THE HINDU
INDIA'S NATIONAL NEWSPAPER SINCE 1878

Daily News Analysis

The Hindu Important News Articles & Editorial For UPSC CSE

Thursday, 05 June, 2025

WORLD ENVIRONMENT DAY

Edition: International

Table of Contents

Page 01 **Syllabus : GS 1 : Social Issue : Population and associated issues**	**Next Census to conclude by March 2027: govt.**
Page 01 **Syllabus : GS 3 : Disaster Management : Crowd management**	**11 die in stampede at RCB victory celebration**
Page 03 **Syllabus : GS 2 : Social Justice : Welfare Schemes for Vulnerable Sections & Management of Social Sector/Health Services**	**Govt. to bring new national policy on senior citizens**
Page 08 **Syllabus : GS 2 and 3 : Social Justice and Environment& Ecology**	**Aiming for an era of 'biohappiness' in India**
Page 10 **Syllabus : GS 3 : Environment& Ecology**	**Has the environmental crisis in India exacerbated?**
Page 08 : Editorial Analysis: **Syllabus :GS 2 and 3 : Social Justice and Environment & Ecology**	**Exposomics for better environmental health**

WORLD ENVIRONMENT DAY 2025

KEY FACTS

- **Date:** June 5 (Every Year)
- **Initiated by:** UN General Assembly (Post-1972 Stockholm Conference)
- **First Observed:** 1973
- **Celebrated in:** 150+ countries
- **Host Country 2025**: South Korea
- **Main Venue:**Jeju Province

THEME 2025

- "Putting an End to Plastic Pollution"
- Campaign: UNEP's #BeatPlasticPollution
- **Focus Areas:**
  - Circular economy & eco-alternatives
  - Global cooperation to manage waste
  - Policy reforms + Public engagement

SIGNIFICANCE

- World's Largest Environmental Awareness Platform
- **Stakeholders:**
  - Governments
  - Schools
  - Citizens & NGOs
- **Critical Issues Highlighted:**
  - Pollution
  - Biodiversity Loss
  - Climate Change

PLASTIC POLLUTION: GLOBAL CRISIS

- 11 million tonnes→ water bodies annually
- Microplastics→ soil, marine life, food chain
- Economic Damage: $300–600 billion/year

INDIA & PLASTIC POLLUTION

- Total Waste: 9.3–9.5 million tonnes/year
- Per Capita: ~0.12 kg/day
- Urban Issues:
  - Drain Blockage
  - 5.8 million tonnes burnt - air pollution
  - Poor waste management (Delhi, Mumbai, Bengaluru)
  - 7500+ km coastline - marine ecosystem threat

INDIA – WAY FORWARD

- Stricter Plastic Ban Enforcement
- Improved Waste Segregation & Recycling
- Public Awareness & Environmental Education
- Promote Eco-Friendly Alternatives
- Enforce Extended Producer Responsibility (EPR)
- Community-Led Clean-up & Circular Economy Models

Page 01:GS 1 : Social Issue : Population and associated issues

After a historic 16-year gap, the Government of India has announced the completion of the next Census by March 1, 2027. This will be India's first-ever digital Census and the first post-independence Census to include caste enumeration, marking a transformative step in demographic data collection.

Next Census to conclude by March 2027: govt.

- The Census after an unprecedented 16-year gap will be the country's first digital Census
- This Census will also be the first in Independent India to include an enumeration of castes as well
- The dates of the two phases will be 'published in the official gazette tentatively on June 16

Vijaita Singh
NEW DELHI

India will count its population by March 1, 2027, in a Census to be held after an unprecedented 16-year gap, the Union Ministry of Home Affairs announced on Wednesday. This will be the country's first digital Census, and the first in Independent India to include an enumeration of castes as well.

The Census will be conducted in two phases by February 28, 2027 and the data will have a reference date of 12 a.m. on March 1, 2027. For the Union Territory of Ladakh and the non-synchronous snow-bound areas of the Union Territory of Jammu and Kashmir and the States of Himachal Pradesh and Uttarakhand, the reference date for the population count will be 12 a.m. on October 1, 2026. However, the government has not yet notified the date of commencement of the exercise. The notification of the Centre's intention to conduct the Census, and the dates of the two phases will be "published in the official gazette tentatively on June 16 as per provisions of section 3 of the Census Act 1948," according to the press release.

The Constitution mandates that the first Census after 2026 can be used as the basis to redraw Lok Sabha constituencies which are currently drawn on the basis of 1971 Census data.

Two-phase process

The next general election is expected to be held in 2029.

The last Census was held in 2011 and the subsequent exercise scheduled to take place in 2021 was delayed indefinitely, initially due to the COVID-19 pandemic. On April 30, the Union Cabinet had decided to include caste enumeration as part of the next Census exercise.

India's Census is conducted under the provisions of the Census Act, 1948 and the Census Rules, 1990, and will be completed in two phases: first, the house listing and housing schedule; and then, the population enumeration. Both phases usually span a period of 11 months from April 1 to February 28 the following year. This time around, caste will be enumerated in the second phase.

The 24 lakh enumeration blocks that were finalised for the planned 2021 census are likely to be used for the 2027 exercise. Around 30 lakh enumerators, including a sizeable number of government school teachers, will be trained afresh on the mobile application that has been readied for the exercise.

NPR updation

"A significant addition to the training manual would be the enumeration of caste. Another drop box to record the castes is likely to be added next to the Scheduled Caste (SC) and Scheduled Tribe (ST) tables, the only two categories counted so far," a senior government official said.

There was no announcement on updating the National Population Register (NPR), which already has a database of 119 crore residents.

The population register was to be updated during the first phase of the planned 2021 census.

Citizens may also get an opportunity to "self-enumerate" as the Office of the Registrar General of India, which conducts the census, had developed a self-enumeration portal in English for the planned 2021 census. This option, however, will only be available to those households that have updated the NPR online.

According to the Citizenship Rules 2003, the NPR is the first step towards compilation of a National Register of Indian Citizens (NRIC/NRC).

The census will impact the next delimitation of Lok Sabha and State Assembly seats and the proposed 33% reservation for women in Parliament and Assemblies.

To be counted

India will be counting its people after a gap of 16 years in the first digital Census which will also include caste enumeration

Crucial numbers: An enumerator at a household in Hyderabad during the 2011 Census. FILE PHOTO

October 1, 2026: Reference date for Union Territory of Ladakh and the non-synchronous snow-bound areas of the U.T. of Jammu and Kashmir and States of Himachal Pradesh and Uttarakhand

March 1, 2027: Reference date set for remaining parts of the country

Around **24 lakh** enumeration blocks (EB) finalised for the 2011 Census are likely to be used for the 2027 Census. Each EB usually comprises 150-180 houses or 650-800 people

No reason for another delay of 23 months: Cong.

NEW DELHI

Hours after the Union government announced the schedule for the Census exercise, the Congress on Wednesday said there was no reason to delay the exercise for another 23 months and slammed the Narendra Modi-led government for not meeting "deadlines". » PAGE 5

Key Highlights

- **Two-phase Census:** The enumeration will occur in two phases—House Listing and Housing Schedule, followed by Population Enumeration.
- **Reference Dates:**
  - March 1, 2027 (most of India)
  - October 1, 2026 (for snow-bound areas like Ladakh, J&K, Himachal, Uttarakhand)
- **Digital and Self-enumeration:** A mobile app and online self-enumeration facility will be introduced.
- **Caste Data Collection:** For the first time since independence, caste data (beyond SC/ST) will be collected.
- **NPR Update:** No formal announcement yet regarding the National Population Register (NPR) update.

- **Impact:** The data will be crucial for delimitation of Lok Sabha and State Assembly seats, and for implementing 33% women's reservation in legislatures.

Significance of the 2027 Census

- **Historical Gap Closure:**
  - The 2021 Census was delayed due to COVID-19.
  - A 16-year gap in population data affects planning and development outcomes.
- **Digital Transformation:**
  - Introduction of mobile-based data collection and a self-enumeration portal marks a shift towards transparency and efficiency.
  - Reduces manual errors and enables faster processing of data.
- **Caste Enumeration:**
  - For the first time, detailed caste-based data will help design targeted welfare schemes and improve social justice delivery.
  - It reflects a response to long-standing demands from several states and communities.
- **Delimitation and Political Reconfiguration:**
  - As per Constitutional mandate, the next Census post-2026 will be used for delimitation of constituencies.
  - Could significantly alter the political representation balance, especially between northern and southern states.
- **Women's Reservation:**
  - The Women's Reservation Bill (2023) requires fresh delimitation based on the first Census post-enactment.
  - Hence, this Census directly affects the implementation timeline of the 33% quota for women in Parliament and Assemblies.

Challenges Ahead

- **Training & Implementation:**30 lakh enumerators need to be trained in digital tools and new caste enumeration guidelines.
- **Data Privacy and Integrity:**Safeguarding the digital data infrastructure against leaks or misuse is essential.
- **Caste Sensitivities:**Enumeration of caste identities could stir political and social tensions.
- **Overlap with NPR/NRIC:**Public apprehension regarding potential linkages to National Register of Citizens (NRC) persists, especially in vulnerable regions.

Conclusion

- The upcoming 2027 Census is not merely a demographic exercise but a foundational pillar for future governance, political restructuring, and affirmative action implementation in India. While it promises more granular and inclusive data, the government must ensure transparency, inclusivity, and data security throughout the process to uphold public trust.

UPSC Mains Practice Question

Ques : India is set to conduct its first digital and caste-inclusive Census by 2027, after a gap of 16 years. Critically examine the potential benefits and challenges of this exercise, especially in the context of electoral delimitation and social justice policies. **(250 words)**

Tirumal Classes Quality education

Page 01:GS 3 : Disaster Management : Crowd management

On a day that was meant to mark Royal Challengers Bengaluru's first IPL victory, celebrations in Bengaluru took a tragic turn. A stampede outside the M. Chinnaswamy Stadium led to the death of 11 people (all under 40) and left 47 injured. The incident raises serious questions about urban crowd management, event coordination, and disaster preparedness in India's metropolitan spaces.

Tirumal Classes Quality education

Rush hour: Fans in a jam as they gather to celebrate the Royal Challengers Bengaluru's IPL victory at the Vidhana Soudha in Bengaluru on Wednesday. SUDHAKARA JAIN

11 die in stampede at RCB victory celebration

The Hindu Bureau
BENGALURU

What began as a day of rapturous celebration over the IPL victory of Royal Challengers Bengaluru (RCB) in Bengaluru on Wednesday turned into one of crushing tragedy when 11 people – all aged below 40 – were killed and 47 injured after a massive build-up of fans at the M. Chinnaswamy Stadium led to a stampede.

Karnataka Chief Minister Siddaramaiah announced a magisterial inquiry into the incident that drew sharp criticism from the Opposition over failed crowd management. He said over two lakh people had gathered at the stadium which had a capacity of 32,000. The tragedy unfolded near the gates of the stadium, where thousands of fans had gathered to mark RCB's historic first title win in 18 years. Doctors attributed all the deaths to asphyxia from lack of oxygen after overcrowding and narrow passageways led to a deadly rush.

While six deaths have been confirmed at the State-run Bowring and Lady Curzon Hospital and Research Institute in Shivajinagar, four persons, including a woman corporate professional, were brought dead to the Vydehi Superspeciality Hospital on Mallya Road. One death was reported at Manipal Hospital, Millers' Road.

A sea of loyal RCB fans had begun converging at the stadium since afternoon, hoping to catch a glimpse of their favourite players with the much-coveted trophy as part of the anticipated open-bus victory parade from Vidhana Soudha to Chinnaswamy Stadium.

A victory parade announced by the RCB team, though the police claimed to have not allowed it, had led to lakhs congregating all around the stadium.

A stampede occurred at the gates of the stadium when they demanded to be let in even as the stadium was full.

Police were outnumbered as the frenzied fans fell over each other to gain entry and jumped over barricades. Even as chaos and tragedy unfolded outside, the event inside the stadium was scaled down and wrapped up in a hurry. The felicitation event prior to this, at Vidhana Soudha, attended by the Chief Minister, Deputy Chief Minister D.K. Shivakumar and Governor Thaawarchand Gehlot, was also hurriedly concluded.

18 injured

Bowring Hospital Dean-cum-Director Manoj Kumar H.V. said five, including a 13-year-old girl, were brought dead and a 25-year-old woman was gasping for breath and died in casualty.

Apart from the six deceased, including three women, 18 injured fans are currently being treated in the hospital. While a few of them have suffered fractures (ankle, spine and neck) and injuries in the leg and abdomen, a few have suffered head injuries. Their condition is stable as of now, according to the doctor.

Vydehi Medical Administrator Humera Sayeeda said that apart from the four deceased, 12 others who suffered injuries were under treatment at the hospital. Their condition was stable, she said.

Since late afternoon, roads in and around the stadium and the entire Central Business District (CBD) were choked and the traffic police had trouble ensuring smooth movement of vehicles.

CELEBRATION AND TRAGEDY
» PAGE 3

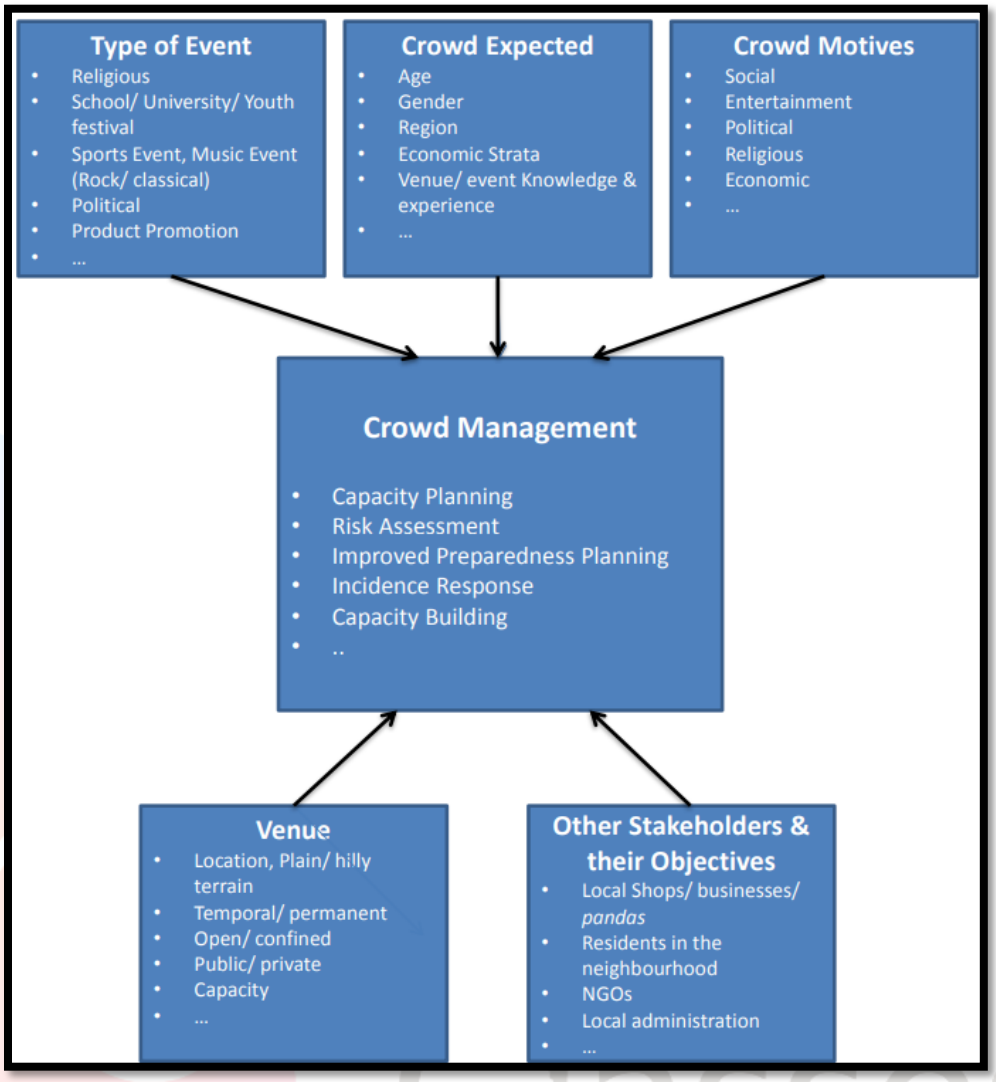
Key Issues Highlighted

- **Failure of Crowd Management:**
  - The stadium has a capacity of 32,000, yet over 2 lakh fans gathered, largely due to the anticipation of an open-bus victory parade.
  - No official coordination between RCB organisers and police was confirmed.
  - Lack of pre-emptive restriction measures or gate-wise crowd control mechanisms.

- **Stampede Trigger Factors:**
  - Overcrowding at stadium gates due to narrow passageways.
  - Demand to enter the already full stadium led to pushing and panic.
  - Police personnel were outnumbered and failed to prevent barricade breaches.
  - Miscommunication or misinformation about public access to the parade.
- **Medical Response and Casualties:**
  - Deaths attributed primarily to asphyxia.
  - At least 18 severely injured, many with fractures or head injuries.
  - Incident exposed inadequate emergency medical planning near such high-density events.
- **Administrative Response:**
  - CM Siddaramaiah has ordered a magisterial inquiry.
  - Opposition parties criticized the government for poor preparedness and mismanagement.

Broader Issues and UPSC Relevance

- **Governance & Urban Administration:**
  - Highlights lack of inter-agency coordination (police, event managers, civic bodies).
  - Reflects on urban infrastructure gaps, especially in managing spontaneous or large gatherings.
- **Disaster Management:**
  - Stampedes fall under man-made disasters in the NDMA framework.
  - Exposes the need for standard operating procedures (SOPs) for crowd control during public events.
  - Demonstrates the absence of real-time surveillance, public address systems, and early warning mechanisms.
- **Public Accountability:**
  - Raises concerns over event permits, public safety audits, and transparency in risk communication.
  - Whether organisers can be held accountable under law remains a key governance issue.
- **Ethical and Legal Aspects:**
  - State's duty to protect lives in public spaces.
  - Need for legislative reforms or new protocols to make event organizers jointly liable for public safety.



What are NDMA Guidelines to Control Stampedes?

- **Infrastructure Development:** Ensuring venues and access routes can handle large crowds, especially in disaster-prone areas like hilly terrain and narrow pathways.
- Encouraging separate routes for normal, express, and emergency flows helps manage the movement of vulnerable groups like children, the elderly, and the disabled.
- **Panic Management:** In case of incidents like rumors or sudden events (e.g., a loud noise), the NDMA advises quick intervention by trained personnel to prevent stampedes.
- **Crowd Control:** The NDMA advocates a community-based approach to crowd control, focusing on clear communication and understanding rather than relying solely on force.
- **Demand Management:** This involves analyzing historical crowd data, arrival patterns, and peak periods. Advanced ticketing or registration can help manage crowd inflow.

- **Fire Safety:** NDMA highlights precautions such as safe electrical wiring, monitoring LPG cylinder usage, and caution with fireworks to prevent fires.

National Disaster Management Authority (NDMA)

- **About:** NDMA headed by the Prime Minister of India, is the country's highest statutory body for managing disasters.
- **Establishment and Purpose:** It was established under the Disaster Management Act, 2005 to build institutional mechanisms at both the State and District levels for effective disaster management.
- **Responsibilities:** NDMA is tasked with formulating policies, plans, and guidelines for disaster management, emphasizing prevention, mitigation, preparedness, and response.
- **Vision and Goals:** The authority aims to create a safer and disaster-resilient India through a proactive approach and sustainable development strategies.

Way Forward

- **Live Crowd Tracking:** Deploy thermal and LiDAR sensors to track crowd density, feeding data into AI models to predict surges and trigger early warnings.
- **Communication Tools:** Install interactive displays showing wait times, evacuation routes, and information in multiple languages.
- **Lighting and Pathway Systems:** Implement crowd-responsive lighting that adjusts brightness and color based on density to guide movement or calm situations. Use bioluminescent pathways that glow brighter during emergencies to guide movement in low light.
- **Public Awareness and Education:** Launch campaigns to educate the public on crowd safety protocols and appropriate behavior at large gatherings.

Conclusion

- This tragedy in Bengaluru is a grim reminder that celebrations without planning can turn fatal. In a country that hosts large religious, political, and sporting gatherings, disaster risk reduction must become a core element of urban governance and public safety planning. Future events must be governed not by ad hoc arrangements but by a structured, multi-agency, technology-backed approach.

UPSC Mains GS 3 PYQ : 2020

Ques: Discuss the recent measures initiated in disaster management by the Government of India departing from the earlier reactive approach.

Tirumal Classes Quality education

Page : 04 :GS 2 : Social Justice : Welfare Schemes for Vulnerable Sections & Management of Social Sector/Health Services

The Union Ministry of Social Justice and Empowerment is drafting a new National Policy on Senior Citizens, recognizing the pressing need to address the implications of India's rapidly ageing population. With 20% of India projected to be senior citizens by 2047, the new policy aims to reflect changing demographic realities, social welfare needs, and institutional reforms.

Key Highlights

- **Demographic Shift:**
  - **According to 2011 Census:** Senior citizens = 8.23% of population.
  - **Estimated in 2026:** 12.16%.
  - **Projected for 2047:** 20% of India's population to be 60+.
- **Policy Objectives Under Discussion:**
  - Aligning policy with demographic transitions and future social needs.
  - Ensuring dignity, autonomy, care, and digital inclusion of the elderly.
  - Institutionalising the role of NGOs, associations, and civil society in shaping and implementing senior care services.

Govt. to bring new national policy on senior citizens

Population projections estimate 20% of the country will be senior citizens by 2047; discussions focus on how the draft policy should 'reflect demographic realities' as India heads into the future

Abhinay Lakshman
NEW DELHI

A new national policy on senior citizens is in the draft stages with the Union Ministry of Social Justice and Empowerment, government officials said, adding that some details of it were discussed on Wednesday at a meeting of the National Council for Senior Citizens, chaired by Social Justice Minister Virendra Kumar.

The Ministry said discussions focused on how the draft policy should "reflect the demographic realities" of India as it heads into the future.

A statement from the Ministry said population projections estimated that 20% of the country would be senior citizens by 2047.

According to the 2011 Census, senior citizens accounted for 8.23% of the nation's population at the time.

According to the government's projections, senior citizens will account for 12.16% of the country's population in 2026. GETTY IMAGES

According to the government's projections, they will account for about 12.16% of the country's population in 2026. The government on Wednesday said the forthcoming Census reference period for a headcount would be March 2027.

A government official told *The Hindu*, "The policy is in a draft stage now. Suggestions have already come in from relevant stakeholders and some of these suggestions were put forth at the meeting on Wednesday."

They added that one of the suggestions was to consider that India will have a higher proportion of senior citizens by 2047.

This was the fourth meeting of the National Council for Senior Citizens, the government said in its statement.

Digital inclusion

At the meeting, the council also deliberated on "digital inclusion" of senior citizens, the government said. It further discussed institutionalising NGOs and senior citizen associations in policy formulation, implementation, and feedback mechanisms.

Deliberations also went into establishing a grievance redress mechanism to address elder abuse and neglect; implementing minimum standards for "old age homes" and senior care institutions; and "promoting community engagement and intergenerational bonding".

The council also undertook a detailed review of the progress under the Rashtriya Vayoshri Yojana (RVY) and Integrated Programme for Senior Citizens (IPSrC), Senior Citizen Portal in terms of enhancing quality and post-distribution follow-up of assisted living devices, the statement added.

The government said that under the Rashtriya Vayoshri Yojana, more than five lakh senior citizens had been given "free assisted living devices".

Key Focus Areas:

- **Digital Inclusion:** Bridging the digital divide for elderly citizens to enhance participation and access to services.
- **Elder Abuse and Neglect:** Creating a grievance redressal mechanism and community-based monitoring.
- **Old Age Homes:** Introducing minimum standards of care and regulation.
- **Intergenerational Bonding:** Promoting social cohesion through engagement of youth and seniors.
- **Use of Technology:** Improving post-distribution services under welfare schemes like RashtriyaVayoshriYojana.

Review of Existing Schemes:

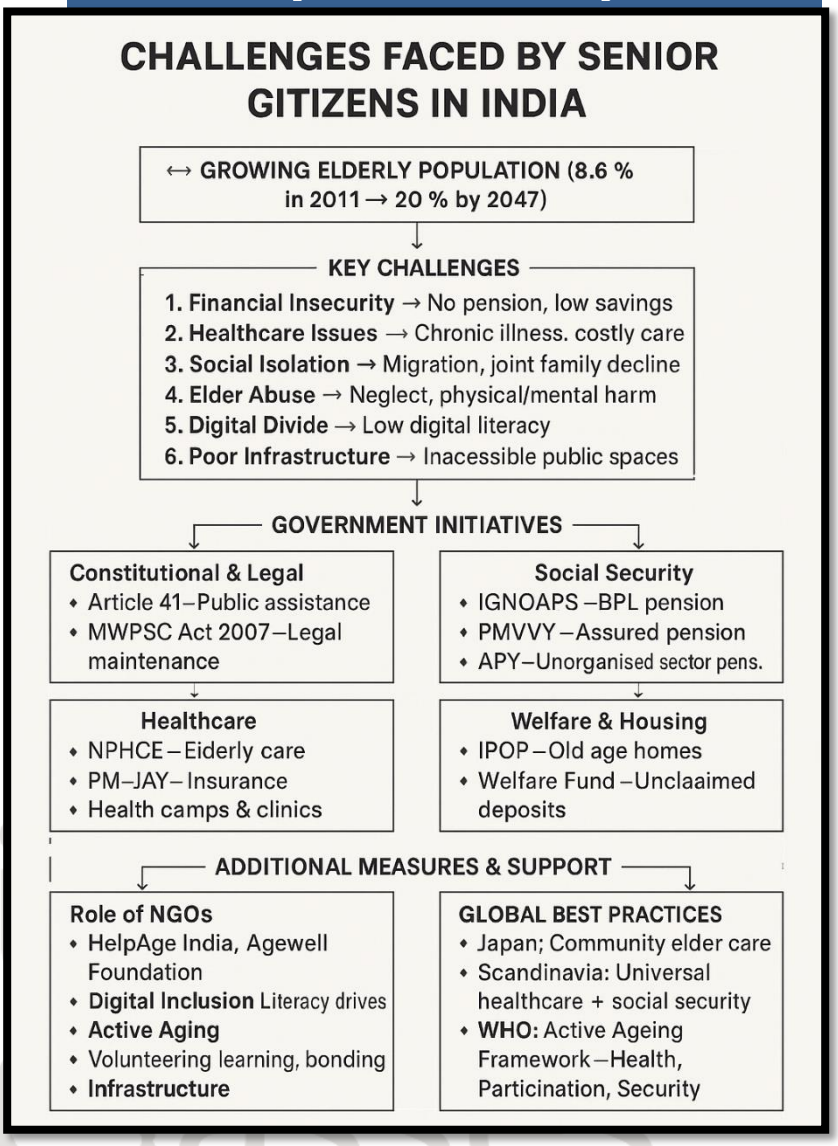
- **RashtriyaVayoshriYojana (RVY):** Over 5 lakh senior citizens have received free assisted living devices.
- **Integrated Programme for Senior Citizens (IPSrC):** Implementation quality and outreach under review.

Governance and Policy Significance

- **Need for New Policy:** The existing National Policy for Older Persons (1999) is outdated and fails to address current challenges like urban migration, loneliness, non-communicable diseases, and lack of infrastructure.

Constitutional Mandate:

- **Article 41:** Right to public assistance in old age.Directive Principles promote state responsibility for vulnerable sections.
- **Rights-based Approach:** The policy reflects a shift from charity-based to a rights-based welfare framework for the elderly, incorporating dignity, participation, and social security.



- **SDG Linkage:** Strong alignment with SDG 3 (Good Health & Well-being) and SDG 10 (Reducing Inequality).

Challenges Ahead

- **Urban-Rural Disparity:** Availability of elderly care services is urban-centric.
- **Lack of Geriatric Infrastructure:** Shortage of trained caregivers, hospitals with geriatric facilities.
- **Digital Literacy:** Inclusion remains difficult due to low digital exposure among older adults.
- **Social Isolation:** Increasing nuclear family setups have led to rising emotional vulnerability among the aged.

- **Policy Execution Gaps:** Poor monitoring of old-age homes and low awareness of schemes like RVY.

Way Forward

- Enact comprehensive elderly welfare legislation based on new policy.
- Expand community-based elder care models, including day-care centers and mobile health units.
- Institutionalize elderly representation in local governance and feedback mechanisms.
- Promote digital literacy programs tailored for the elderly.
- Ensure universal social pensions, especially for informal sector retirees.
- **A joint effort by Govt + Society = Age-friendly India**

Conclusion

- India's journey towards becoming an ageing society requires not only demographic planning but also a compassionate policy framework that ensures dignity, care, and empowerment for senior citizens. The proposed national policy, if robust and inclusive, could become a transformative social security blueprint for India's future.

UPSCMainsPractice Question

Ques:India is projected to become an ageing nation by 2047. In this context, critically examine the need for a revised national policy on senior citizens and suggest measures to ensure social inclusion, care, and dignity for the elderly.250 Words)

Page 08:GS 2 and 3 : Social Justice and Environment & Ecology

In an era of climate vulnerability and nutrition crises, Dr.SoumyaSwaminathan advocates for a shift toward "Biohappiness", a concept rooted in biodiversity conservation, agricultural sustainability, and nutrition security, originally envisioned by Prof. M.S. Swaminathan. The article emphasizes reviving neglected and underutilized species (NUS), promoting agrobiodiversity, and mainstreaming traditional ecological knowledge for a resilient future.

Aiming for an era of 'biohappiness' in India

Dr. Soumya Swaminathan

is Chairperson of the M.S. Swaminathan Research Foundation

Dr. E.D. Israel Oliver King

is Director, Biodiversity, M.S. Swaminathan Research Foundation

Recently, on a trip to Arunachal Pradesh, we were amazed by the diversity of greens in the diet – all freshly plucked from the forest and fields. Similarly, across rural and tribal areas of our country, one can find many varieties of millets, beans, legumes, tubers, wild fruits and green leafy vegetables, which the urban Indian is hardly aware of. The Nyishi and Apatani tribal communities in the State are knowledgeable about the nutritional and medicinal properties of many of these local plants.

A senior government official however warned of the rapid rate at which agrobiodiversity was disappearing in northeast India, mirroring the global rise in the rate of species extinction. Traditional knowledge about the medicinal and nutritional properties of these foods, as well as the culinary practices of tribal communities are probably going extinct at the same pace.

India's biodiversity

India covers about 2% of global land area, but harbours nearly 8% of global biodiversity. It is ranked as one of 17 'megadiverse' countries of the world; contains sections of four of the 36 global biodiversity 'hotspots;' and is one of just eight centres of global food-crop diversity. Natural services from India's diverse forests are valued at over ₹130 trillion a year, and local ecosystem services sustain livelihoods of a vast majority of the rural population.

However, continuous decline in our natural assets reduces India's GDP and hinders sustainable development. Yet, biodiversity and its potential to increase human well-being remain largely unexplored.

Global food systems are dominated by three crops – rice, wheat, and maize – which provide over 50% of the world's plant-based calories. This concentration and loss of biodiversity comes at a heavy price, causing nutritional imbalances, and vulnerability to climate shocks.

Sustainable use of natural resources — which includes bringing forgotten foods back to the table — will lead to better well-being

Non-communicable diseases such as diabetes and obesity are rising globally, and despite technological advances in agriculture that have enabled unprecedented gains in productivity, the benefits have not been equitably distributed, as the resilience of our food systems comes under threat.

For long we have ignored locally grown crops such as small millets, buckwheat, amaranth, jackfruit, yams and tubers, and indigenous legumes that remain classified as Neglected and Underutilized Species (NUS) in favour of popular commercial crops. The NUS, also known as orphan crops, are now being referred to as opportunity crops because they are nutritionally dense, climate-resilient, and adapted to local environments.

Crops and communities

Orphan (or Opportunity) crops have always been embedded in local culinary traditions, often linked with cultural identity and ecological knowledge. The community of Kolli hills (Eastern Ghats of Tamil Nadu) preferred growing locally adapted millets. Over three decades, farmers have moved to cultivating cash crops such as cassava, coffee, and pepper, resulting in a decline of agrobiodiversity. The M.S Swaminathan Research Foundation (MSSRF) has been working with agricultural communities here for over 20 years, to prevent the erosion of millet crop diversity in the region through participatory research and empowering farmers' groups. These interventions have enabled a community of farmers, especially women, to document traditional knowledge and best practices, while improving the vitality of the soil, diversifying crop production, improving local processing and value addition, leading to increasing income.

India's action plan under the UN-declared International Year of Millets and Shree Anna Yojana was focused on strategies to enhance production and productivity, consumption, export, strengthening value chains, branding, creating awareness for health benefits and more. Many States have their own Millet Missions. In the Koraput district of Odisha, we have worked closely with the Odisha Millet Mission in supporting community-led millet revival from seed to consumption. While the focus nationally has been on ragi, jowar and bajra, the next step should be to expand the State missions to cover a variety of minor millets and to include them in the Public Distribution System.

More than five decades ago, Professor M.S. Swaminathan envisioned an Evergreen Revolution – that is rooted not in chemical intensification but in restoring ecological balance and nutrition security. The future of food is diverse and nutritious. To bring these forgotten foods back to the table is also to put our cultural identity and ecological knowledge at the forefront of the climate crisis – for people, planet, and its posterity.

WORLD ENVIRONMENT DAY 2025

An interdisciplinary science

Today, a new biodiversity science is emerging across the globe, which India can leverage, given its human resources and scientific infrastructure. Furthermore, this interdisciplinary science will help us meet our most pressing challenges in sustainable use of India's unique biodiversity, for agriculture and food production, health and nutrition, climate change and disaster risk management, bio-economy, and providing a variety of jobs to meet the needs of 1.4 billion people.

India could become a global leader in conservation and sustainable use of natural resources leading to better health and human well-being. Could we aim for an era of "Biohappiness", as presciently envisioned by M.S. Swaminathan?

Key Themes and Issues

- **India's Biodiversity Strength:**
  - India holds 8% of global biodiversity, ranks among the 17 mega-diverse nations, and contains four global biodiversity hotspots.
  - Yet, agrobiodiversity is declining due to monoculture practices and market-led crop choices.
- **Food System Vulnerabilities:**

- Global dependence on three crops (rice, wheat, maize) has led to nutritional imbalance, loss of resilience, and higher NCDs (e.g., diabetes, obesity).
- Ignoring indigenous crops undermines climate adaptability and local food sovereignty.

- **Reviving Orphan Crops:**
  - Crops like small millets, legumes, jackfruit, yams, etc., are termed Neglected and Underutilized Species (NUS) or "opportunity crops."
  - These are nutrient-rich, climate-resilient, and tied to traditional food cultures.
- **Community-Centric Conservation:**
  - Examples like Kolli Hills (TN) and Koraput (Odisha) show how farmers, especially women, are reviving millets through participatory research, value addition, and local markets.
  - The M.S. Swaminathan Research Foundation (MSSRF) supports such community-led biodiversity preservation.
- **Government Interventions:**
  - India celebrated the International Year of Millets, launched the Shree Anna Yojana, and various State Millet Missions.
  - Focus so far has been on ragi, jowar, and bajra; the next step should involve minor millets and their integration into PDS and value chains.
- **The Concept of 'Biohappiness':**
  - Coined by Prof.Swaminathan, "biohappiness" refers to human well-being derived from biodiversity, achieved through ecological balance, diversified diets, and rural employment.
  - Emphasizes a new interdisciplinary science involving agriculture, health, climate, and economy.

Policy and Governance Relevance

- **SDG Linkages:**
  - SDG 2 – Zero Hunger
  - SDG 3 – Good Health & Well-being
  - SDG 12 – Sustainable Consumption and Production
  - SDG 15 – Life on Land
- **Food and Nutrition Security:**
  - Essential for tackling hidden hunger and malnutrition.
  - Diversified crops can restore dietary diversity and improve health outcomes.
- **Climate Change Adaptation:**
  - Indigenous crops are better suited to local agro-ecological conditions, helping reduce carbon footprint and build climate-resilient agriculture.
- **Women's Empowerment:**
  - Biodiversity-based farming enhances women's agency in agricultural planning, seed saving, and community leadership.

Challenges Ahead

- Market Access & Branding for NUS crops remains weak.
- Policy inertia towards high-yield, input-intensive farming models.
- Lack of awareness in urban and institutional consumption spaces (schools, canteens).
- Research Gaps in scientific validation of traditional knowledge.

Way Forward

- Mainstream biodiversity into national agriculture policy and climate action plans.
- Expand millet and NUS promotion to urban diets, hospital nutrition, and PDS.
- Fund interdisciplinary research that links biodiversity, nutrition, and local economies.
- Build community seed banks, value chains, and digital platforms to support farmer livelihoods.
- Promote agroecological education and culinary revival of traditional foods.

Conclusion

- India stands at a unique crossroads where it can combine ancient wisdom with modern science to lead a bio-culturally rich and nutritionally secure future. Embracing the vision of biohappiness, India can be a global pioneer in sustainable agriculture, climate resilience, and health equity, rooted in biodiversity and community wisdom.

UPSC Mains Practice Question

Ques: Agrobiodiversity plays a crucial role in ensuring nutrition security, climate resilience, and sustainable livelihoods. In light of this, discuss India's potential to promote 'Biohappiness' through conservation and mainstreaming of neglected and underutilized species. **(250 words)**

Tirumal Classes
Geetha Hospital, Street No:5, Chaitanyapuri Main Rd, above Dmart Pick-up Point,
opp. to Genius Grammar School, Chaitanyapuri, Hyderabad, Telangana 500060
Contact:- 082477 38641 Website:- www.tirumalclassesiasinstitute.com

As World Environment Day is observed, it is imperative to critically examine how environmental conditions have evolved in India over the last decade. Despite awareness and international efforts, the environmental crisis has worsened, driven by carbon emissions, biodiversity loss, and persistent pollution.

Has the environmental crisis in India exacerbated?

What are the major factors which contribute to the current environmental crisis?

Tikender Singh Panwar

The story so far:

As we observe June 5 as World Environment Day, one takes stock of how the previous decade has exacerbated/mitigated existing environmental crises.

What are main environmental crises?

The world is grappling with three deeply intertwined planetary crises: carbon emissions, biodiversity loss , and pollution. Over the last 10 years, these crises have deepened, despite growing awareness and international efforts.

Between 2015 and 2024, global CO_2 emissions rose from around 34.1 billion metric tonnes to 37.4 billion metric tonnes, a nearly 10% increase. In the same period, India's emissions surged from 2.33 billion to 3.12 billion metric tonnes, persistent dependence on coal and oil. On the biodiversity front, mass extinctions and ecological disruptions are becoming the norm. India, with its mega-diverse ecosystems, faces growing threats from deforestation, wetland degradation, and monoculture agriculture. Meanwhile, pollution, particularly air pollution, has remained stubbornly high. India consistently ranks among the world's most polluted countries, with Delhi topping global lists.

What are the root causes?

There are myriad causative factors. First is fossil fuel dependency. Most global carbon emissions are driven by coal, oil, and gas consumption in power generation, transportation, and heavy industry. In India, coal still accounts for nearly 70% of electricity generation. Second, we have deforestation and land-use change. In India, forest clearances for roads, mining, and dams have increased, especially in biodiversity-rich regions like the Western Ghats and the northeast. Third, agricultural intensification. High-input monocultures, especially driven by agribusinesses, destroy habitats and pollute water bodies with nitrates, pesticides, and plastics. Waste mismanagement and unchecked urbanisation is also a major factor causing environmental degradation. Unregulated landfills, untreated sewage, and industrial effluents have polluted rivers like the Ganga and Yamuna. India generates 62 million tonnes of waste annually, of which barely 20% is scientifically processed. And finally, overconsumption and industrialisation. The Global North's high consumption and global supply chains externalise pollution and ecological damage to the Global South.

How is India positioned?

As a developing economy, India has a smaller per capita carbon footprint (~1.9 tonnes/year vs. the U.S.'s 14.7 tonnes), yet its aggregate emissions are rising due to rapid industrialisation and urbanisation. The poor bear the brunt of pollution and climate shocks – whether in Delhi's smog-choked slums or drought-stricken villages in Maharashtra. Yet India is also a victim of the environmental damage caused by global forces. Climate change, largely driven by the historical emissions of richer nations, has intensified India's monsoons, floods, and heatwaves, while biodiversity loss has weakened India's food systems and health infrastructure.

What needs to be done?

A meaningful response must include accountability from nations of the Global North. Wealthy nations must drastically cut emissions, provide climate finance, and stop outsourcing dirty industries. Large polluting corporations must also be held accountable through strict laws and carbon taxation. Moreover, the future of development must be based on ecological concerns. For example, corporations that do not adhere to the 'green policy' should not be allowed to trade in the market. Creating such protocols will pave way for systemic changes. Sustainable development should be encouraged with a shift toward low-carbon livelihoods, ecological agriculture, and community-led conservation.

Tikender Singh Panwar is former deputy mayor of Shimla, and member of the Kerala Urban Commission.

THE GIST

- The world is grappling with three deeply intertwined planetary crises: carbon emissions, biodiversity loss , and pollution.
- As a developing economy, India has a smaller per capita carbon footprint (~1.9 tonnes/year vs. the U.S.'s 14.7 tonnes), yet its aggregate emissions are rising due to rapid industrialisation and urbanisation.
- A meaningful response must include accountability from nations of the Global North.

Current Environmental Crises

- India's environmental crisis can be broadly categorized into three interconnected crises:
- **Climate Change (Carbon Emissions):**
  - India's CO_2 emissions rose from 2.33 billion tonnes (2015) to 3.12 billion tonnes (2024).
  - Continued reliance on coal for ~70% of electricity is a major driver.
- **Biodiversity Loss:**
  - Deforestation, habitat loss, and monoculture-based agriculture are leading to mass extinctions and ecological instability.
  - Critical zones like Western Ghats and the Northeast are most affected.
- **Pollution:**
  - India is home to some of the world's most polluted cities.
  - Rivers like Ganga and Yamuna are polluted by untreated sewage and industrial effluents.
  - 62 million tonnes of waste are generated annually; only 20% is scientifically treated.

Root Causes of the Crisis

- **Fossil Fuel Dependency:**

  - Coal, oil, and gas dominate power and industrial sectors.
  - Transport and heavy industries remain carbon-intensive.
- **Deforestation and Land-Use Change:**
  - Infrastructure projects (dams, roads, mining) lead to ecological destruction.
  - Forest clearance continues unchecked in ecologically sensitive areas.
- **Unsustainable Agriculture:**
  - Monocultures encouraged by agribusinesses degrade soil and water.
  - Excessive pesticide and fertilizer use impacts both ecosystems and human health.
- **Waste Mismanagement and Urbanisation:**
  - Rapid urban expansion lacks parallel environmental planning.
  - Municipal waste and untreated sewage are overwhelming cities.
- **Overconsumption and Global Supply Chains:**
  - Global North's high consumption leads to environmental costs being outsourced to the Global South, including India.

India's Position

- Per Capita Emissions: Low (~1.9 tonnes/year) compared to developed countries like the U.S. (~14.7 tonnes/year).
- Aggregate Impact: Rising emissions due to industrialisation and urbanisation.
- Vulnerability: The poor face the worst impacts of climate change (e.g., floods, heatwaves, droughts).
- Global Inequity: Historical emissions from the Global North continue to shape India's climate vulnerabilities.

What Needs to Be Done?

- **Global Accountability:**Developed countries must cut emissions, provide climate finance, and cease polluting outsourcing.
- **Corporate Responsibility:**Enforce green compliance through laws and carbon taxation.
  - Companies must be barred from markets if they violate ecological norms.
- **Green Development Framework:**
  - Low-carbon jobs, community-led conservation, and ecological agriculture should be core to economic planning.
  - Shift away from GDP-centric growth to bio-centric and sustainable development.

Conclusion

- India's environmental crisis is deepening, fuelled by both internal mismanagement and external global forces. The solution lies in a just ecological transition, wherein economic growth is aligned with environmental integrity and intergenerational equity. Structural reforms, global cooperation, and grassroots empowerment must collectively shape India's green future.

UPSC Mains Practice Question

Ques: The environmental crisis in India is no longer a distant threat but a lived reality. Critically examine the major drivers of this crisis and suggest measures for a sustainable ecological transition in the Indian context. **(250 words)**

Tirumal Classes Quality education

Exposomics for better environmental health

Dr. Kalpana Balakrishnan

is Dean (Research), Sri Ramachandra Institute of Higher Education and Research (SRIHER), Chennai

The focus for World Environment Day in 2025 (June 5) is on ending plastic pollution. Micro-plastics represent one of the many thousands of chemical, physical and biological hazards that lurk in the air, water and living spaces for which we have neither the sensory capabilities nor sensing technologies to measure exposure and assess health risks. Thus, reducing the environmental disease burden continues to be a daunting challenge for public health.

In India, rapid economic growth is increasing the scale and the complexity of environmental exposures and the interdependencies between the living environment and lifestyles. With India already accounting for nearly 25% of the global environmental disease burden, there is a need to develop newer paradigms for environmental management that rest on integrated health risk assessments.

These must include all environmental factors into the study of disease development. The piece-meal approaches that define our current framing on environment or health indicators are likely to exaggerate environmental health inequities and result in spiralling health costs. We must embrace new and cutting-edge scientific developments in the field of "exposomics" to gain a more complete picture of disease etiologies over the life course and develop holistic prevention strategies. Strategic investments in long-term environmental health surveillance that integrate novel environmental and biomonitoring efforts with digital health and data science platforms are critical.

Environmental disease burden

The World Health Organization (WHO) began estimating the environmental disease burden in 2000, which is the basis for the modern estimation approach being adopted in the Global Burden of Disease, Injuries, and Risk Factor (GBD) study. Each cycle of the GBD identifies risk factors with the greatest attributable health burden. In the latest cycle (2021) that included 88 risk factors, environmental and occupational (OEH) risk factors in the GBD were responsible for 18.9% (12.8 million) of global deaths and 14.4% of all disability-adjusted life years (DALYs), led by ambient $PM_{2.5}$ air pollution (4.2% DALYs, 4.7 million deaths) and household air pollution from the use of solid fuels for cooking (3.9% DALYs, 3.1 million deaths).

In India, nearly three million deaths and 100 million deaths are attributable to occupational and environmental health (OEH) risks. OEH risk factors in India are also estimated to account for more than 50% of the attributable burden for non-communicable diseases including ischemic heart disease, stroke, chronic obstructive lung disease, lung cancer, asthma and, more recently, diabetes and chronic kidney disease. Risk factors such as lead exposures can have grave developmental health impacts for children under five, with India accounting for up to 154 million or 20% of the total estimated IQ points lost globally in children under five.

What are we missing? The GBD results provide a strong and robust body of evidence to initiate actions for cleaner air, safer water and better sanitation. However, the current environmental burden of disease addresses only a limited number (around 11) of categories of environmental risk factors as there is a paucity of human exposure data. Several environmental risk factors that can contribute to significant health burdens are currently not included in the GBD. These include various chemical exposures, risks from complex mixtures such as micro-plastics and solid waste and physical hazards such as environmental noise.

More importantly, environmental risk factors interact in complex ways with metabolic (high blood pressure or high fasting plasma glucose) and behavioural risk factors (smoking and unhealthy diets) as well as underlying genetic susceptibility and upstream health determinants (such as socio-economic status) to produce a health impact within populations. Risk estimates are often derived for single risk factors; while confounding is often well adjusted in long-term cohort studies, complex mixtures and interactions over a life course have not been adequately explored.

Finally, climate change can magnify hazards posed by multiple environmental risk factors, such as heat, air pollution, vector-borne diseases, storms and flooding, and wildfires. Climate change may reduce crop yields, reduce agricultural worker productivity, disrupt food security and affect food supply chains. Depression, anxiety and other mental health outcomes, driven by both ecological concerns and direct health impacts of climate-sensitive environmental risk factors such as fine particulate matter, are also important to consider. Several of these risk factors can occur together, resulting in compound events and synergistic effects. These hazards can further amplify health impacts among populations with inadequate access to health systems or healthy food systems. Methods and data are not yet available to support inclusion of these important risk factors in the global burden of disease assessments.

Thus, the current environmental burden of disease estimates are not only a conservative underestimates but also do not provide an adequate means of prioritising against competing risk factors to develop holistic, scalable preventive health strategies.

Scientific developments in the field of exposomics will also help get a better picture of disease etiologies and craft holistic prevention strategies

The human exposome

The global human genome project (1990-2003) revolutionised our ability to explore the genetic origins of disease. However, it also revealed the limited predictive power of individual genetic variation for many common diseases. Genetic factors for example, contribute to less than half of the risk of heart disease, which is a leading source of mortality.

The success in mapping the human genome has fostered the complementary concept of the "exposome". The exposome is defined as the measure of all the exposures of an individual in a lifetime and how those exposures relate to health. Traditional environmental health studies include hypothesis-driven methods which have focused on one or a class of environmental exposures at a few time points. These fail to account for the complex interactions of exposures across the lifespan, on human health.

Exposomics aims to bridge this gap by understanding how external exposures from physical, chemical, biological and psycho-social environments interact with diet and lifestyle and internal individual characteristics such as genetics, physiology, and epigenetics to create health or disease. This would allow the generation of an atlas of exposure wide associations (EWAS) to complement genome-wide associations (GWAS) and enable discovery-based analysis of environmental influences on health. The exposome requires synchronisation of several inter-disciplinary technologies which include real time sensor based personal exposure monitoring with wearables; untargeted chemical analyses on human biomonitoring samples; testing on human-relevant micro-physiological systems (also known as organs-on-a-chip) wherein in vitro models replicate the structure and function of human organs or tissues to understand the mechanistic basis of biological response; and big data, and artificial intelligence (AI) to mine data and generate integrated pieces of evidence.

Given that capacities and resources to generate exposomics data are not widely available, an immediate need for the exposomic framework to become a reality is also the creation of a data ecosystem in which harmonised data can be found, accessed, and shared through sustained and interoperable data repositories.

Mainstream environment within health

Exposome frameworks may seem implausible or irrelevant in India where the implementation of environmental health management programmes faces numerous hurdles. But, leapfrogging to technology and data-driven approaches is not new to the health sector. Exposomics offers unprecedented potential to mainstream environmental risks within public health programmes by generating more accurate predictive models for many chronic diseases while also enabling precision medicine. Unbridled investments in capacity building and synchronising available analytical, environmental and public health infrastructure offer the promise of addressing the concerns of our populations with unprecedented cost-effectiveness. The time is ripe for the Indian environmental health community to engage and contribute to the global momentum on the science of exposomics.

Future celebrations of World Environment Day may soon focus on why the human exposome project can be the best prescription for holistic prevention efforts that preserve and promote health equity.

Paper 03:GS 2 and 3 : Social Justice and Environment & Ecology

UPSC Mains Practice Question:The rising burden of environmental diseases in India calls for a shift from traditional risk management to innovative frameworks like exposomics. Discuss the relevance and challenges of adopting exposomics in India's public health policy.(250 words)

Context :

- On World Environment Day 2025, attention has turned to plastic pollution, but the discussion also brings focus to broader, often invisible threats in our environment. A new frontier in environmental health — exposomics — is emerging as a powerful tool to address complex environmental disease burdens in India and globally.

What is the Problem?

- India is facing an escalating environmental health crisis. Despite improvements in awareness and monitoring, we still lack the tools and frameworks to comprehensively assess how long-term, multi-source environmental exposures affect human health.
- India accounts for nearly 25% of the global environmental disease burden.
- 3 million deaths and 100 million DALYs are attributed to occupational and environmental health (OEH) risks.
- **Major contributors include:**
  - Air pollution (PM2.5, household smoke)
  - Solid waste and chemical exposures (like lead, microplastics)
  - Water pollution, noise, and climate stressors
- Non-communicable diseases (e.g., heart disease, asthma, diabetes) are increasingly linked to environmental factors.

Why Current Approaches Fall Short

- The Global Burden of Disease (GBD) estimates include only around 11 environmental risk categories, excluding many major threats like:
  - Microplastics
  - Combined exposure to chemicals
  - Climate-related compounding effects
- Traditional models often treat each risk in isolation, ignoring interactions over a life course or with genetics and social determinants.
- India's data ecosystem for tracking exposures is fragmented, incomplete, and non-interoperable.

What is Exposomics?

- Exposomics is the study of the totality of environmental exposures (chemical, physical, biological, social) from conception to death, and their impact on health.
- **It integrates:**
  - Wearable tech and real-time sensors
  - Human biomonitoring and organ-on-chip simulations
  - Big data and AI for analysis and prediction
  - Gene-environment interaction mapping (similar to how GWAS map genes, EWAS map exposures)
- **It seeks to move from reactionary to preventive public health, enabling:**
  - Personalized medicine informed by environmental history
  - Better disease prediction models
  - Targeted interventions for vulnerable populations

Why It Matters for India

  - India lacks large-scale, real-time exposure monitoring and integrated environmental health surveillance.
  - Poor populations disproportionately bear exposure burden, yet lack access to mitigation and healthcare.
  - Many diseases are underestimated in burden due to incomplete exposure data.
- **However, India also has:**
  - A growing digital health infrastructure
  - Emerging AI and bioscience capacities
  - A vast burden of environmental-linked diseases, justifying the need for exposomic science

Way Forward

- Invest in infrastructure for exposomic research: sensors, labs, AI systems, human biomonitoring.
- Build a national data repository to harmonize environmental and health data.
- Integrate exposomics into public health and disease prevention policies.
- Support multidisciplinary collaborations between environment, health, tech, and data science sectors.
- Use exposomics to predict, prevent, and personalize healthcare, especially for chronic diseases.

Conclusion

- As India grapples with a rising environmental disease burden, exposomics offers a transformative solution — shifting from fragmented, delayed reactions to predictive, life-course-centered healthcare. It's time to mainstream environmental risks in health policy, making "exposure science" a core tool in India's pursuit of health equity, disease prevention, and environmental justice.

Tirumal Classes Quality education