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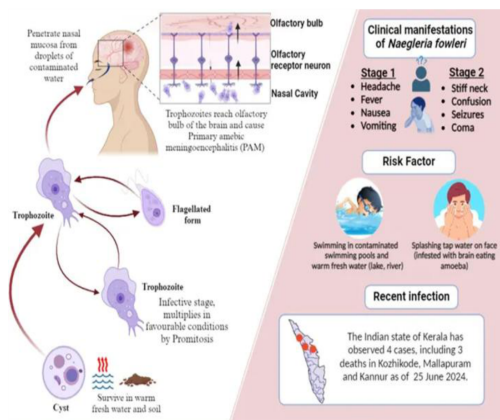
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Topics Covered

- 2 more die of brain- eating amoeba infection in Kerala
- The rise and risks of health insurance in India
- Noise pollution is rising but policy is falling silent
- What is CERBO, the brain tool developed indigenously?
- New Bairabi- Sairang rail line set to improve connectivity in Mizoram
- All of India breathes bad air, AQLI 2025 report say

2 more die of brain- eating amoeba infection in Kerala



2 more die of 'brain-eating amoeba' infection in Kerala

The toll due to amoebic meningoencephalitis in the State this year has risen to three; so far, 42 cases have been reported; the infection mainly spreads through contaminated water

The Hindu Bureau
KOZHIKODE

Two more people lost their lives to amoebic meningoencephalitis at the Government Medical College Hospital (MCH) in Kozhikode district of Kerala on Sunday.

The deceased included a three-month-old infant, who had been undergoing treatment at the hospital for nearly a month. The infant, who died is suspected to have contracted the disease from the well water used at home.

The other deceased is Ramla, 52, from Kannamangalam in Malappuram district. She started treatment on July 8. She was



Risky dip: The pond in Kozhikode where the nine-year-old girl who died by the infection is said to have taken bath. K. RAGESH

shifted to the Intensive Care Unit at the MCH. Her condition further worsened on August 26 and she died on Sunday.

The death toll due to amoebic meningoencephalitis in Kerala this year

has now risen to three. A nine-year-old girl had died due to the illness on August 14 at the MCH. Of the 13 still under treatment, eight are at MCH. So far, 42 cases have been reported. The 'brain-eating amoeba,' enters the human body through the nose from contaminated water, while bathing or swimming. The common symptoms of the infection are fever, headache, nausea and vomiting, experienced within five to 10 days of contracting it.

There are two variants of the infection, primary amoebic meningoencephalitis (PAM) and granulomatous amoebic encephalitis (GAE), the latter being the one reported in Kerala now. The mortality rate is normally 95%.

The Health Department has launched a State-wide drive to ensure the cleanliness of waterbodies through chlorination as a precautionary measure.

The rise and risks of health insurance in India

GS Paper 2

- Issues relating to development and management of Social Sector/Services relating to Health, Education, Human Resources.
- Government policies and interventions for development in various sectors and issues arising out of their design and implementation.

The rise and risks of health insurance in India

A minimal definition of universal health care (UHC) is that quality health care should be guaranteed to "all members of the community irrespective of their ability to pay" – as the Bhore Committee report put it as early as 1946. Nearly eight decades later, India is nowhere near this basic goal of human development, even as many other countries, rich and poor, have achieved it in substantial measure.

An illusion is being created today that UHC can be achieved by expanding health insurance. In the last 10 years, State-sponsored health insurance schemes have grown by leaps and bounds. The Pradhan Mantri Jan Arogya Yojana (PMJAY), launched in 2018 under Ayushman Bharat, is one landmark in this regard. Alongside PMJAY, every major State has its own State Health Insurance Programme (SHIP). Most SHIPs are modelled on PMJAY, with a maximum cover of ₹5 lakh a household a year. All these insurance schemes are restricted to in-patient care, with patients making a choice from a list of empanelled hospitals, public and private (roughly half-half). In 2023-24, PMJAY covered 58.8 crore individuals with an annual budget of about ₹12,000 crore (assuming that States contributed 40% of the total, as prescribed). Taken together, SHIPs covered a similar number and had a combined budget of at least ₹16,000 crore. The grand total of ₹28,000 crore or so is still a relatively small portion of public expenditure on health, but it is growing fast. In Gujarat, Kerala and Maharashtra, States for which relevant data are available, we found that the SHIP budget had grown at 8% to 25% a year in real terms between 2018-19 and 2023-24.

The faultlines can deepen

There is no doubt that the PMJAY and SHIPs provide some relief to poor patients when public facilities are overcrowded or substandard, by giving them wider options at reduced cost. However, these schemes are no substitute for a sound UHC framework. And they have major defects, some of which could worsen the fault lines of India's health-care system.

First, health insurance promotes for-profit medicine. About two-thirds of the PMJAY budget is spent on private, mainly profit-oriented hospitals (corresponding figures for SHIPs are not available). A recent study of PMJAY in six major States found that the scheme made little difference to hospitalisation rates, but increased the utilisation of private hospitals. As is well understood in economics, the profit motive in health care is highly problematic. If profit-seeking



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Health insurance schemes are not a sound route to universal health care

private providers are allowed at all, they must be tightly regulated. India's health-care system, however, is dominated by poorly-regulated profit seekers. Health insurance reinforces this bias rather than correcting it.

Second, health insurance also tilts the health-care system towards hospitalisation, when investments in primary and outpatient care may be more urgent. Strengthening primary care would not only ensure accessible treatment but also reduce unnecessary hospital visits and their financial burden. The ongoing induction of all elderly citizens (aged 70 years and above) in PMJAY, along with the rapid ageing of the population, involves a risk that expensive tertiary care will absorb a growing share of public health expenditure, even as many basic health services continue to fall short.

Third, there appear to be serious utilisation problems. Official figures suggest that the combined coverage of PMJAY and SHIPs is as high as 80% of the population. However, many people do not seem to know about the scheme or how to use it even if they are nominally enrolled. As a recent analysis of the 2022-23 Household Consumption Expenditure Survey shows, only 35% of insured hospital patients in that year were able to use their insurance. Other studies also report serious utilisation hurdles, especially among disadvantaged groups. Perhaps this is one reason why there is no strong evidence linking PMJAY or SHIPs with a substantial reduction in out-of-pocket health expenditure.

Hospitals and discrimination

Fourth, targeted health insurance schemes create issues of discrimination between insured and uninsured patients. Private hospitals prefer an uninsured patient since commercial charges for health care are usually higher, often much higher than the insurance reimbursement rates. One plausible reason why insurance utilisation is so low is that private hospitals discourage it in one way or another. Public hospitals, for their part, prefer insured patients since they get some money for their treatment. This creates its own problems, such as discriminatory treatment and pressure to enrol for insurance on the spot.

Fifth, health-care providers have their own complaints about health insurance, including low reimbursement rates and long delays. The first complaint may or may not be fair (one would expect to hear it), but the second is hard to dismiss. Indeed, the National Health Authority (NHA) itself revealed a few months ago that pending dues under PMJAY alone added up to ₹12,161 crore, more than the scheme's entire

annual budget. Many reports have emerged of private hospitals suspending services to patients under PMJAY or even withdrawing from the scheme, as bills remain unpaid for months. According to a recent statement of the Health Ministry, in the Lok Sabha, 609 hospitals have opted out of PMJAY since its inception.

Last but not the least, health insurance schemes are prone to corruption and abuse. The NHA recently recommended action against 3,200 hospitals for fraudulent activities under PMJAY. There are also regular media reports of irregularities from across the country. These include eligible patients being denied treatment, private providers charging insured patients, and unnecessary procedures being performed to milk the scheme. These irregularities defeat the purpose of health insurance by exposing patients to serious financial and health risks.

Tight monitoring and a battery of audits are supposed to prevent irregularities, but there is little evidence that these safeguards are effective. We were unable to find any trace of audit reports on the scheme portals. This is one symptom, among others, of a pervasive lack of transparency in health insurance.

The system is profit driven

In short, India's health insurance schemes are a very poor way of arranging health care, especially for people who find it difficult to navigate the system. They cannot make up for India's persistent failure to expand and improve public health facilities. No country has achieved UHC on this sort of foundation.

This is not to deny that social health insurance is a part of the UHC framework in some countries. Canada and Thailand are two examples. But PMJAY and SHIPs lack important features of social health insurance, such as universal coverage, and more importantly, a strong focus on non-profit health-care providers.

India's profit-driven health-care system reflects decades of severe under-investment in public health facilities – few countries beat India in this regard. According to the World Bank's latest World Development Indicators, public expenditure on health was still as low as 1.3% of GDP in India in 2022, compared with a world average of 6.6%. UHC cannot be achieved without a serious effort to address this deficit and transform health-care standards in the public sector. Some Indian States are moving in that direction, with encouraging results, but immense gaps remain. Health insurance is little more than a pain killer for a system that needs proper healing.

Key highlights of the article

Universal Health Care (UHC):

- Defined as quality healthcare for all irrespective of ability to pay (Bhore Committee, 1946).
- India still lags behind global peers in ensuring UHC.

Expansion of Health Insurance Schemes:

- **PMJAY (2018, Ayushman Bharat):** Covers 58.8 crore people; annual budget ~₹12,000 crore.
- **State Health Insurance Programmes (SHIPs):** Cover a similar number; combined budget ~₹16,000 crore.
- Total government spending on insurance ~₹28,000 crore (rising rapidly).
- Most schemes offer inpatient care up to ₹5 lakh per household/year.

Faultlines in Current Approach:

Profit-driven healthcare:

- 2/3rd of PMJAY budget goes to private hospitals.
- Encourages for-profit medicine with weak regulation.

Neglect of primary care:

- Insurance pushes hospitalisation over preventive and outpatient care.
- Risk: ageing population will raise costly tertiary care demand.

Utilisation Gaps:

- Despite ~80% coverage, only 35% of insured hospital patients could use it (2022–23 survey).
- Low awareness + procedural hurdles.

Discrimination & Provider Bias:

- Private hospitals prefer uninsured (higher fees).
- Public hospitals prefer insured (reimbursement income).

Provider Complaints & Dropouts:

- Delayed reimbursements: pending dues under PMJAY ~₹12,161 crore (higher than its annual budget).
- Over 600 hospitals opted out of PMJAY.

Fraud & Corruption Risks:

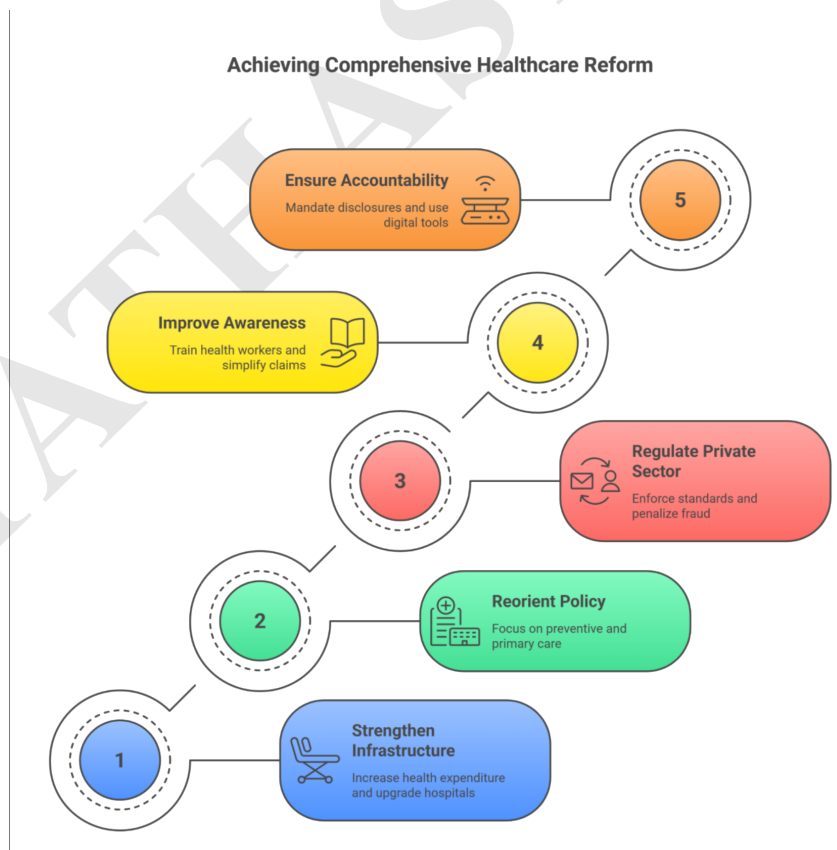
- 3,200 hospitals flagged for fraud (NHA).
- Fake billing, unnecessary procedures, denial of treatment, double charging.
- Lack of transparency: audit reports missing from scheme portals.

Underlying Structural Issue:

- India's public health spending only **1.3% of GDP (2022)** vs. world average **6.1%** (World Bank).
- Health insurance cannot substitute for underfunded and underperforming public healthcare.

Health insurance in its present form is **palliative, not curative**. True Universal Health Coverage requires **robust public investment, regulation of profit-driven healthcare, and strengthening of primary health systems**.

Way Forward



Noise pollution is rising but policy is falling silent

GS Paper II (Governance, Constitution, Polity, Social Justice)

- Fundamental Rights: Article 21 (Right to life with dignity), Article 48A (Environmental protection).
- Issues of transparency, accountability, and institutional effectiveness.

GS Paper III (Environment, Ecology, Disaster Management)

- Environmental pollution and degradation.
- Conservation of urban ecosystems and public health concerns.

Noise pollution is rising but policy is falling silent

Urban noise pollution has quietly emerged as one of the most neglected public health crises of our time. Across Indian cities, decibel levels routinely exceed permissible limits, especially near schools, hospitals and residential zones, eroding the constitutional promise of peace and dignity.

In 2011, the Central Pollution Control Board (CPCB) launched the National Ambient Noise Monitoring Network (NANMN), which was envisioned as a real-time data platform. A decade later, the network functions less as a tool for reform and more as a passive repository. Data are scattered across dashboards, but meaningful enforcement remains elusive.

The problem lies not only in flawed sensor placement (many are mounted 25 to 30 feet high, in violation of the CPCB's 2015 guidelines – but in a deeper absence of accountability. Whether biased or incomplete, the available data remains politically and administratively inert. Contrast this with Europe, where noise-induced illnesses and mortality statistics actively shape policy. The European Environment Agency recently pegged the annual economic cost of urban noise pollution at €100 billion, prompting redesigns in speed zones and zoning frameworks. India, by contrast, suffers from regulatory fragmentation and institutional silence. Right to Information queries go unanswered; State Pollution Control Boards operate in silos; and even in States such as Uttar Pradesh, first-quarter 2025 data remains unavailable to the public.

Apathy, neglect, serious questions

This is not merely environmental apathy. It borders on constitutional neglect. Article 21 guarantees the right to life with dignity, encompassing mental and environmental well-being. Article 48A mandates proactive environmental protection. When “silence zones” become epicentres of noise, it raises serious questions about state capacity and civic respect.

The Noise Pollution (Regulation and Control) Rules, 2000 offer a robust legal framework, but



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Urban India must adopt a rights-based approach to fight growing noise pollution

enforcement has remained largely symbolic. According to the World Health Organization, safe limits in silent zones are 50 dB(A) by day and 40 dB(A) by night. Yet, in cities such as Delhi and Bengaluru, readings near sensitive institutions often reach 65 dB(A)-70 dB(A).

Infrastructure expansion and logistics-driven traffic have exacerbated the crisis. Late-night drilling and crane operations continue despite regulatory restrictions. In 2024, the Supreme Court of India reaffirmed that environmental disruptions – including excessive noise – can infringe upon the fundamental right to life and dignity under Article 21. In *Noise Pollution (V)*, In Re, the Court recognised that unchecked urban noise poses a serious threat to mental well-being and civic freedom (The case dates back to 2005, and was referenced and interpreted again by the Court in 2024, in the context of renewed concerns over urban noise and its impact on fundamental rights).

The ecological cost is no less troubling. A 2025 study by the University of Auckland found that urban noise and artificial light disrupted the sleep and song patterns of common mynas after just one night. The birds sang less and with reduced complexity, impairing their social signalling. This is not merely an avian concern, it signals a breakdown in ecological communication systems. When biodiversity loses its voice, it reflects a deeper erosion of urban environmental ethics.

Civic fatigue and the politics of silence

Urban noise is not just a technical issue, it is deeply political. The absence of sustained public outrage stems from a normalisation of sonic aggression. Honking, drilling and loudspeakers have become ambient irritants, tolerated rather than challenged. This civic fatigue is compounded by the invisibility of noise as a pollutant. Unlike smog or garbage, sound leaves no residue, no visible stain – only a frayed mind and a disturbed sleep cycle. The result is a quiet erosion of public health, especially among children, the elderly, and those with pre-existing

conditions.

India's legal framework, while robust on paper, suffers from fragmented execution. The Noise Pollution Rules, 2000 are rarely updated to reflect urban realities. There is little coordination between municipal bodies, traffic police and pollution control boards. A national acoustic policy akin to the National Ambient Air Quality Standards is urgently needed. Such a framework must define permissible decibel levels across zones, mandate regular audits, and empower local grievance redress mechanisms. Without inter-agency synergy, enforcement will remain sporadic and symbolic.

Adopt a culture of ‘sonic empathy’

Ultimately, the fight against urban noise is not just regulatory, it is cultural. Cities must cultivate a shared ethic of sonic empathy. Public campaigns should move beyond slogans to immersive education, in schools, driver training programmes and community spaces. Just as seatbelt usage became a norm through sustained messaging, honking reduction and noise sensitivity can be socially internalised. Silence is not the absence of sound, but the presence of care.

Where, then, must reform begin? First, decentralise NANMN – grant local bodies access to real-time noise data and the responsibility to act.

Second, link monitoring to enforcement – without penalties, zoning compliance or construction curbs, data remains performativity.

Third, institutionalise awareness – initiatives such as “No Honking Day” must evolve into sustained behavioural campaigns.

Fourth, embed acoustic resilience in urban planning – cities must be designed not just for speed and expansion, but for sonic civility.

Silence must not be imposed and must be enabled through design, governance and democratic will. Unless India adopts a rights-based lens to urban noise, its smart cities may remain unliveable at the level of sound.

Key highlights of the article

Neglected Public Health Crisis:

- Urban noise pollution routinely exceeds permissible limits in cities, especially near schools, hospitals, and residential areas.
- Affects physical and mental health → disturbed sleep cycles, stress, cognitive impairment in children, and vulnerability in elderly.

Regulatory Framework vs. Reality:

- **Noise Pollution (Regulation and Control) Rules, 2000** exist but remain weakly enforced.
- WHO safe limits: 50 dB(A) day, 40 dB(A) night.
- Indian cities like Delhi & Bengaluru record **65– 70 dB(A)** near sensitive institutions.



Weak Institutional Response:

- **National Ambient Noise Monitoring Network (2011):** Data exists but fragmented, poorly placed sensors, little enforcement.
- State Pollution Control Boards work in silos, RTI queries unanswered.
- Lack of coordination between police, municipal bodies, and boards.

Judicial Stand:

- **Supreme Court (2024, revisiting 2005 ruling):** Excessive noise violates Article 21 → threat to dignity, well-being, civic freedom.

Global Contrast:

- **European Union:** Recognises noise-induced illness, mortality.
- Economic cost pegged at €100 billion annually; policies redesigned (speed zones, zoning laws).
- India lags due to weak policy integration and “politics of silence.”

Ecological Impacts:

- **2025 study (University of Auckland):** Noise + light pollution altered sleep and song of mynas in just one night.
- Indicates disruption of biodiversity communication systems.

Sociocultural Aspect:

- Noise normalised as “sonic aggression” — honking, drilling, loudspeakers tolerated.
- Unlike smog/garbage, noise is invisible → leads to **civic fatigue** and lack of outrage.

Policy Vacuum:

- Rules not updated; no comprehensive **National Acoustic Policy**.
- Absence of inter-agency synergy & proactive grievance redressal.

Way Forward**Strengthen Enforcement & Coordination:**

- Update Noise Rules (2000) to reflect urban realities.
- Ensure cooperation between municipal bodies, traffic police, and pollution control boards.

Decentralised Real-time Monitoring:

- Empower local governments with NANMN data and enforcement authority.
- Mandate transparent public dashboards.

National Acoustic Policy:

- Frame standards like National Ambient Air Quality Standards.
- Define zone-wise decibel limits, mandatory audits, and penalties.

Urban Planning for Acoustic Resilience:

- Integrate soundproofing, green buffers, and zoning reforms.
- Restrict construction/drilling at night; redesign speed limits.

Cultural Shift towards ‘Sonic Empathy’:

- Public campaigns, driver training, school awareness.
- Institutionalise “No Honking Days” into sustained behavioural programs.

Rethinking carbon pricing and taxes**GS Paper 3 – Economy & Environment**

- International Trade & Free Trade Agreements (FTAs)
- Climate Change & Carbon Pricing Mechanisms
- WTO, UNFCCC & Paris Agreement issues

Rethinking carbon pricing and taxes

India's free trade agreement (FTA) with the U.K., heralded as the gold standard by the Minister for Commerce and Industry, Piyush Goyal, has a lot going for it. Yet, it does not address the one imminent policy instrument that is likely to significantly upend its possible benefits for India.

The U.K.'s Carbon Border Adjustment Mechanism (UK-CBAM), similar in principle to the European Union (EU)'s CBAM, will be implemented from January 2027. It covers both direct and indirect emissions for hard-to-abate sectors such as steel and aluminum, including the electricity used in their production. CBAM's scope will later be expanded to other products.

Mr. Goyal noted that India would retaliate against any harmful impacts of CBAM. However, any prospective action may not provide the desired relief for the imminent cost impact. This is an issue that needs to be addressed upfront in a bilateral agreement. For instance, in the recently announced U.S.-EU trade agreement, the EU has agreed to address U.S. concerns on CBAM and other rules relating to corporate sustainability, through flexibilities.

CBAM effect on India's exports

Before the FTA, the U.K.'s MFN rates for aluminium and iron and steel were in the range of 0-6%. Under the India-U.K. FTA, these duties will be reduced to zero for Indian exports. At first glance, this appears beneficial for India. But from January 2027, aluminium and steel imports will need to match the U.K.'s carbon price, which, as of now, is approximately \$66/tCO₂, translating to a cost increase of at least 20% to 40% for exporters.

The U.K.'s CBAM permits deductions for carbon pricing in exporting countries, including carbon taxes or prices paid under emissions trading schemes. While Indian industry pays levies such as coal cess, bears costs under the



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renewable purchase obligation, and now an explicit carbon price under the recently announced Carbon Credit Trading Scheme (CCTS), it is unclear whether the U.K. will allow deductions beyond the CCTS. Even with respect to the CCTS, a major challenge is the large gap between India's projected carbon price, estimated by the Bureau of Energy Efficiency at around \$8-10 per tonne of CO₂, and the U.K.'s carbon price, currently at \$66 per tonne.

As with the EU's CBAM, the U.K.'s approach is focused on levying a charge on exports into the U.K. to match the embedded carbon price paid by domestic producers. By levying the same price as paid by U.K. producers in specific sectors where the U.K. perceives a competitive disadvantage, the unilateral setting of carbon price upends multilateral commitments on emission reductions under the United Nations Framework Convention on Climate Change and the Paris Agreement.

There can never be a singular carbon price across economies as emissions vary across countries based on energy mix, industry structure, and technological availability and viability. A joint report by multilateral institutions in October 2024 urged greater coordination on carbon markets, warning that fragmented systems cause distortions, leakage, and undermine net-zero goals.

Fragmented markets will only raise compliance costs, disrupt supply chains, and hinder both growth and climate goals. A global carbon pricing agreement is essential to align methods for measuring emissions, streamline reporting requirements, and ensure support for green tech transfer. The International Monetary Fund in 2021 proposed an International Carbon Price Floor (ICPF) with tiered pricing: \$25 for low-income, \$50 for middle-income, and \$75 for high-income countries. Building on this, the World Economic Forum proposed a three-phased

approach to facilitate a smooth transition to global carbon pricing, starting with minimum standards for pricing and reporting, and linking this to regional systems and harmonising monitoring and verification processes. It also proposed linking regional carbon markets (EU, China, India, other parts of Asia) to reduce fragmentation and move towards a unified global system.

It is important for the Indian government to assess whether this model would work and explore synergies with like-minded developing countries. In an era of rising tariff and non-tariff barriers, we cannot risk fragmented carbon pricing turning into massive compliance costs.

National action

Amidst rising protectionism global consensus is unlikely in the short term. Hence Indian industry must view clean technologies as tools for efficiency and competitiveness, and not just as export compliance. The government needs to act as an enabler by streamlining various implicit carbon taxes into a unified carbon market framework. Implementing stricter emission reduction targets under a single explicit carbon tax through the CCTS, instead of multiple taxes on carbon-intensive sectors, will improve carbon price discovery, simplify compliance and monitoring, and preserve our competitiveness. It would position India to build a stronger carbon pricing system, capable of joining a cohesive global carbon market in the future. Revenues from these carbon taxes should be ploughed back for industrial decarbonisation. The draft climate finance taxonomy developed by the Ministry of Finance, is another initiative that will enable investors to boost clean tech investment.

In a world where multilateral rules are being undermined, and bilateral free trade deals are failing to secure equity, proactive action between government and industry within the country is the only answer.

Key highlights of the article

- India-UK Free Trade Agreement (FTA) reduces tariffs to zero on steel and aluminium.
- But UK's **Carbon Border Adjustment Mechanism (CBAM)** (from Jan 2027) may offset these gains by adding carbon costs.

What is UK-CBAM?

- Similar to EU's CBAM.
- Imposes carbon price on imports (steel, aluminium, later more sectors).
- Current UK carbon price: **\$66/tCO₂** → will raise cost of Indian exports by **20-40%**.
- Deductions allowed only if exporting country has carbon taxes/pricing.

India's Problem

- India has **coal cess, renewable purchase obligations, and Carbon Credit Trading Scheme (CCTS)**.
- But India's projected carbon price: **\$8-10/tCO₂** vs **UK's \$66/tCO₂** → huge gap.
- Unilateral CBAM undermines multilateral climate agreements (UNFCCC, Paris Agreement).

Global Issue

- Carbon prices vary by country (energy mix, tech, economy).
- **Fragmented carbon pricing → high compliance costs, supply chain disruption, leakage.**
- Global coordination needed:
 - ♦ IMF's 2021 proposal: **International Carbon Price Floor (ICPF)** → \$25 (low income), \$50 (middle), \$75 (high income).
- WEF's approach: phased global carbon pricing, linked regional markets, harmonised reporting

What India Should Do

- Accept global consensus is unlikely soon → act nationally.
- **View clean tech as competitiveness, not just compliance.**
- Streamline implicit carbon taxes into **one explicit carbon market** (via CCTS).
- Use revenues from carbon tax for **industrial decarbonisation**.
- Build strong domestic carbon pricing → prepare to join global market in future.
- Push for cooperation with other developing nations.

What is CERBO, the brain tool developed indigenously?

What is CEREBRO, the brain tool developed indigenously?

How are traumatic brain injuries caused? Why would the tool be particularly useful in rural areas?

Bindu Shajan Perappadan

The story so far:

CEREBRO is a novel hand-held, portable non-invasive brain injury diagnostic tool, developed through a collaboration between the Indian Council of Medical Research (ICMR), the Medical Device & Diagnostics Mission Secretariat (MDMS), AIIMS Bhopal, NIMHANS Bengaluru, and Bioscan Research. The device is to be used for Traumatic Brain Injuries (TBIs) and can detect intracranial bleeding and edema within a minute. It is safe for infants and pregnant women, and can be used by paramedical staff as well as unskilled personnel.

Why is this device important?

Offered as an option in settings where advanced diagnostic tools like CT or MRI scans are inaccessible or delayed, CEREBRO provides colour-coded,

radiation-free, and cost-effective results. The device is designed for deployment in ambulances, trauma centres, rural clinics, and disaster response units and is aimed at enhancing early TBI detection and patient outcomes. According to the ICMR, CEREBRO has undergone clinical validation, regulatory approvals, and feasibility studies, paving the way for global adoption in emergency and military healthcare systems.

ICMR added that multi-centre clinical performance evaluation and utility trials were conducted at leading trauma care and neurosurgical centres to generate prospective evidence on diagnostic accuracy, time-to-decision benefits, and integration feasibility within emergency care pathways. Post-market surveillance supported by ICMR-MDMS further confirmed its role in user adoption as a tool for effectively triaging patients for further neurological assessments. Health technology assessments also

recommended the adoption of the device in tertiary care to accelerate CT scans, optimise triage, and reduce imaging costs.

What is TBI?

TBIs are a significant public health challenge, particularly in emergency settings, rural areas, and underserved populations. Traditional diagnostic methods, such as the Glasgow Coma Scale (GCS), are prone to errors and subjective interpretations, while imaging techniques require specialised infrastructure, trained personnel, and are cost-intensive. It is to address this issue that CEREBRO has been developed using advanced near-infrared spectroscopy technology powered by machine learning.

TBI is a condition caused by a sudden trauma or injury to the head, which disrupts normal brain function. This injury can range from mild (concussion) to severe, often resulting in long-term physical, cognitive, emotional, and

behavioural impairments. The severity of TBI depends on factors such as the force of impact, the location of the injury, and the individual's overall health. According to an article titled, 'Epidemiology of traumatic brain injuries: Indian scenario', TBIs are a leading cause of morbidity, mortality, disability and socio-economic losses in India and other developing countries. It is estimated that nearly 1.5 to 2 million persons are injured and one million succumb to death every year in India. Road traffic injuries are the leading cause (60%) of TBIs followed by falls (20%-25%) and violence (10%).

It is possible for a TBI to go undiagnosed initially, especially if symptoms are mild or if there are no visible signs of injury. A TBI can cause permanent brain damage in some cases, particularly if the injury is severe or if there are complications such as bleeding or swelling in the brain. Patients with mild TBIs (concussions) may only require monitoring and observation to ensure symptoms do not worsen. "Close monitoring of neurological status, vital signs, and cognitive function is important, especially in the first 24 to 48 hours after injury," it adds. Long-term consequences of TBI include cognitive impairments (such as memory problems), emotional and behavioural changes (such as depression, anxiety), physical disabilities, and increased risk of neurodegenerative diseases later in life, say experts.

THE GIST

▼
The device is to be used for Traumatic Brain Injuries (TBI) and can detect intracranial bleeding and edema within a minute.

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