and the technical know-how from one species can be translated to the other.

"Fungal cells exist morphologically in two forms – rounded forms called yeast and long filamentous forms called molds," Dr. Garg said. "India has many moldy infections due to pathogens like *Aspergillus* and *Fusarium*."

"We do not have enough people looking into the biology of filamentous fungi," Dr. Kaur added. "Even with *Candida*, basic questions like what turns this fungus, which is often found on human skin, suddenly pathogenic is not well-understood."

"We need to also study the fungus in its native state and understand its relationship with its host," Dr. Vasudevan said. He also highlighted the importance of skilled taxonomists who can painstakingly grow, identify, and maintain fungal cultures.

Just like the medical community, the wildlife biology community will also benefit from fungal expertise within the country because samples can't be out of the country, limiting access to skilled personnel elsewhere.

The good news is that researchers in India are working to identify priority fungal pathogens circulating within its borders, both including and beyond a list of species the World Health Organization released in 2022. They are also working to map antifungal resistance in pathogens in the environment and develop newer therapeutics such as antimicrobial peptides. Better-equipped hospitals are also training others in the medical community to pay attention to the fungal infection crisis.

(Somdatta Karak hosts science communication at CSIR-CCMB. somdattakarak@ccmb.res.in)

Key Dimensions of India's Fungal Burden

1. The Tropical Vulnerability

Fungi thrive exceptionally well in hot and humid environments. This places tropical countries like India at a disproportionately higher risk compared to temperate regions.

- Example: While an ophthalmologist in a temperate western country might see only one or two cases of fungal eye infections per year, premier Indian institutes like the L.V. Prasad Eye Institute (LVPEI) in Hyderabad treat **three to four cases daily**.

2. Clinical Blindspots& Misdiagnosis

There is a profound systemic delay in identifying fungal infections:

- **The Antibiotic First Approach:** Clinicians routinely prescribe antibacterial drugs first. When these fail, antifungals are introduced. This delay allows the fungi to penetrate deeper into tissue, making treatment difficult or fatal.
- **The TB Overlap:** Many respiratory fungal conditions like **aspergillosis** or **histoplasmosis** present symptoms identical to Tuberculosis (TB). Patients testing negative for TB are frequently misdiagnosed and given aggressive anti-TB drugs instead of being screened for respiratory fungi.

3. The "Dying Art" of Diagnostics

Confirming a fungal infection is complex and technically demanding:

- **Culture Contamination:** Fungi are omnipresent in the environment. Distinguishing an actual patient sample from an environmental contaminant requires painstaking observation of fungal spore morphology (color, shape, size).
- **Lack of Experts:** Mycological taxonomy and spore identification are fading skills in Indian microbiology. Furthermore, lab cultures can take up to a month to yield results, a timeline that many healthcare setups cannot afford.

Technical & Therapeutic Roadblocks

1. High Cost of Advanced Diagnostics

Advanced automated systems like **MALDI-TOF** (Matrix-Assisted Laser Desorption/Ionisation Time-of-Flight Mass Spectrometry) can identify surface proteins of fungal pathogens within 30 minutes. However:

- Units are prohibitively expensive (up to ₹1.5 crore each).
- Their prevailing reference databases lack signatures of newly emerging tropical fungal variants.

2. Limitations of PCR Tests

Unlike viruses, fungal cells possess highly resilient, tough chitinous cell walls. Standard PCR tests cannot easily break open these cells to extract DNA without complex, unstandardized pre-processing steps (like mechanical cell lysis using bead-beaters).

3. The Evolutionary Challenge: Eukaryotic Cells

Developing antifungal drugs is structurally difficult. Fungal cells are **eukaryotic**, sharing the same basic cellular architecture as human cells. Consequently, chemical molecules designed to kill a fungus often show high toxicity toward human tissues.

4. Compounding Antifungal Resistance (AFR)

Rampant self-medication, over-the-counter sales of steroidal/antifungal creams, and the widespread use of antifungals in commercial plant agriculture have driven severe environmental mutation, leading to widespread **Antifungal Resistance (AFR)**.

Beyond Humans: Wildlife Decimation

The crisis extends directly to biodiversity. The **chytrid fungus** (chytridiomycosis) is currently decimating amphibian populations (frogs and salamanders) globally, including in India. Culturing and studying these pathogens remains highly inconsistent due to restrictive biosecurity laws that prevent shipping wildlife samples outside national borders, necessitating domestic expertise.

Current Initiatives & The Way Forward

- **Integrated Testing Protocols:** Microbiology laboratories must mandate that fungal testing begins simultaneously with bacterial and TB testing for respiratory and ocular ailments.
- **Database Localization:** Indian research bodies (like BRIC-CDFD and CSIR-CCMB) must collaborate to create localized, open-access databases of tropical fungal pathogens to maximize the utility of diagnostic tools.
- **Research Pivot to Filamentous Fungi:** Academic research must move beyond standard baker's yeast models to study the complex biology of molds (like Aspergillus and Fusarium) that dominate tropical infections.
- **Development of Antimicrobial Peptides (AMPs):** Funding should be fast-tracked toward bio-technological innovations like AMPs, which offer novel therapeutic pathways to bypass traditional antifungal resistance.

Conclusion

The lessons of the COVID-19 pandemic—specifically India's severe outbreak of **Mucormycosis (Black Fungus)**—demonstrated how devastatingly opportunistic fungal pathogens can be when patient immunity is compromised. India can no longer treat medical mycology as a niche sub-discipline. Addressing the 5-crore burden requires a structured national program that integrates fungal diagnostics into primary healthcare, incentivizes taxonomic expertise, and strictly regulates antifungal misuse in both clinical and agricultural spheres.

UPSC Mains Exam Practice Question

Ques: MALDI-TOF technology, recently discussed in the context of fungal diagnostics, is primarily used for:

(a) Genome editing of fungi

(b) Rapid identification of microbial pathogens

(c) Production of antifungal vaccines

(d) Agricultural pest management

Ans: b)

UPSC Mains Exam Practice Question

Ques: Despite bearing one of the world's highest burdens of fungal diseases, India lacks a comprehensive fungal health strategy. Examine the institutional and public health gaps responsible for this crisis.**(150 Words**

Page : 09: GS III : Indian Economy - Agriculture / Prelims Exam

Amid the ongoing geopolitical crisis in West Asia, fluctuating global fuel prices, and severe supply chain pressures, optimizing India's agricultural input management has become an urgent strategic necessity.

An analytical brief by Professor Nandula Raghuram highlights that while India has focused aggressively on securing its fertilizer supply, it has structurally neglected Fertilizer Use Efficiency (FUE) and Nitrogen Use Efficiency (NUE). With the country spending over ₹2 lakh crore annually on fertilizer subsidies, over two-thirds of this fiscal expenditure is lost to environmental pollution rather than being converted into food. This reality has trapped Indian agriculture in an ecological and economic "fertilizer trap."

Improving efficiency of fertilizer use in India

The ongoing war in West Asia and the rising costs of fuel and fertilizers give India an opportunity to enhance fertilizer use efficiency and moderate demand. India produces 80% of its urea requirement domestically and imports the rest while also boosting domestic production capacities to become fully self-reliant. But India's urea industry relies too heavily on imported fuel. While green ammonia produced from the electrolysis of water using solar energy is an option, it is not sustainable in water-stressed areas. The situation is worse for phosphatic fertilizers, as India lacks mineral rock phosphate and therefore has to import such fertilizers almost entirely.

Together, both the nitrogen (mostly urea) and phosphorus components of fertilizers define India's food security. While the government has been enhancing subsidies to maintain fertilizer prices for farmers, over two-thirds of the ₹2 lakh crore spent on annual subsidies is not harvested as food, and is lost to pollution.

The fertilizer trap

Inefficient, excessive or unbalanced use of fertilizer nutrients not only wastes money but also damages the soil, water, air, human health, biodiversity, and causes climate change and global warming. The more fertilizers we use, the more they deplete the soil's organic matter and its holding capacity for water and nutrients, threatening crop yields and pushing farmers to add more fertilizers. This 'fertilizer trap' explains why India's national demand for fertilizers never saturates, even as supply has increased over the decades.

Therefore, it is high time to move beyond supply side management and boost fertilizer use efficiency to moderate demand. Efficiency means producing more crop per kg of fertilizer used, or maintaining yields while reducing fertilizer input. The government's 'nutrient-based subsidy' did not improve efficiencies or reduce demand as urea was not included in the scheme. While neem-coated urea was meant to improve nitrogen-use efficiency, it could not stop the loss of most of the urea as ammonia to air pollution.

Similarly, most of the phosphatic fertilizers are also lost to water pollution.

Lack of coordination

While pulses, other leguminous cover crops, manures, composts and biochar could reduce fertilizers to a large extent, they are no longer the mainstay of our farming systems. Last month, the Union government directed the State governments to promote green manure but did not emphasise on fertilizer savings.

In November 2017, the Prime Minister had, in his *Man ki Baat* address to the nation, called for halving fertilizer usage within five years. However, fertilizer consumption has only increased due to the lack of inter-ministerial and interdepartmental coordination to address farming systems in an integrated manner. For example, though the government announces Minimum Support Prices (MSPs) for over 20 crops, actual government procurement is limited to rice, wheat and sugarcane, which is why farmers prefer to grow only these three crops. These crops consume over two-thirds of all the urea in India. This destroys traditional crop rotations involving pulses/legumes and pushes farmers into the fertilizer trap.

Pulse-cereal rotations sustained agriculture for thousands of years before fertilizers were invented, as most pulses leave behind some of the fixed nitrogen in the soil for the next crop. India must incentivise pulses/legume-based crop rotations or multicropping, as legumes fix atmospheric nitrogen, and need no urea or only 10% of the urea used for cereals. They are also ideal for rain-fed areas facing deficit monsoons (as predicted this year).

The Dalhan Aatmanirbharta Mission launched in October 2025 promised 100% procurement of Tur, Urad, and Masoor at MSP for four years. Under it, ₹11,440 crore was allocated to scale up production to 350 lakh tonnes per year in five years by expanding the area under cultivation. But according to the April 2026 data released by the government, the area for sowing pulses grew only 1.26% over last year. This is negligible compared to the 10% fall in area between 2021-22 to 2024-25. This calls for better implementation, as recommended by the Supreme Court in March.

Enhancing efficiency

India must also triple the recycling of manure, compost and biochar (residue from biogas plants) to replace fertilizers and boost soil health. Fertilizer recommendations need to be revised in order to ensure that organics form the basal dose and fertilizers are used only as a top-up to meet any shortfall, after exhausting all locally available organic sources. Coordinated crop trials across India showed that upto half of the recommended doses of fertilizers can be replaced with manure, biochar or compost with no loss of crop yield.

There should also be investment when it comes to alternatives for efficient nitrogen/phosphorus sources for crop improvement. The adoption of an improved but existing variety is what the farmer needs – not fancy capital-intensive technologies or drones. India's own research shows that the rice germplasm alone has the potential to double nitrogen use efficiency, in terms of grain yield per unit urea supplied. To ensure the inter-sectoral coordination required to implement the above, the Union government should revive the Interministerial National Nitrogen Steering Committee. Its tenure expired before any of its recommendations were acted upon.

Nandula Raghuram
Professor and Founder, Centre for Sustainable Nitrogen and Nutrient Management, Guru Gobind Singh Indraprastha University, New Delhi, President, Sustainable India Trust and Society for Conservation of Nature, New Delhi, and Emeritus Chair, International Nitrogen Initiative. Views expressed are personal

The more fertilizers we use, the more they deplete the soil's organic matter and its holding capacity for water and nutrients, threatening crop yields and pushing farmers to add more fertilizers

Environmental Losses

- **Nitrogen (Urea):** Most applied urea is lost to the atmosphere as ammonia (NH3) volatilization and nitrous oxide (N2O, a potent greenhouse gas), causing severe air pollution and contributing to global warming. Even interventions like Neem-Coated Urea have failed to halt these massive ambient losses.
- **Phosphorus:** Heavily leaches into surrounding water bodies, causing eutrophication (algal blooms), destroying aquatic biodiversity, and polluting groundwater reserves.

Structural Structural Flaws in Current Policy

1. Incomplete Subsidy Frameworks

The Nutrient-Based Subsidy (NBS) scheme was launched to promote balanced fertilizer application. However, Urea was kept out of the NBS. Because urea remains heavily subsidized and artificially cheap compared to phosphatic and potassic fertilizers, farmers continue to overapply it, severely distorting the ideal soil nutrient ratio.

2. The MSP and Procurement Distortion

While the government announces Minimum Support Prices (MSPs) for over 22 crops, actual, assured government procurement is overwhelmingly skewed toward rice, wheat, and sugarcane.

- These three water-and-chemical-intensive crops consume over two-thirds of all urea used in India.
- This dynamic disincentivizes traditional cereal-legume crop rotations, driving monoculture and expanding the fertilizer trap.

3. Implementation Lags in Alternative Missions

The DalhanAatmanirbharta Mission (launched in October 2025) allocated ₹11,440 crore to boost pulse production to 350 lakh tonnes by promising 100% procurement for Tur, Urad, and Masoor. However, data from April 2026 shows that the pulse sowing area grew by a meager 1.26%, failing to reverse the structural 10% decline witnessed between 2021 and 2025.

4. Supply-Side Hydrogen Bottlenecks

While generating Green Ammonia via water electrolysis using solar energy is touted as a sustainable alternative to fossil-fuel-derived urea imports, it is highly resource-intensive and unsustainable in water-stressed agricultural zones.

Technical and Biological Solutions for Efficiency

1. The Pulse-Cereal Bio-Fixation Ecosystem

Leguminous crops (pulses) harbor symbiotic Rhizobium bacteria in their root nodules, which naturally fix atmospheric nitrogen into the soil. Reintroducing pulse-based crop rotations or multi-cropping provides critical benefits:

- They leave behind natural residual nitrogen for the subsequent cereal crop.
- Legumes require **zero urea or a mere 10%** of the chemical nitrogen needed by intensive cereals.
- They are highly drought-resilient, making them ideal for rain-fed regions facing erratic monsoons.

2. Re-engineering Fertilizer Recommendations

Coordinated national crop trials have proven that up to 50% of recommended chemical fertilizers can be replaced with manure, compost, or biochar (biogas plant residue) without any loss in crop yields, while significantly restoring soil health.

3. Leveraging Genetic Germplasm

Rather than relying on capital-intensive technologies like agricultural drones, India can utilize its rich genetic biodiversity. Domestic agricultural research indicates that existing rice germplasm variants possess the genetic potential to double Nitrogen Use Efficiency (NUE) (grain yield per unit of urea supplied).

Way Forward

- **Revive Administrative Steering Bodies:** The Union Government must urgently revive and grant statutory permanence to the Interministerial National Nitrogen Steering Committee to ensure policy coordination across the Ministries of Agriculture, Chemicals & Fertilizers, and Environment.
- **Incentivize Legume Cultivation:** Bridge the gap identified by the Supreme Court in pulse procurement. Decentralized, assured procurement of pulses at the local level must be enforced to de-risk crop diversification for smallholders.
- **Include Urea in NBS:** To end the skewed over-application of nitrogen, urea must be brought under the Nutrient-Based Subsidy regime to rationalize its price parity with P & K fertilizers.
- **Mandate Bio-Organic Blending:** Create a structured market link between decentralized biogas plants (under schemes like GOBARdhan) and fertilizer distributors to standardize and scale the distribution of organic digestate/biochar as a basal soil application.

Conclusion

True food security cannot be sustained by an import-dependent, fiscally exhausting, and ecologically degrading fertilizer supply chain. As global geopolitical and climate vulnerabilities intensify, India must transition from absolute consumption metrics to efficiency metrics. Elevating Nitrogen Use Efficiency via legume-based crop rotations, biological germplasm utilization, and an organics-first approach will protect state finances, build climate resilience, and secure long-term agricultural productivity.

UPSC Prelims Exam Practice Question

Ques: The term "Fertilizer Trap" refers to:

(a) Excessive dependence on imported fertilizers due to low domestic production

(b) A vicious cycle where excessive fertilizer use degrades soil health, forcing even higher fertilizer application

(c) Hoarding of subsidized fertilizers by intermediaries

(d) Excessive export of fertilizers causing domestic shortages

Ans: b)

UPSC Mains Exam Practice Question

Ques: India's fertilizer subsidy architecture has created an ecological and economic "fertilizer trap."Critically examine.**(150 Words)**

Page 10:GS II & III : Social Justice and Science & Tech / Prelims Exam

The World Health Organization (WHO) has declared the Ebola virus disease (EVD) outbreak in the Democratic Republic of the Congo (DRC) and Uganda a **Public Health Emergency of International Concern (PHEIC)**.

Driven by the rare **Bundibugyo ebolavirus strain**, this development highlights critical vulnerabilities in international biosecurity. Unlike previous epidemics dominated by the Zaire strain, the current crisis presents a distinct challenge: the international community lacks approved vaccines or specific therapeutics for this specific variant.

Why has the WHO declared a PHEIC over Ebola outbreak?

What is Ebola? How is Ebola transmitted? What measures are being taken to contain the outbreak?

Ramya Kannan

The story so far :

On May 16, the World Health Organization (WHO) declared the Ebola outbreak in the Democratic Republic of the Congo (DRC) and Uganda a 'public health emergency of international concern (PHEIC). Just ahead of that, the Ministry of Public Health, Hygiene and Social Welfare, DRC, and the Uganda Ministry of Health declared an Ebola outbreak.

What is a PHEIC?

A PHEIC is the WHO's highest level of global health alert, formally declared under the International Health Regulations, whenever the health event is 'serious, sudden, unexpected, or unusual, and poses a public health risk to other countries through spread'. The declaration of the PHEIC also calls for a coordinated global response to tackle the current outbreak.

A new Ebola outbreak was notified in eastern DRC and Uganda, reportedly driven by the Bundibugyo ebolavirus strain. According to the WHO report, as of May 16, eight laboratory-confirmed cases, 246 suspected cases, and 80 suspected deaths have been reported in Ituri Province of the DRC. In addition, two laboratory-confirmed cases (including one death) with no apparent link to each other have been reported in Kampala, Uganda, within 24 hours of each other, among two individuals travelling from the DRC.

What is Ebola?

Ebola virus disease is a zoonotic disease that can be severe and often fatal in humans. It is caused by the eponymic Ebola virus, and has spilled over to humans from wild animals, including fruit bats and non-human primates, but is now capable of spreading between humans whenever there is direct contact with blood, secretion, bodily fluids of those infected, and even contaminated surfaces. According to the WHO, three different viruses are known to cause large Ebola disease outbreaks: Ebola virus, Sudan virus, and Bundibugyo virus. This current epidemic involves the last variant.

Ebola has been known since 1976, with most early outbreaks occurring in remote villages of Central Africa. However, things changed dramatically with the worst Ebola outbreak in history, which occurred in West Africa from 2014 to 2016, sweeping across Guinea, Liberia, and Sierra Leone, resulting in over 28,600 reported cases and 11,325 deaths.

But this outbreak served as a milestone turning point for the way in which the world treated Ebola; it catalysed unprecedented global support for research and development into vaccines for Ebola. As a result, there are two vaccines in the market that have been approved for Ebola, in a single and double dose regimen. Both are being used for targeted "ring vaccination" for all contacts and frontline workers dealing with the cases, as post-exposure prophylaxis. There are monoclonal-antibody treatments in the market that reportedly improve survival when given early to patients.

What measures are in place now?

The WHO-led response now focuses on several aspects including rapid isolation of a patient and immediate provision of intensive supportive care (rehydration, symptom management) to reduce mortality. But what will be crucial in actually containing this outbreak is to initiate rapid case tracing, contact tracing, ensuring safe burials, and establishing strict infection-control measures in all health facilities where people are being treated. The WHO's plan also includes deploying approved vaccines and monoclonal antibodies to at-risk groups wherever feasible. An essential part of the strategy, according to the global agency, is to launch social mobilisation campaigns to build trust, reduce stigma, and encourage early care-seeking among the people in the affected zones.

According to the WHO, "outbreak control relies on a package of interventions including intensive supportive care of patients, infection prevention and control, disease surveillance and contact tracing, laboratory services, safe and dignified burials, vaccination if relevant, and social mobilisation."

THE GIST

- WHO declared the Ebola outbreak in the Democratic Republic of the Congo and Uganda a public health emergency of international concern (PHEIC), its highest level of global health alert.
- The outbreak, driven by the Bundibugyo ebolavirus strain, has prompted rapid isolation, contact tracing, safe burials, vaccination, and monoclonal-antibody treatment.

What is a PHEIC?

A Public Health Emergency of International Concern (PHEIC) is the **highest level of global health alert** issued by the WHO under the International Health Regulations (IHR, 2005).

It is formally declared when an infectious event meets specific criteria:

- It is **serious, sudden, unusual, or unexpected**.
- It carries structural implications for public health **beyond the affected nation's borders**.
- It necessitates **immediate, well-coordinated international action** to prevent or mitigate global spread.

Why was a PHEIC declared for this specific outbreak?

1. **Cross-Border Transmission:** International spread has already manifested, with laboratory-confirmed cases emerging in Kampala, Uganda, among individuals traveling from the DRC.

2. **The Strain Factor:** This epidemic is driven by the Bundibugyo ebolavirus. While highly effective medical countermeasures exist for the Zaire ebolavirus strain (such as Ervebo and Zabdeno vaccines), **there are currently no licensed vaccines or targeted monoclonal antibody therapies for the Bundibugyo strain**.

3. **High-Risk Operational Context:** The epicenter in the DRC's Ituri Province is severely impacted by humanitarian crises, armed insecurity, and massive population displacement. This complicates classic contact tracing, active disease surveillance, and the safe transport of medical samples.

4. **Healthcare-Associated Amplification:** Multiple deaths among healthcare workers have been recorded, signaling highly dangerous hospital-associated (nosocomial) transmission chains.

What is Ebola and How is it Transmitted?

1. The Pathogen

Ebola Virus Disease (EVD) is a severe, often fatal zoonotic illness caused by viruses within the genus Orthoebolavirus (family Filoviridae).

Three major variants are associated with large-scale human epidemics:

- Zaire ebolavirus (historically the most common)
- Sudan ebolavirus
- Bundibugyo ebolavirus (the driver of the current outbreak)

2. Transmission Dynamics

- **Zoonotic Spillover:** The natural reservoir hosts are fruit bats (Pteropodidae family). The virus spills over into humans through close contact with the blood, organs, or bodily fluids of infected wild animals found ill or dead in the rainforest (e.g., bats, monkeys, forest antelopes).

- **Human-to-Human Transmission:** The virus propagates within communities via **direct contact** (through broken skin or mucous membranes) with:

    - Blood, secretions, organs, or other bodily fluids (sweat, saliva, vomit, feces) of an infected, symptomatic person.

    - Surfaces and materials (e.g., bedding, clothing, medical equipment) contaminated with these fluids.

    - Direct contact with the body of a deceased Ebola victim during traditional, non-dignified burial practices.

Crucial Distinction: Ebola **does not spread through the air** like influenza or COVID-19. Transmission strictly requires direct contact with infected fluids or fomites.

Comprehensive Containment Measures

Because specific pharmaceutical countermeasures (vaccines/therapeutics) are unavailable for this strain, response strategies rely heavily on classical, rigorous public health protocols:

- **Intensive Supportive Clinical Care:** Early operational deployment of aggressive oral or intravenous rehydration, electrolyte stabilization, and symptom-specific management dramatically lowers the mortality rate.
- **Strict Infection Prevention and Control (IPC):** Equipping isolation units and primary healthcare centers with Personal Protective Equipment (PPE), rigorous waste management protocols, and decontamination solutions to halt nosocomial transmission.
- **Active Ring Surveillance & Digital Contact Tracing:** Rapidly identifying, isolating, and monitoring all primary and secondary contacts of confirmed cases for a mandatory 21-day window.
- **Safe and Dignified Burials (SDB):** Deploying specialized, culturally trained teams to manage the bodies of deceased individuals, preventing post-mortem transmission during traditional funerary rites.
- **Cross-Border Screenings:** Activating rapid response units and temperature checks at formal and informal points of entry along transit routes, mining zones, and pilgrimage corridors between the DRC, Uganda, and other neighboring nations.
- **Social Mobilization and Behavioral Campaigns:** Launching localized community engagement programs to counter disinformation, alleviate societal stigma, build institutional trust, and incentivize early self-reporting to treatment clinics.

Conclusion

The declaration of a PHEIC over the Bundibugyo Ebola outbreak reminds the global community that biosecurity cannot rely on single-pathogen solutions. While the post-2014 R&D revolution successfully yielded countermeasures against the Zaire strain, the current emergency exposes a dangerous gap in preparedness for rarer filoviruses. Containing this outbreak requires a blend of rigorous, traditional public health interventions, immediate international funding for regional diagnostic capacity, and an accelerated research pivot toward broad-spectrum, pan-Ebola vaccines and treatments.

UPSC Prelims Exam Practice Question

Ques: A Public Health Emergency of International Concern (PHEIC) is declared by:

(a) United Nations Security Council

(b) World Health Organization under International Health Regulations (2005)
(c) World Bank under Global Pandemic Framework
(d) GAVI Alliance under Vaccine Preparedness Treaty

Ans: b)

UPSC Mains Exam Practice Question

Ques: What is a Public Health Emergency of International Concern (PHEIC)? Discuss its significance in strengthening global health governance with reference to the recent Ebola outbreak in Africa.**(150 Words)**

Page : 08 : Editorial Analysis

Gender, caregiving, the law in Indian research funding

Nabeela Siddiqui

Assistant Professor, Vinayaka Mission's Law School, Vinayaka Mission's Research Foundation (Deemed University), Chennai

The structural gender gaps in India's research ecosystem must be addressed with little formal support for reintegration or reduced workload. The expectation of immediate full productivity after childbirth is unrealistic and requires clear policy intervention rather than informal goodwill from supervisors.

India's scientific ambitions are increasingly visible in space missions, pharmaceutical research, and peer-reviewed scholarship. Yet, its institutional culture that sustains this continues to marginalise many researchers. Women in academia, especially in mid-career stages, face a convergence of professional and domestic responsibilities that their male peers rarely experience to the same extent. Age relaxation provisions in research grants were introduced to address this gap, but as these policies evolve, they require closer scrutiny to improve their effectiveness rather than weaken them.

The legal foundation for gender-sensitive research policy in India is not merely permissive; it is, in important respects, directive. Article 15(3) of the Constitution allows the state to make special provisions for women and children, and this has long been read as enabling affirmative measures in employment and public opportunity. Article 16 reinforces equality of opportunity without precluding measures that correct historical disadvantage and read alongside the Directive Principles which speak of equal right to an adequate means of livelihood. There is a coherent constitutional argument that funding agencies have not just the authority but also a degree of responsibility to ensure women researchers are not structurally penalised for caregiving.

Article 51A(e), the fundamental duty to renounce practices derogatory to the dignity of women, adds another dimension. A policy environment that routinely produces grant cohorts with negligible female representation is not a neutral outcome – it reflects accumulated disadvantages that the constitutional framework obliges institutions to address.

The legislative gap at heart of the problem

The Maternity Benefit (Amendment) Act, 2017 remains the most substantive legal protection available to women. The 2017 amendment extended paid maternity leave to 26 weeks for women with fewer than two surviving children and introduced provisions for crèche facilities in larger establishments. For women in academic research, this matters – but imperfectly. Many researchers at the postdoctoral or early career stage are employed on fellowships, project positions, or contractual appointments that fall outside the clear ambit of the Act.

Equally overlooked in current frameworks is the return to research after childbirth. Women returning from maternity leave often face disrupted laboratory work, changed collaborations, and misaligned grant timelines,

India has no central legislation on paternity leave. Central government employees receive 15 days under the Central Civil Services (Leave) Rules, 1972, but this is administrative rather than statutory, and no comparable entitlement exists for researchers funded through extramural grants. This legislative asymmetry – generous maternity protection, minimal paternity provision – is not incidental. It shapes how institutions and funding agencies think about caregiving, and it partly explains why age relaxation policies have been designed exclusively around women rather than around the act of caregiving itself.

The case for women-specific support in research funding is supported by persistent data, not assumption. The All India Survey on Higher Education (2021-22) shows that the higher education system had nearly 16 lakh faculty in 2021-22 with 57% male and 43% female. Women remain underrepresented in faculty positions across central universities and especially in science and technology institutions. The Science and Engineering Research Board (SERB) has also reported consistently lower application and success rates among women researchers.

The pattern is clear. Women who complete doctoral degrees in their mid-to-late twenties enter postdoctoral work at the same time as peak domestic responsibilities. Balancing grant cycles, publication pressure, travel, and childcare is not shared equally in academic households. Studies on dual-career faculty, including at the Tata Institute of Social Sciences, show that women typically bear a greater share of domestic work regardless of professional status. The consequences are measurable: delayed publications, gaps in grant records, and reduced international visibility. Age relaxation, in this context, is a partial remedy for a documented structural disadvantage.

What the courts have suggested

The Supreme Court of India's reasoning in *Vijay Lakshmi vs Punjab University And Others* (2003) is relevant here. Addressing preferential provisions for women in service matters, the Court drew a clear distinction between formal equality and substantive equality, which accounts for unequal outcomes.

It held that measures favouring women are constitutionally valid when they address demonstrated disadvantages. This logic applies to research grants as well: extending eligibility windows for women is not preferential treatment, but a corrective to structural disadvantage.

None of this implies that current policy is adequate. Age relaxation policies such as those under SERB address eligibility at the application stage but not the everyday conditions of research. A five-year extension to the upper age limit may allow women to apply for grants they would otherwise miss, but it does not provide childcare support during proposal writing, institutional support during maternity leave, or re-entry funding after career breaks.

There is also the question of who the policy excludes. A single father or a man caring for an ailing parent may also face significant career disruption, but the policy does not recognise him. This is not an argument to weaken protections for women, as evidence shows that caregiving burdens are not equal in Indian academia. Rather, it calls for an additional layer of support for documented caregiving responsibilities, while retaining and strengthening women-specific provisions that address the more widespread disadvantage.

What more considered policy would be

The National Education Policy 2020 gestures toward institutional flexibility and faculty wellbeing, but these commitments have not yet translated into binding research funding policy. That gap is overdue to be addressed. Funding agencies should consider no-cost grant extensions for documented caregiving periods, re-entry fellowships for women returning to research, and flexible milestone reporting for researchers with caregiving responsibilities. Several European research councils have implemented similar measures, showing that gender-neutral caregiving support, alongside gender-specific provisions, can improve equity without appearing arbitrary.

Gender-based age relaxation in Indian research grants is constitutionally grounded and empirically justified. The disadvantage it addresses is real, documented, and persistent. Removing it in the name of gender neutrality would be a policy error not supported by evidence. What is needed instead is a layered approach that retains support for women researchers while adding provisions for other caregivers. India's research institutions owe their women scholars not just formal access to grants but the structural conditions in which a sustained research career is genuinely possible. Age relaxation is a beginning. It should not be mistaken for an ending

GS Paper II:Indian Polity and Social Justice

UPSC Mains Exam Practice Question: Discuss how the Indian Constitution provides the foundation for gender-sensitive affirmative policies in academia and scientific research.**(250 Words)**

Context : India's contemporary advancements in deep-tech, space exploration, and pharmaceutical research present the image of a burgeoning scientific superpower. However, an analytical critique of India's academic architecture by legal scholar Nabeela Siddiqui reveals a stark structural contradiction: the institutional culture sustaining this scientific momentum continues to marginalize women researchers.

By failing to account for the convergence of career milestones and intensive caregiving responsibilities—particularly during mid-career stages—India's research funding ecosystem creates an unequal playing field. Addressing this requires moving beyond formal "gender neutrality" toward a framework of **substantive equality** that integrates constitutional directives, legislative reforms, and structural policy interventions.

The Constitutional Architecture for Gender-Sensitive Policy

The argument for gender-differentiated research funding and age-relaxation policies is rooted in the text and spirit of the Indian Constitution. It transforms affirmative action from an administrative favor into a judicial directive.

- **Article 15(3) (Special Provisions for Women):** This clause explicitly empowers the State to make special provisions for women and children. It acts as an enabling fountainhead for affirmative measures, ensuring that gender-conscious policies cannot be struck down under the guise of formal equality.
- **Article 16 (Equality of Opportunity in Public Employment):** Read alongside the Directive Principles of State Policy (DPSPs), Article 16 mandates the correction of historical, structural, and biological disadvantages that impede a citizen's right to an adequate means of livelihood.
- **Article 51A(e) (Fundamental Duty):** This article places a fundamental duty on citizens and institutions to renounce practices derogatory to the dignity of women. A policy ecosystem that consistently produces research cohorts with negligible female representation is not neutral; it is an unconstitutional accumulation of systemic disadvantages.

Judicial Interpretation: Formal vs. Substantive Equality

In the landmark case **Vijay Lakshmi vs. Punjab University and Others (2003)**, the Supreme Court of India drew a sharp line between formal equality (treating everyone identically regardless of baseline advantages) and **substantive equality** (altering rules to account for unequal starting points and structural barriers).

The Court affirmed that preferential provisions for women are constitutionally valid when they correct demonstrated, systemic vulnerabilities. In research funding, granting age-relaxations or exclusive eligibility windows to women is a corrective mechanism designed to achieve a fair outcome.

Empirical Realities: The Leaky Pipeline in Indian STEM

The necessity of targeted interventions is underscored by empirical trends rather than assumptions:

- **The Faculty Deficit:** The All India Survey on Higher Education (AISHE) 2021-22 highlights that while women make up 43% of total faculty across higher education, they remain heavily underrepresented in senior faculty roles, particularly within premier Science and Technology institutes and Central Universities.

- **The Mid-Career Divergence:** The "leaky pipeline" phenomenon peaks in the mid-to-late twenties and early thirties. This is the exact period when intense postdoctoral publication pressure and grant cycles intersect with biological childbirth and gendered domestic caregiving.
- **Data from SERB:** The Science and Engineering Research Board (SERB) notes a significant drop-off in application volumes and success rates among mid-career female scientists compared to their male counterparts.
- **The Double Burden:** Sociological studies, including those by the Tata Institute of Social Sciences (TISS) on dual-career academic couples, demonstrate that women bear a disproportionate share of domestic labor and childcare regardless of their professional standing. This domestic imbalance translates into measurable career impacts: delayed publications, gaps in grant histories, and reduced international networking opportunities.

Gaps in the Existing Legal and Policy Framework

1. Misalignment of the Maternity Benefit Act

The Maternity Benefit (Amendment) Act, 2017 mandates 26 weeks of paid leave and crèche facilities. However, early-career and postdoctoral researchers are frequently employed on temporary fellowships, extramural project grants, or contractual terms. These non-standard positions sit in a legal gray zone, often leaving researchers without formal statutory protections.

2. The Statutory Paternity Void

India has no central, statutory legislation governing paternity leave. Central government employees receive a brief 15 days of leave under administrative rules (CCS Leave Rules, 1972), but this entitlement rarely extends to extramural, grant-funded researchers. This legislative asymmetry institutionalizes the assumption that caregiving is solely a woman's responsibility, reinforcing uneven professional sacrifices.

3. The Re-entry and Reintegration Barrier

Existing age-relaxation policies (such as SERB's 5-year extension) are helpful but narrow. They address eligibility at the **application stage** but ignore the daily challenges of returning to a laboratory after childbirth. Women returning from maternity leave face disrupted experiments, evolved collaborations, and rigid milestone timelines with minimal systemic support.

Way Forward: A Layered, Empathetically Engineered Policy

To translate the commitments of the **National Education Policy (NEP) 2020** into binding research funding rules, India must implement a layered approach combining gender-targeted and gender-neutral caregiving frameworks.

- **Institutionalizing Caregiving Extensions:** Funding agencies should introduce automatic, **no-cost grant extensions** and flexible milestone reporting for documented periods of intensive caregiving.
- **Introducing Dedicated Re-entry Fellowships:** Establish bridge-funding and re-entry fellowships specifically designed for researchers returning from career breaks due to childbirth or caregiving. This helps them rebuild laboratory infrastructure and catch up on publication cycles.
- **Broadening Caregiving Definitions (Gender-Neutral Layers):** While maintaining robust, women-specific protections to counter widespread societal disadvantages, policies should add a gender-neutral layer. Single

fathers or male researchers caring for ailing parents should be eligible for caregiving-based age relaxations upon providing documented proof. This unties the concept of caregiving from gender alone while protecting the groups that need it most.

- **Universal Grant Inclusivity:** Amend funding guidelines to ensure that all fellowship, project-linked, and contractual researchers are explicitly covered by parental leave benefits, insulating their stipends and tenures from family-planning decisions.

Conclusion

A nation's scientific capability is structurally constrained if its funding mechanisms penalize researchers for caregiving. Transitioning Indian academia from formal access to true substantive equity requires recognizing that age relaxation is merely an entry point, not a complete solution. By anchoring research policies in constitutional directives, closing legislative gaps for contractual scholars, and accommodating the realities of caregiving, India can build a truly inclusive scientific ecosystem. Providing these conditions is not a compromise of merit, but the very prerequisite for sustainable, high-impact scientific progress.