Caste and class

Exclusion of creamy layer is essential, but must be done consistently

If public resources are to dismantle both caste hierarchy and class inequality, OBC reservation should resist the notion that caste disadvantage makes economic differences among OBC families irrelevant. The 'creamy layer' rules are responsible for identifying those OBC members who have advanced sufficiently to no longer require affirmative action. However, the government has implemented them inconsistently. The Supreme Court in March corrected one inconsistency, that the government cannot hold the salary alone of an OBC candidate's parent as evidence of social advancement. In *Indra Sawhney* (1992), the Court upheld the government's 27% reservation for OBC candidates in central government services if it also excluded economically advanced sections, i.e., the creamy layer, among OBCs. Following the equivalence requirement issued in 1993, the Department of Personnel & Training (DoPT) issued a "clarification" in 2004 that the government used, from around 2015, to deny dozens of OBC candidates who had cleared the Civil Services Examination their benefits because their parents' salaries exceeded the official threshold due to pay revisions that did not always reflect changes in occupational status. The Cabinet also approved equivalence guidelines in 2017 but a parliamentary committee criticised it over a number of issues.

In *Rohith Nathan* (2026), the Court rightly rejected the government's use of the 2004 "clarification" to arbitrarily exclude OBC candidates based on their parents' salaries alone. However, the government stalled service allocations following the 2025 examination and appealed that retrospectively applying the ruling would create administrative chaos. On November 6, the Court conceded that it had not asked the government to reopen completed selections, as it could set workers against one another while leaving government misapplication unaddressed. A proactive policy is essential now as the government must create supernumerary posts for legitimate claimants and apply the 1993 rules to pending allocations without vouchsafing these remedies for only those who can afford litigation. Access to public employment continues to be grossly unequal: per the 2024-25 DoPT Annual Report, OBC representation in central government employment was 26.3% but declined steadily towards higher positions. As the Justice G. Rohini Commission also indicated, the benefits of reservation are distributed unevenly among OBC communities. However, the report, submitted in 2023, is still not in the public domain. The coming Census includes caste enumeration but policymakers also need data on each caste's education, occupations, assets, and landholdings. Defending redistribution among caste groups while ignoring major inequalities within them, and constraining OBC reservation assuming relatively more high-income families capture the benefits without first establishing the extent and the causes are equally difficult to justify.

GS 2: Polity

Key Pointers:

- What is the Creamy Layer?
- Indra Sawhney v. Union of India (1992)
- Rohith Nathan case (2026)
- Why is creamy layer exclusion necessary?

AMRITA IAS

Transparency is essential to institutional credibility



Clement Arockiasamy

A public and social policy analyst, a British Chevening Scholar, and a Master's graduate in Development Studies from the Institute of Development Studies (IDS), University of Sussex, U.K.. He is the author of the book, 'Dalit Christians – Exclusion by State, Church and Society'

The proposed amendments to the Foreign Contribution (Regulation) Act, 2010, have triggered strong reactions from civil society organisations, Opposition parties and Christian institutions. The concerns are not without substance. What it seeks is tighter regulation of foreign-funded organisations, including provisions concerning assets created or acquired through foreign contributions. The Government maintains that the objective is greater transparency, accountability and prevention of misuse of foreign funds, while critics fear possible restrictions on legitimate civil society activity and minority institutions being disproportionately affected. With the Bill referred to a Joint Parliamentary Committee for further scrutiny, there is an opportunity for a reasoned debate.

Foreign contribution cannot become a pretext for suppressing legitimate charitable, educational, health care or social-service activity. At the same time, the receipt and utilisation of foreign funds cannot be placed beyond scrutiny.

Transparency is not an assault on minority rights; it is a condition of public trust. This raises a question for minority institutions opposing the proposed amendments: are they prepared to put their own houses in order? This is not about greater state interference, but about voluntary transparency and accountability to those they claim to serve.

Consider the Catholic Church in Tamil Nadu. The dioceses have established numerous social-service structures and societies dedicated to the poor, vulnerable and marginalised. Their contribution to social development is substantial, but how many ordinary faithful have meaningful access to even the basic financial picture of these institutions? How many can readily see annual income-and-expenditure statements, audited accounts, major sources of funding and the broad utilisation of resources? The more fundamental question is this: should institutions that speak forcefully about accountability to the state, not voluntarily practise an equally high, if not higher, standard of accountability to their faithful, beneficiaries and stakeholders?

Institutional power, financial accountability

The question becomes even more pertinent when one considers the enormous educational and social footprint of popular religious orders such as the Society of Jesus and the Salesians of Don Bosco, as well as the many premier institutions run by dioceses, including medical colleges, and numerous congregations of women religious. Their contribution to education and public life is undeniable. Yet, influence carries responsibility.

Minority institutions opposing the FCRA amendments must demonstrate transparency and accountability themselves

Across the educational sector, there have long been allegations and public concerns regarding admission-related donations, capitation and other payments in institutions offering sought-after courses. Such allegations must not be treated as established facts against particular institutions without evidence. But where institutions receive substantial fees, donations, grants or other contributions, a legitimate question remains, a demand for transparency is not an accusation of wrongdoing. On the contrary, the most effective answer to allegations of financial mismanagement or diversion is transparent, independently audited and accessible accounting.

The same principle should apply to religious and social-service organisations. If institutions appeal to the faithful and the public for donations in the name of the poor, education, health care and social development, their stakeholders should reasonably expect a clear picture of how those resources are utilised. Transparency need not mean exposing confidential individual transactions or compromising institutional autonomy. It can simply mean publishing audited annual accounts, broad income-and-expenditure statements, major funding sources and the purposes for which resources are deployed. Such voluntary disclosure would strengthen the moral authority of organisations that are now demanding greater accountability from the state.

The unfinished question of Dalit Christians

The issue becomes particularly compelling in the context of the Church's advocacy for Dalit Christians. The Catholic Bishops' Conference of India (CBCI) has raised concerns over the FCRA Amendment Bill with the Union Government. Its memorandum has also raised the continuing denial of Scheduled Caste (SC) status to Christians of SC origin and sought an early resolution of the matter pending before the Supreme Court. The CBCI has undertaken initiatives on the issue and its policy documents have acknowledged the persistence of caste discrimination within Indian society and, importantly, within the Church.

For decades, Dalit Christians have awaited a resolution of their claim to SC status. The Church possesses considerable institutional influence, extensive organisational reach and substantial financial resources. Has that influence and capacity been mobilised with the same sustained intensity for the constitutional rights of its most marginalised faithful as it is now being mobilised when the regulatory framework governing its institutions is threatened?

There is an inherent irony here. The Church rightly argues that caste does not disappear when a Dalit becomes a Christian. If that is so, and if caste-based exclusion continues beyond conversion, then the constitutional marginalisation of Dalit Christians should occupy a central place in the Church's public advocacy. It is difficult, therefore, to avoid asking what institutional accountability means if the voices of the most disadvantaged members of the institution remain comparatively weak.

Accountable autonomy

The answer should lie neither in unchecked state power nor in unchecked institutional autonomy, but in accountable autonomy. Minority institutions have made an invaluable contribution to India's educational, healthcare and social landscape, and their right to function freely must be protected.

But institutional freedom carries institutional responsibility. The credibility of their opposition to excessive FCRA regulation will ultimately depend not merely on what they demand from the government, but on what they are willing to disclose to the people who sustain and depend upon their institutions.

Perhaps the most important test of an institution is not how loudly it protests when its own autonomy is threatened, but how openly it answers questions from the poor, the faithful, the beneficiaries, parents, students and the communities it serves. Minority rights and institutional accountability are not opposing principles; they are complementary ones. The state must not use transparency as a pretext to weaken legitimate minority institutions. But minority institutions, in turn, cannot demand transparency from the state while treating transparency to their own stakeholders as optional.

Before asking the state to put its house in order, minority institutions should be willing to open their own doors and demonstrate that their houses are in order.

GS 2: Governance

Key Pointers:

- Foreign Contribution (Regulation) Act, 2010
- What is the controversy surrounding the proposed FCRA amendments?
- Why is transparency important for NGOs and religious institutions?
- What forms of voluntary financial transparency can institutions adopt?
- What is the issue concerning Dalit Christians and Scheduled Caste status?
- What is meant by 'accountable autonomy'?

Strategic autonomy must guide India's Starlink policy



Ashwin Prasad Rao

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India must balance Starlink's benefits with national security and strategic autonomy

Recently, Elon Musk unleashed a volley of social media posts, accusing Indian "oligarchs" of impeding Starlink's entry into India. The government rejected the accusation and clarified that all satellite operators must go through the same regulatory process. The ensuing public debate has centred on Mr. Musk, Mukesh Ambani, protectionism and telecom competition. All this obscures important questions of how much control India will have over Starlink once it operates here.

In its current form, Starlink is unlikely to replace fibre and mobile networks because they have almost opposite strengths. Fibre and mobile networks take time and money to set up, but can serve many people in one area. Starlink reaches remote places without towers or cables but is limited by how many users it can serve in one region. While fibre and mobile networks are optimised for density, Starlink is optimised for reach. Starlink has previously stopped taking new residential customers in areas where it ran out of capacity.

Starlink is well-suited for isolated settlements, border regions, ships, and disaster affected areas. Governments and the military require reliable connectivity in such areas. Starlink can connect soldiers, drones, sensors and command centres without traditional connectivity. Therefore, its operation in India goes beyond retail customer choices and has national security implications.

The risks for India

India has very limited control over Starlink. The network could remain usable in an area where Indian authorities have ordered it switched off. Conversely, it could be disabled when India needs it most. India can licence and penalise Starlink, but SpaceX retains direct control over its satellites, software and terminal access.

The government has recognised these risks and imposed stringent security requirements on satellite Internet providers. Operators must route Indian user traffic through ground stations, called gateways, located in India. They cannot use inter-satellite links to bypass Indian gateways or route Indian traffic through gateways abroad. They must also provide monitoring facilities to Indian security agencies and restrict connectivity when authorities issue security-related orders. Starlink has indicated willingness to comply. It announced Indian gateway sites and introduced India-specific data controls.

Some of these conditions are difficult to enforce independently. Indian authorities can inspect domestic gateways, but verifying whether Indian traffic has been routed through foreign gateways or mirrored abroad through satellite links is more difficult and depends partly on information provided by SpaceX.

There is also a trade-off. Starlink's advantage is that its satellites can pass traffic between themselves when a ground station is unavailable. If Indian gateways fail, however, these restrictions prevent Starlink from rerouting Indian traffic through gateways abroad, reducing one source of redundancy.

Global experiences

Iran's experience is also a valuable demonstration of the enforcement problem. Since 2023, Iran has complained to the International Telecommunication Union (ITU) about Starlink terminals illegally operating on its soil without authorisation. The ITU's Radio Regulations Board has repeatedly called for Starlink transmissions to be stopped over Iran.

At its October 2026 meeting, the Board again noted that unauthorised Starlink transmissions in Iran were continuing. It reiterated its earlier decisions calling for the transmissions to stop and its conclusion that it lacked the authority to suspend the relevant satellite frequency assignments.

Ukraine provides an interesting contrast. In February, Ukrainian authorities worked with SpaceX to identify authorised Starlink terminals and block those used by Russian forces. In Ukraine, SpaceX acted on the government's requests. In Iran, years of appeals have failed to achieve the same result.

Conversely, on October 14, Ukrainian officials reported that Starshield, the military service built on Starlink technology, began losing connectivity on terminals travelling faster than about 160 km/h, disrupting drone missions and frontline logistics. Zelenskyy said the restrictions applied in Ukraine but not in EU countries. Ukraine said normal service was restored on October 24. The reason and responsibility remain contested. Reuters reported, citing officials, that an order came from within the White House, although Trump denied personally issuing it. The disruption coincided with Washington's pressure on Ukraine to stop striking Russian oil refineries.

For an ordinary user, losing Internet access can be an inconvenience. For armed forces, emergency responders and other essential services, it can have far more serious consequences.

SpaceX also depends on American regulatory approvals and government contracts, giving Washington considerable leverage over the company. If American interests diverge from India's during a crisis, this dependence could become a strategic vulnerability.

India needs alternatives

Keeping Starlink out entirely would sacrifice valuable connectivity, particularly in remote regions. India should retain its strict licensing conditions while improving its ability to check compliance. Starlink continues to evolve and regulation will have new challenges to contend with.

Therefore, a more effective way to reduce the dependency risks is to have alternatives to Starlink. Military and other essential users should maintain backup connections and tested procedures for switching between them. Using more than one satellite internet provider, from countries under different jurisdictions, would reduce dependence on the decisions of a single entity. Expanding ground coverage would reduce the number of communities for whom Starlink will be the only practical option. A parliamentary review found that only 30% of gram panchayats had a functional BharatNet connection as of February 2026.

But fibre and mobile towers cannot cover every ocean, mountain region or remote frontier. India will also need satellite alternatives of its own. India should encourage more domestic constellations and use their demand for satellites and rockets to build Indian industry. Industrial capacity and satellite Internet capacity go hand-in-hand.

India needs enough alternatives to keep essential communications working even when Starlink is unwilling or unable to.

GS 3: Science and Technology

Key Pointers:

- What is Starlink and how does it provide internet connectivity?
- Can Starlink replace conventional fibre and mobile networks?
- Why is Starlink strategically important for India?
- What are India's major concerns regarding Starlink?
- What security conditions has India imposed on satellite internet providers?
- What are satellite gateways and inter-satellite links?
- What is Starshield?

World Wars and India's sacrifice



Priyanjali Malik

writes on politics and international relations. In the interest of full disclosure, the three Bhagat brothers were her father's cousins

On the 11th hour of the 11th day of the 11th month, most Commonwealth and other allied nations fall silent for two minutes to honour the fallen of the two World Wars. Not so much in India: wreaths are laid in cantonments, but for most, this is just another day. India has an uneasy relationship with Remembrance Day. However, the idea that the World Wars were something that happened to someone else, somewhere else, could not be further from the truth.

Indian ambivalence over the two World Wars belies its enormous contribution to fighting fascism. Undivided (British) India sent 1.5 million men to fight in World War I, 74,000 of whom never returned home. For WWII, India produced the largest volunteer army of 2.5 million soldiers, with 87,00-89,000 making the ultimate sacrifice. The princely states also sent significant troops. Whereas the Indians who fought in the Great War were mostly sent to distant lands, in WWII, about 7,00,000 of them were defending Indian territory. The war came home to India when Japan invaded the country in March 1944.

The argument that the Indian soldiers who fought under British command were defending freedom for the British while their country's aspirations for the same freedoms remained suppressed under colonial rule is legitimate. Yet independent India's ambivalence over WWII goes deeper. The fact that the adversary in this case included an Asian power claiming Asian solidarity has sometimes obscured the fact that imperial Japan was pushing into India in a brutal campaign of expansion.

And then there is the complicated history of the Indian National Army (INA), led by Subhas Chandra Bose.

The INA, which was initially formed under Captain Mohan Singh in 1942, comprised mainly 40,000 Indian Prisoners of War (PoWs) who were captured and tortured by Japan when Singapore fell in 1942. It was re-formed by Bose when he joined the Japanese in Singapore in July 1943. Bose expanded the INA, or the Azad Hind Fauj, setting up a government in exile. However, nothing about the provisional government of free India could disguise the fact that several of the men who joined the INA did so under duress. Bose teaming up with the Japanese pitted Indian against Indian.

Fallen heroes

On April 6, 1942, the war came to India with Japanese aircraft bombing ships entering the Vizag harbour and the port. In December of that year, Kolkata was bombed over four days, with the Japanese targeting the city's infrastructure. The following December, Japanese aircraft bombed Kolkata's Kidderpore dock, killing hundreds of people and causing significant damage. From January 1942, the Japanese Army swept through Southeast Asia, overrunning Myanmar and occupying Burma. The fighting in the Burma campaign, which involved over 7,00,000 Indians, was brutal, not just because of Japanese tactics, but also because of the forbidding jungle terrain. In March 1944, the Japanese Army attempted a land invasion of India from Myanmar. The Japanese calculated that once they entered, the locals could be encouraged to revolt against the British. However, Indians decided against trading British rule for the Japanese.

India was defended by Indians in some of the fiercest fighting of the war. Indians (from undivided India) made up 87% of the multinational fighting force troops in the Burma campaign. A disciplined fighting force was forged in the heat of this combat; and this force has defended India after 1947.

The first Indian to be awarded a Victoria Cross (VC) in WWII was Second-Lt (later Lt-Gen) Premindra Singh Bhagat for 'most conspicuous gallantry on active service' clearing mines in East Africa in early 1942. In late 1943, his eldest brother, Nripendra Bhagat, was taken PoW by the Japanese while fighting in Burma. While in prison, he was made to broadcast a propaganda piece, almost certainly under torture. He was handed over to the INA, rising quite high in the 'provisional government'. He subsequently disagreed with Bose and was imprisoned by him in Burma. He escaped and was captured by Indian soldiers, who handed him over to the middle brother, Brijindra, who was with the 5th Indian Division in Burma. All three were fierce nationalists and one story cannot be told without mentioning the others.

Soon after Prem Bhagat was awarded the VC, he went to see Mahatma Gandhi. How could he work for his country, he asked Gandhi. The answer was simple: stay in the army. India would need men like him to defend her. History is complicated. However, we owe it to ourselves to be honest with our past, just as we owe it to our armed forces to honour the sacrifices of those who went before them.

We owe it to ourselves to be honest with our past, just as we owe it to our armed forces to honour the sacrifices of those who went before them

GS 1: History

Key Pointers:

- Why is November 11 observed as Remembrance Day?
- What was India's contribution to World War I and World War II?
- How did World War II directly affect Indian territory?
- What was the significance of the Battles of Imphal and Kohima?
- What was the Indian National Army (INA)?
- What was the role of Subhas Chandra Bose in the INA?
- Who was Premindra Singh Bhagat?

More women work but in informal and less secure jobs

Despite the rise of women's participation in the labour force, women still carry the burden of unpaid domestic work and childcare

DATA POINT

Tanu M. Goyal
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The rise in women's workforce participation in India is now well-documented. Yet, it conceals a less encouraging reality – men and women are experiencing India's structural transformation very differently.

Between 2017-18 and 2025, the number of working women nearly doubled, from 104 million to 201 million, and the female worker population ratio rose from 22% to 38%. But most of the increase has come from rural India, largely in agriculture and in own-account and unpaid family work on farms and in household enterprises.

The positive here is that a larger part of women's daily work is finally being counted. For decades, the labour women did on the fields and cattle sheds went mostly unrecorded, and was thereby left out of policy and budgets. Simply counting, however, has just revealed how many women work but says little about the work itself. The recent ICRIER report, 'The Participation Paradox', uses the Periodic Labour Force Survey (PLFS) and the Time Use Survey to look at these dimensions. Five data points stand out.

Most of the surge in women's employment has been absorbed by agriculture, the sector that structural transformation expects workers to move out of (**Chart 1**). The number of rural women working in crop and animal production rose from 54 million to over 100 million. Rural men, however, did move out as their share in agriculture fell from 54.1% to 47.2%, while women's rose from 70.7% to 73.3%. Surprisingly, urban women employed in agriculture rose from 2.6 million to 6.3 million, becoming their largest single employer in 2025. Outside agriculture, women's employment gains were concentrated in garments, retail and construction, sectors where work is largely informal and dominated by micro and own-account enterprises. The shift towards self-employment is particularly pronounced in rural areas where women in own-account work quadrupled, while the share of regular salaried jobs among them slipped from 10.5% to 9.3%.

Despite the rise in women's workforce participation, average weekly working hours have fallen for every group between 2017-18 and 2025. The decline was steepest for rural women, who worked a little over six hours less per week. The combination of rising participation and falling hours suggests that much of the new employment is marginal and low in intensity (**Chart 2**).

Manufacturing reflects this pattern most clearly. In rural textiles, the gender gap in weekly working hours widened from 11 to 21; in wearing apparel, from 19 to 21. Garments and textiles are expected to draw women into regular factory work, where their hours would gradually rise towards men's. The widening gap suggests that many women in these industries remain in home-based, piece-rate, or own-account work.

The wage gap

While women's earnings have risen, men's wages have risen faster. A rural woman now earns roughly 45% of what a rural man earns, down from 53%. The sectoral picture is equally telling. The widest hourly earnings gaps are in the sectors that employ most women. Per hour, men in rural tobacco manufacturing earn 2.1 times what women do; in education, 2 times; in textiles, 1.8; in crop production, 1.7. By contrast, women earn on par with men in about 20 urban sectors, including scientific research, publishing, advertising and management consultancy which employ a small fraction of working women.

When asked why they are not in the labour force, 60% of women cite childcare and household commitments. Among men, fewer than 1% give these reasons.

These patterns have barely changed since 2021-22. Skilling and job creation can expand women's employment only if women have the time to take up these opportunities. That time is already absorbed by unpaid work at home that remains invisible in national income accounting. The Time Use Survey Shows that in 2024, Indian women spent an average of 3.7 hours a day more than men on domestic work and nearly one hour more on care.

Concerningly, taking up paid work does little to ease this burden. Working women still spend around four hours a day on unpaid domestic work and nearly two on care, in rural and urban India alike. Working men, in contrast, spend under three hours on both type of activities combined.

These paradoxes suggest that the gains from India's structural transformation have gone largely to men. Beyond raising participation, women should be pushed towards more productive, better-paid work without adding onto the unequal burden of unpaid care.

First, reduce that care burden, the main supply-side constraint. This means affordable, good-quality childcare, paid paternity and shared parental leave financed partly through social insurance. Second, make industrial and MSME policy work for women. MSME support should reward hiring women, widen access to finance and technology, and open hostels and arrange transport in textile parks and industrial areas. Third, create paid work for rural women close to home through place-based enterprise clusters, livelihood missions, and women-led producer organisations.

India has brought women's work into the data. The next step is making that work more productive, better paid, and more secure.

Labour at what cost?

The data were sourced from the Indian Council for Research on International Economic Relations (ICRIER), 'The Participation Paradox' (2026). Authors are with the ICRIER. Views expressed are personal

Chart 1: The surge in women's employment was mostly due to the agriculture (primary) sector, from which men have moved out of between 2017 and 2025

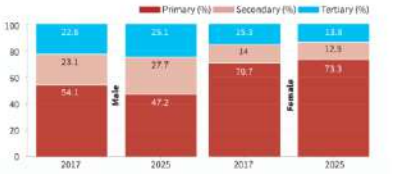


Chart 2: While more women are working, their average working hours have gone down, which suggests that much of the employment is marginal and low in intensity

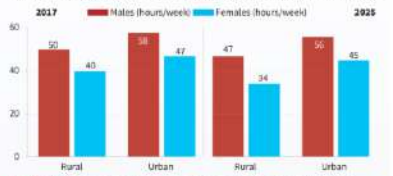
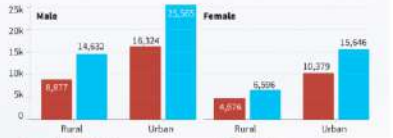


Chart 3: While women's earnings per month have risen, they are falling behind men's monthly wages, which rose faster. Figures for wages are in ₹





GS 1: Indian Society

Key Pointers:

- Status of Women's workforce participation in India
- What has been the trend in women's employment in India?
- Why is the rise in women's employment not necessarily a sign of structural transformation?
- What are the changes in sectoral employment of women?
- What does the gender gap in manufacturing employment indicate?

Is right-wing populism set to retreat?

Does the Republicans' historic defeat in the midterm elections in the United States signal a waning of right-wing populism? Does the right's emphasis on immigration and foreigners as political issues have an impact on voters? How will the anger of young protesters in India, France and other countries find political expression?

WORLD INSIGHT

Atul Mishra

Populism is the politics of what is – or can be made – popular with the people. It surfaces in democracies from time to time; its latest iteration began rising after the 2008 financial crisis, which hit ordinary people hard. Whether of the left or the right, all populism targets ruling elites and identifies a major, almost unyielding, enemy of the people. On the face of it, both target capitalism. But for the left, the system itself is the problem; for the right, the problem lies with a self-serving, globalist business elite – the capitalists. The right also identifies a second enemy in the form of immigrants and other foreigners living in their midst. In power, populists of both stripes increase executive authority and frequently game the electoral system and institutional checks to stay in office.

A setback for right-wing populism

Donald Trump's rise in the 2010s gave right-wing populism a global boost. Because the U.S. is powerful and other democracies often follow its lead, his success lent this politics legitimacy elsewhere. He has also backed fellow populists, from the Bolsonaros in Brazil and Nayib Bukele in El Salvador to Viktor Orbán in Hungary, and got along well with the strongmen of Russia, China and Turkiye. If Mr. Trump weakens, political equations could change well beyond the U.S. That is why the question matters.

The Republican defeat also comes against the backdrop of reversals and pressure for Mr. Trump's allies and camp mates. Mr. Orbán, after 16 years in power, lost in April. Serbian President Aleksandar Vučić lost in October, after 12 years in power. Flávio Bolsonaro lost to Brazil's Lula da Silva in late October. And Benjamin Netanyahu, a key Trump ally and regional militarist who has held office for about 19 years in all, may be next to lose power. His bloc fell short of a majority, and his rival, Gadi Eisenkot, has been asked to form the government. Furthermore, India's ruling establishment, a leading example of non-Western right-wing populism, has faced street pressure on the issues of accountability and institutional subversion.

These are major developments. But they represent a setback for right-wing populism, not its reversal.



Supporters celebrating the Democrats' victory in the U.S. midterm elections. REUTERS

A widening economic divide

First, the crisis that fuels this politics shows no sign of abating. A wide swathe of opinion holds that capitalism has failed the masses even as the rich get unbelievably richer and more powerful: consider America's billionaire tech bros and India's infrastructure barons. The failure has shown up in a cost-of-living crisis. In India, where it surfaces with jobs and exam leaks, it has only begun to find traction. But it is central in western democracies – driving French protests, German discontent and British Prime Minister Andy Burnham's anxieties.

Second, while this issue is common to both left- and right-wing populists, the right has an advantage: it links affordability to immigrants and those who do not share the majority's ethnicity or identity. In a word, it ties the issue to culture and security, on which the left has struggled to find a persuasive position. It claims that governments led by legacy political forces have favoured outsiders over their own people.

And this is tied to national sovereignty, that is, a country's ability to take independent decisions in its national interest. Right-wing populists claim that their country is taking decisions favouring outsiders and others, whether migrants or, for European populists, the European Union in Brussels.

Third, economic discontent means that the avenue for mass politics is open to both left and right, at the expense of the liberal centre. The absent centre means polarisation, electorally and otherwise. Flávio Bolsonaro topped Brazil's first round and lost the runoff by under four percentage points, while the Trump-endorsed candidate Abelardo de la Espriella won in Colombia in June. In Poland, Donald Tusk ousted the Law and Justice party (PiS) in 2023, but its nominee Karol Nawrocki won the presidency in 2025 and the far right is again making gains.

Then there are the big three. Economic grievance has yet to play itself out in France, Germany, and the U.K.; right-wing populism has a lot going for it in these countries. In France, Marine Le Pen's far-right National Rally (RN) leads the polls before next April's presidential election and could take office.

The Alternative for Germany (AfD) tops national polls and emerged as the largest party in the state of Saxony-Anhalt, shaking up the country's mainstream politics. A recent interview with AfD co-leader Alice Weidel in *The Economist* reveals how the party is recasting itself around economics rather than migration, as better to reach the mainstream and, eventually, federal power. In the U.K., Reform UK won May's local elections but has slipped behind Labour since Mr. Burnham replaced Keir Starmer. But there is enough fuel for its politics, especially Islamophobia and resentment against asylum seekers. If Mr. Burnham cannot address the cost-of-living crisis effectively, Reform UK may well recover.

And back in the U.S., the Democrats are split over what to read into their victory: affordability, acceptance of multiculturalism, identity politics, or socialist economics. If they emphasise an identity politics rooted in sex and gender, or play up the identity of America's first Muslim senator Abdul El-Sayed too much, they risk fuelling a right that feels betrayed by Mr. Trump. Right-wing populism may well outlast him.

The force to watch is the youth. Protesting for nearly two years, they ousted Mr. Vučić at the ballot box. In India, protests led by the Cockroach Janta Party forced out the country's Education Minister. Gen Z has filled the streets of France and Germany. And in the U.S., young voters overwhelmingly voted Democrat. This anger could turn left or right. Young Germans are splitting between the AfD and the radical left, and the unrest in France has so far helped Ms. Le Pen. Where they would settle remains to be seen.

(Atul Mishra is a professor of international relations at Shiv Nadar University, Delhi-NCR.)

THE GIST

- Donald Trump's rise in the 2010s gave right-wing populism a global boost. Because the U.S. is powerful, his success lent this politics legitimacy elsewhere
- Economic discontent means that the avenue for mass politics is open to both left and right, at the expense of the liberal centre. The absence of a strong centre leads to polarisation

GS 2: Polity

Key Pointers:

- What is populism? How does left-wing populism differ from right-wing populism?
- Why did right-wing populism gain global influence?
- What recent developments indicate a setback for right-wing populism?
- How is the idea of national sovereignty used by right-wing populists?

CACHE

Does the Temple wearable reveal useful information about brain health?

The wearable device sold by billionaire Deepinder Goyal is said to monitor brain health and ageing by measuring changes in cerebral blood flow; critics and doctors question its medical claims, noting that the evidence is preliminary and its core metric, the Brain Flow index, remains controversial

Jacob Koshy

Billionaire entrepreneur Deepinder Goyal, co-founder of Zomato and Blinkit, has announced the commercial availability of Temple, a wearable monitoring device that he claims could become "Humanity's last personal device".

A graduate in Computer Science and Mathematics from the Indian Institute of Technology Delhi, Mr. Goyal has no academic background in medical sciences or biological research. His claims have drawn criticism from doctors, including social media influencer and physician Cyriac Abby Philips (UserDoc), who has described the device as a "scam".

Mr. Goyal's claims span several areas. Temple, he says, is the most accurate wearable health monitor yet and can continuously track changes – not absolute values – of blood flow to the brain and heart outside laboratory settings.

The device, a small pod attached to the temple, he controversially claims, measures changes in cerebral blood flow. From these readings, he uses a proprietary score ranging from 1 to 250 and touts it as a proxy for how relaxed the brain is, with meditation representing the lower end and elite athletes at peak performance the higher end.

The device is also part of Mr. Goyal's larger hypothesis that gravity plays a significant role in ageing and the associated decline in bodily functions. Separately, he claims that Temple can detect vibrations generated by the wearer's voice through motion sensors, convert them into text and function as an executive assistant without requiring a conventional microphone.

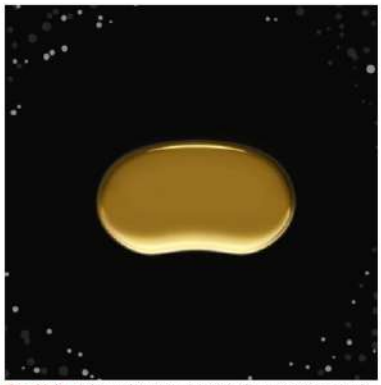
While entropy – a measure of disorder and one of the fundamental laws of nature – is better understood in the context of physics and information theory (involving computation), it doesn't have established metrics in biology. The 'entropy' that Mr. Goyal claims is a proprietary index that relates to health and ageing and, from what appears, only has a tenuous connection to the entropy in physical systems.

When questioned by doctors online, Goyal underlines that Temple "isn't a medical device" and that there are several studies ongoing, that haven't been made public yet regarding the device's ability to gauge 'entropy.'

However, much of the recent criticism has centred on its claims about brain blood flow. Publications available on Temple's website are not peer-reviewed, although they involve researchers affiliated with several established international institutions. Their findings provide some evidence for the device's measurement capabilities, but remain considerably narrower than the ambitions of Mr. Goyal's public claims.

How does Temple measure blood flow?

The technology has some similarities to pulse oximetry, the familiar finger-mounted device used widely during the pandemic to measure blood oxygen saturation. Pulse oximetry uses photoplethysmography (PPG), exploiting the different light-absorption properties of oxygenated and deoxygenated haemoglobin.



Disputed device: Temple, a wearable monitoring device sold by billionaire Deepinder Goyal, is said to measure changes in cerebral blood flow. AFP

Typically, it shines red and infrared light through the finger and measures how much light is absorbed. The pulsatile component of the signal corresponds to arterial blood and helps estimate the proportion of haemoglobin carrying oxygen.

Temple uses a related approach. It shines green, red and infrared light into the skin and measures how much is reflected. Blood absorbs light, and with every heartbeat the tiny vessels beneath the skin expand, causing the reflected light to fluctuate.

The frequency of these fluctuations provides heart rate, while their amplitude relative to the background signal offers an indication of changes in blood volume in the tissue being monitored. Different wavelengths penetrate to different depths, with green light largely confined to superficial tissue and red and infrared light reaching deeper.

Temple combines several features of these optical signals, including pulse amplitude, indicators of oxygen-carrying blood, pulse shape, heart rate, skin temperature and motion, to generate its proprietary Brain Flow index, or Temple-BF. The mathematical basis of this score remains opaque. It is also unclear whether readings can be compared meaningfully between individuals.

The central assumption is that monitoring a blood vessel supplied by the external carotid artery, which connects with vessels branching from the artery supplying the brain, can provide information about cerebral blood flow.

However, Temple researchers themselves acknowledge that the anatomical connection does not establish that the signal reflects blood flow inside the brain. Their paper's limitations section states that the sensor fundamentally detects changes in blood flow in the skin and underlying tissue.

Why does brain blood flow matter?

The brain consumes about a fifth of the body's energy and depends on a continuous supply of oxygen and glucose. Scientists usually measure this supply using Magnetic Resonance Imaging, which estimates blood flow per unit of tissue; ultrasound, which measures blood velocity in a major artery supplying the brain; and optical techniques, which track changes in haemoglobin as an indirect indicator of blood flow.

Previous research has associated ageing with declining cerebral blood flow. A 2021 study involving 185 healthy adults aged 21 to 80, published in the *Journal of Cerebral Blood Flow & Metabolism*, found that the major arteries in the neck remained similar in width with age, but blood moved through them more slowly. The authors suggested that narrowing of downstream vessels could explain the finding.

Other studies have associated lower cerebral blood flow with an approximately 30% higher risk of dementia and faster cognitive decline over 5.7 years.

These are associations, however, cannot establish whether reduced blood flow causes cognitive decline or whether brain shrinkage resulting from cognitive decline reduces the amount of tissue requiring blood.

Evidence linking blood pressure to dementia is stronger. A 2016 study in *PLOS Medicine* associated orthostatic hypotension – a fall in blood pressure on standing – with an approximately 15% higher risk of dementia. Evidence connecting cerebral blood flow to longevity is considerably weaker.

There is no trial demonstrating that increasing brain blood flow extends life or delays cognitive decline. Importantly, none of these studies has anything to do with entropy.

What do Temple's studies establish?

In one study, 44 young men wore Temple while undergoing different postural manoeuvres, including lying head-down on a tilting table, squatting and moving from standing to lying flat. Their readings were compared with time-domain near-infrared spectroscopy (NIRS), a research technique that uses the time taken by light to return to distinguish signals from the scalp and deeper brain tissue. Temple-BF correlated more strongly with the modelled brain signal than with the scalp signal in the three manoeuvres, although the difference was relatively small in one test and could have been due to chance.

Another study involving 20 participants compared Temple readings with transcranial Doppler (TCD), an ultrasound technique that measures blood velocity in a major artery supplying the brain. Participants undertook seated cycling and a stand-then-lie-down test. Temple-BF correlated approximately 0.80 with the ultrasound measurements in both tests.

The researchers also found that when participants lay down, Temple-BF rose alongside blood velocity in the brain artery rather than following the fall in heart rate. They argue that this suggests the index is not simply a repackaged heart-rate measurement.

The strongest evidence presented for Temple concerns heart-rate monitoring. In a company report involving 43 healthy adults undergoing a graded treadmill test, Temple was compared with wearables such as an Apple Watch, Fitbit, WHOOP, Garmin and Oura Ring, using a chest strap as the reference. Temple recorded the smallest average error and deviated least from consistently accurate readings. The report also found that the placement of the device mattered: the Apple Watch's error fell when it was worn higher on the forearm. Measuring closer to the heart, where blood is pumped, can improve accuracy, which is a well-known observation.

Dr. Anurag Agrawal, physiologist and dean of biomedical research at Ashoka University, Haryana, told *The Hindu* that he does not dismiss the Temple index. He considers it a legitimate mathematical analysis that can be tested for its predictive value. But he cautions that it is too early to establish whether it can predict longevity, general well-being or specific diseases. Long-term studies monitoring such parameters remain scarce.

At ₹85,000, Temple is likely to attract "self-paying enthusiasts" willing to experiment with a new technology. Dr. Agrawal points out that brain blood flow is tightly regulated and does not ordinarily need to be measured unless there is a major clinical problem.

He nevertheless sees potential in collecting large volumes of real-world data over extended periods, particularly in areas where conventional research funding is limited. "Whether Temple can translate its measurements into reliable information about brain health and ageing will depend on evidence that goes well beyond its initial laboratory studies," he noted.

GS 3: Science and Technology

Key Pointers:

- What is the Temple wearable and what does it claim to do?
- What is the scientific principle behind Temple?
- What is Photoplethysmography?
- Why is cerebral blood flow important for brain health?
- What is entropy and why is its use in health claims controversial?
- What are the broader concerns regarding commercial health wearables?

ECI extends MCC curbs to retired govt. officials

The Hindu Bureau
NEW DELHI

Retired government officials who are re-employed or re-engaged by State or Union Territory governments should not take part in any election campaign or lend their names to any political party or individuals during the poll season, just as in the case of government servants, the Election Commission of India directed on Tuesday.

After complaints of misuse of official positions, the ECI has decided to extend the rules applicable for government officials during the period when the Model Code of Conduct is in force to those who are working with the government after retirement as well, a senior ECI official said.

The directives came in a letter addressed to the Chief Secretaries and CEOs of poll-bound Goa, Manipur, Punjab, Uttar Pradesh, and Uttarakhand.

The letter said that such retired officials who have been re-engaged must maintain political neutrality and refrain from participating in election campaigns. The ECI cautioned that any act in violation of these directions would be viewed seriously.

GS 2: Polity

Key Pointers:

- Functions of ECI
- What is Model Code of Conduct (MCC)?
- Why has the ECI extended these restrictions to retired officials?

AMRITA IAS
An Amrita Group Institution

Supreme Court goes beyond Deepavali AQI, flags vehicular emissions polluting Delhi air

Krishnadas Rajagopal
NEW DELHI

Forty-eight hours before Deepavali, amidst the rising crescendo of crackers heralding the festivities, a Supreme Court Bench headed by Chief Justice of India Surya Kant said the people, and not the judiciary, must strike a blow against air pollution in the national capital.

The court went beyond Deepavali to highlight a consistent danger that sustains and would worsen the toxic air: vehicular emissions. On November 6, the court detected a sharp increase in issues attributable to vehicular emissions.

"It must be borne in mind that Delhi and the National Capital Region (NCR), by virtue of their geographical and economic interconnectedness, bear the cumulative burden of



The Court said it had detected sharp increase in vehicular emissions. FILE PHOTO

vehicular traffic originating not merely within their own boundaries but also from the neighbouring States of Uttar Pradesh, Haryana and Rajasthan," the Supreme Court reminded the authorities in its latest order. The issue warranted urgent intervention, the court said, directing the Municipal Corporation of Delhi (MCD), the Delhi government, the Delhi Police (Traffic department), as well as the neighbouring States of Haryana, Rajasthan, and Uttar Pradesh to file their responses on what they have done to regulate the plying of commercial and non-commercial vehicles. The court wanted to know about measures to regulate traffic originating from outside the national capital.

These include steps taken to identify, monitor, and regulate vehicles that do not conform to prescribed emission standards, and measures to prevent the entry and operation of overage, end-of-life, or non-compliant vehicles.

The Bench has specifically sought information on the measures undertaken against violations, including the number of vehicles inspected, challaned, denied entry, and the coordination mechanisms between the authorities of Delhi and the neighbouring States for regulating inter-State vehicular movement.

No compliance

Incidentally, two separate orders passed several months ago, on January 21 and February 23 this year, had contained detailed long-term and short-term measures recommended by the Commission for Air Quality Management (CAQM) to mitigate air pollution, especially caused by vehicular emissions, in Delhi.

The January 21 order had listed various CAQM recommendations, including phasing out polluting vehicles from Delhi-NCR, fortifying the pollution-under-check regime, augmentation of rail transport and metro models, revised electric vehicle policy, among others.

Subsequently, on February 23, the court directed the Delhi government and three Ministries - Environment, Petroleum and Natural Gas, and Commerce and Industry - to submit a joint proposal for shifting coal-based industries out of Delhi NCR. This direction was based on a CAQM recommendation to ban the establishment of new coal-based thermal power plants within a 300 km radius from Delhi.

However, on November 6, the court was told by its *amici curiae* that the compliance of its orders was "yet to be properly reported to this court".

The court has listed four *suo moto* cases - vehicular emissions, enhancement of green cover, construction activities/power plants, waste management/stubble-burning /firecrackers - from November 23 to November 30.

GS 3: Environment

Key Pointers:

- Why is vehicular pollution difficult to control?
- What measures can reduce vehicular pollution?
- What is the role of CAQM in controlling Delhi-NCR pollution?

PSU insurers dodge questions on underuse of own TPA

A 2022 CAG report found that HITPA had adequate capacity and performance parameters comparable to leading TPAs, yet received only a fraction of the business handled by its promoter insurers. However, responses to RTI applications filed with the four insurers do not establish whether allocations have increased significantly or what action has been taken on the audit recommendation

Balasubramanyam C.P.
CHENNAI

Health Insurance TPA of India Ltd. (HITPA), a third-party administrator (TPA) promoted by four public-sector general insurers, continues to face questions over the extent of business entrusted to it, more than four years after the Comptroller and Auditor General (CAG) flagged its underutilisation and recommended higher allocations.

A 2022 CAG report found that HITPA had adequate capacity and performance parameters comparable to leading TPAs, yet received only a fraction of the business handled by its promoter insurers.

However, responses to Right to Information (RTI) applications filed with the four insurers do not establish whether allocations have increased significantly or what action has been taken on the audit recommendation.

New India Assurance and Oriental Insurance declined to disclose information sought across the questions, invoking Section 8(1)(d) of the RTI Act, which exempts commercial confidence and trade secrets where disclosure could harm competitive interests. Section 8(2), however, permits disclosure where public interest outweighs the protected interests.

United India Insurance and National Insurance provided some operational information available on their websites but withheld financial and performance-related details.

United India reported that HITPA had processed 1,18,712 claims and administered 48,525 policies covering 67.99 lakh lives as of March 31, 2026. National Insurance reported 1,55,137 policies covering 8,52,444 lives. However, neither disclosure established the premium value allocated to HITPA or its share of the insurers' overall TPA business.

Taking cover

None of the four insurers furnish clear account of action taken on CAG's recommendation to revisit business allocation to HITPA

- New India Assurance and Oriental Insurance decline information invoking Section 8(1)(d) of RTI Act
- Section 8(2), however, permits disclosure where public interest outweighs the protected interests
- United India Insurance and National Insurance withhold financial and performance-related details



According to the CAG, HITPA had paid-up capital of ₹120 crore as of March 31, 2021.

Each of the four insurers contributed ₹28.50 crore, while GIC Re held the remaining ₹6 crore.

The audit found that capacity utilisation, measured by lives serviced against available capacity, declined from 5.34% in 2017-18 to 3.68% in 2019-20. HITPA's share of the total premium allocated to TPAs by its promoter insurers, meanwhile, rose from 0.92% in 2016-17 to 6.19% in 2019-20. These were the latest allocation figures cited in the report.

HITPA had approached the General Insurance Public Sector Association (GIPSA) in March 2018, seeking at least 10-15% of health insurance claims-processing work. GIPSA's governing board agreed in September 2018 to transfer 10% of the work handled by the five largest TPAs to HITPA. The decision, however, was not implemented.

The insurers attributed the low allocation to HITPA's limited geographical presence, competition from established TPAs and reluctance among group clients. The CAG rejected these explanations, pointing out that HITPA had adequate capacity and a presence in 10 major cities, including all four metros.

Asked about follow-up action, National Insurance said, "The matter related to the cited report is under review, therefore, the information does not exist at present."

United India said, "The subject matter is under process, information sought does not exist as on date."

GS 3: Economy

Key Pointers:

- What is HITPA and who owns it?
- What is a Third-Party Administrator (TPA)?
- How is the RTI Act relevant?
- Why is the underutilisation of HITPA a governance concern?
- What is the role of CAG in ensuring accountability?

Industry seeks LTCG, STT cuts in 2027 Budget; MSME relief also on wish list

T.C.A. Sharad Raghavan
Gowri Lakshmi
NEW DELHI

Several industry bodies have recommended to the Ministry of Finance that the upcoming Budget 2027 should rationalise the Long-Term Capital Gains (LTCG) tax rate on equities and reduce the rate of the Securities Transaction Tax (STT).

Officials in the Finance Ministry, including Finance Minister Nirmala Sitharaman and Revenue Secretary Arvind Shrivastava, have been conducting their pre-Budget consultative meetings, during which they met the Confederation of Indian Industry (CII), Federation of Indian Chambers of Commerce and Industry (FICCI), the PHD Chamber of Commerce and Industry (PHDCCI), and the Associated Chambers of Commerce and Industry (ASSOCHAM), among others.

Removing LTCG levy would raise post-tax returns and close the gap with Korea, Taiwan and Brazil

One of the most-cited requests from the industry was the rationalisation of LTCG on equities.

Currently, foreign and domestic investors have to pay 12.5% tax on the sale of equities on gains exceeding ₹1.25 lakh per annum on listed shares.

"Removing the LTCG levy would raise post-tax returns and close a gap with Korea, Taiwan and Brazil," Rakesh Nangia, chairman of the task force on International Taxes at ASSOCHAM said.

The PHDCCI has requested that the government abolish LTCG tax on equity investments, reduce the short-term capital gains (STCG) tax rate from 20% to 10%, and lower STT rates "to encourage long-term investment and improve India's capital market competitiveness".

To support the MSME sector, the PHDCCI has requested the Finance Minister to extend the overdue period after which a loan is classified as a non-performing asset (NPA) from 90 to 180 days "to accommodate longer working capital cycles and delayed realisation of receivables".

Further, the chamber has called for an enhancement of PM MUDRA loan limits and a Budget announcement of direct equity support to MSMEs through the Fund of Funds Scheme, "with dedicated allocations for start-up seed capital and SME IPO participation.

GS 3: Economy

Key Pointers:

- What is Long-Term Capital Gains Tax?
- What is Securities Transaction Tax?
- What is PM MUDRA?
- What is Non-Performing Asset?

India's efforts to clean its air need not slow its economic growth

The best interventions must address air pollution while supporting development priorities; cleaner industrial processes may reduce emissions while improving efficiency; clean cooking can reduce household smoke; better waste management can reduce open burning, improving urban services

Ajay Singh Nagpure

India ranked 176 out of 177 countries in the 2026 Environmental Performance Index (EPI), published by the Yale and Columbia Universities in the U.S. The index assesses 47 indicators across 12 categories. Of them, India performed the worst on air quality, where it ranked 175, yet it did considerably better on air pollution, ranking 88.

This contrast is illustrative because only the latter matters for India's health burden. The State of Global Air 2025 report estimated that more than 20 lakh deaths in India in 2023 could be attributed to air pollution.

Many activities that contribute to air pollution are also central to India's development. Industries create jobs, power plants supply electricity, transport moves people and goods, and agriculture supports livelihoods and feeds the population. So cutting emissions from these sources involves choices about technology, investment, affordability, and the ability to implement change.

The Chinese example

China offers a useful example on whether mitigation can keep pace as economic activity expands. It began strengthening industrial emissions controls while its economy was still expanding rapidly. Between 2005 and 2010, sulphur dioxide (SO_2) emissions dropped 14% as a result. China later introduced a broader clean-air campaign that yielded substantial drops in fine-particle pollution. Research in Beijing attributed most of the PM2.5 decline during 2013-2017 to emission controls rather than weather alone.

China's institutions, economy, and energy systems differ from India's, so India cannot simply copy its approach. Nevertheless, its experience shows that bringing pollution under control does not have to wait until economic growth is complete.

For India, the first question is therefore whether pollution can reduce fast enough while the economy continues to grow. India is already adding renewable power, electric vehicles, cleaner cooking fuels, and pollution-control programmes.

Judging progress

The International Energy Agency expects India's electricity demand to grow by 6.4% a year on average through 2030, with industry accounting for roughly a third of the additional demand. Solar power is expected to meet around half of that growth, while coal supplies about one-quarter.

While these projections do not say whether air pollution will rise or fall, they indicate why the number of cleaner technologies introduced is not enough to judge progress. What matters is whether their combined effect is large enough to offset the growth in emissive activities.

The difficulty of balancing these objectives is visible in the thermal power sector. In July 2025, the Union government revised SO_2 requirements for coal- and lignite-fired power plants. Mandatory standards were retained for one category of plants, another category became subject to case-by-case assessments, and a third received exemptions subject to conditions.

The government cited issues such as technical feasibility, electricity prices, water and auxiliary-power requirements, limestone consumption, and associated carbon emissions. These are legitimate considerations in infrastructure policy. However, SO_2 also contributes to secondary, fine-particle pollution. This example captures a larger dilemma: the immediate cost of pollution control is visible and concentrated while some of its health and environmental benefits are distributed across a wider population and may emerge over time. Yet both need to inform decision-making.

India has nevertheless made progress. Official figures show that 108 of the 130 cities covered by the National Clean Air Programme (NCAP) recorded lower annual PM10 concentrations in 2025-26 than in 2017-18. This does not necessarily indicate a similar trend in PM2.5 – nor can an observed decline in pollution after a policy is introduced be attributed to that policy alone. Some confounding factors include the weather and changes in emission profiles.

Between 2019-20 and 2025-26, the government provided ₹16,423.55 crore in performance-linked funds to 130 NCAP cities for air pollution control. National programmes such as the Pradhan Mantri Ujjwala Yojana, PM E-DRIVE, PM Surya Ghar, and solid-waste management initiatives can also provide benefits by nudging household fuel use, transport emissions, electricity generation, and waste-burning. But cleaner air is not their only objective, and the programmes cover different periods and financial arrangements. Put another way, what matters for policymakers should be the connection between investment and outcome: how much pollution a measure is expected to prevent, how much exposure it actually reduces, what it costs and whether the benefits justify those resources. Without that connection, a larger budget may indicate greater activity without necessarily showing that mitigation is keeping pace with the problem.

Practical questions

That brings the discussion to the question: how does scientific knowledge become action in real economic and social conditions? For instance, giving a household access to LPG creates an opportunity to reduce smoke from traditional fuels, but access does not guarantee sustained use. Fuel prices, household income, and the availability of alternatives influence what families actually use. And just being aware of the health risk alone does not remove these constraints.

So the strongest interventions may be those that address air pollution while also supporting other development priorities. Cleaner industrial processes may reduce emissions while improving energy efficiency. Reliable clean cooking can reduce household smoke while improving convenience and health. Better waste management can reduce open burning while improving urban services. Such co-benefits should be demonstrated explicitly.

That approach also changes how success should be judged. Instead of asking only whether a new programme has been launched, a technology installed or funds allocated, each new intervention needs to be examined with practical questions: what pollution is it expected to reduce, what will it cost, who can realistically implement it, what other benefits or burdens will it create, and did exposure actually decline afterwards?

Such an approach will not eliminate the political and economic choices involved in pollution control but it will make those choices more transparent and give decision-makers a clearer basis for expanding measures that work.

(Ajay Singh Nagpure is an environmental systems scientist at the World Emissions Network. an3173@princeton.edu)



A man sweeps near the India Gate in New Delhi that was shrouded in thick smog on Monday. Many activities that contribute to air pollution are also key to India's development and cutting emissions from these sources involves choices about affordability and the ability to implement change. SHASHI SHEKHAR KASHYAP

THE GIST

- For India, the first question is whether pollution can reduce fast enough while the economy continues to grow
- India is already adding renewable power, electric vehicles, cleaner cooking fuels, and pollution-control programmes
- China, which began strengthening industrial emissions controls while its economy was still expanding rapidly, offers a useful example on whether mitigation can keep pace as economic activity expands
- China's institutions, economy, and energy systems differ from India's, so India cannot simply copy its approach
- Nevertheless, China's experience shows that bringing pollution under control does not have to wait until economic growth is complete

GS 3: Environment

Key Pointers:

- What is the status of India's air pollution problem?
- Environmental Performance Index (EPI)
- Why is controlling air pollution difficult for a developing economy like India?
- Why is India's growing electricity demand important for air-quality management?
- How do major government programmes contribute to cleaner air?

AMRITA IAS

WHAT IS IT?

Meson to muons: ultra-rare decay

Vasudevan Mukunth

You know that matter is made of protons, neutrons, and electrons. Technically, matter is made of many, many more subatomic particles — so many that physicists refer to them all as the particle zoo.

Now, scientists at the European nuclear research facility CERN have reported evidence of an extremely rare phenomenon in which one kind of subatomic particle transforms into two other particles. The finding could offer a more precise way to test our understanding of how our universe and its particles work.

The team studied a particle called the B^0 meson. Mesons survive for a small fraction of a second before transforming into other particles. The B^0 meson can decay into two particles called muons, one positively charged and the other negatively charged. Muons are like electrons but around 200-times heavier.

But this transformation is rare. The Standard Model is the theory that describes how these particles behave and three of the forces that act between them. And it predicts only around 1 in 10 billion B^0 mesons will decay into two muons. The researchers found evidence for the decay at the CERN supercollider at a significance of 3.2 sigma — meaning the signal is unlikely to be arbitrary data mimicking the real thing.



Scientists have found evidence of an unusual subatomic phenomenon in data collected by the Large Hadron Collider (shown). AFP

The finding matters because scientists know the Standard Model is incomplete: it can't explain phenomena like dark matter. So scientists have proposed extensions to the theory that invoke new particles, and these could change the frequency of rare particle decays.

In this instance, the team found the B^0 meson decay's properties matched the Model's predictions, which could rule out certain extensions.

For feedback and suggestions for 'Science', please write to **science@thehindu.co.in** with the subject 'Daily page'

GS 3: Science and Technology