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Trump declares end to U.S. citizenship by birth

Democratic-led States challenge order that could affect thousands of Indians in the U.S.; President also threatens 100% tariffs on BRICS countries if they attempt to move to 'non-dollar' transactions

Suhasini Haidar
NEW DELHI

Shortly after being sworn in on Monday, U.S. President Donald Trump signed an Executive Order cancelling the provision of "citizenship by birth", which could directly affect thousands of Indian professionals working in the U.S. under H-1B and other temporary visas, who hoped to raise their families there.

Mr. Trump also said he planned to levy "100% taxes" on BRICS countries for attempting to move to "non-dollar" transactions, referring to the 10-nation grouping of emerging economies that includes India.

"As a BRICS nation, they'll have a 100% tariff if they so much as even think about doing what they



Signing spree: U.S. President Trump throws pens used to sign Executive Orders to the crowd in Washington on Monday. AP

thought, and therefore they will give it up immediately," he said, erroneously referring to Spain as a BRICS member.

In addition, Mr. Trump's plans to crack down on undocumented and illegal immigrants could hit about 7.25 lakh Indians, of which nearly 18,000 are already

on a "final list for removal" or deportations.

Move challenged

A coalition of 18 Democratic-led States along with the District of Columbia and city of San Francisco filed a lawsuit in federal court in Boston on Tuesday arguing that the Republican Presi-

dent's effort to end birthright citizenship was a flagrant violation of the U.S. Constitution.

As concerns grew in India over the announcements, External Affairs Minister S. Jaishankar was set to meet incoming U.S. Secretary of State Marco Rubio to discuss priorities for the India-U.S. bilateral relationship and the Quad.

The one-on-one meeting, which would be Mr. Rubio's first with any foreign dignitary, was due to take place on Tuesday afternoon in Washington, following a meeting of the Quad Foreign Ministers.

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Nature's rhythms



In sync: A pair of Olive Ridley turtles seen in the waters of the Bay of Bengal off Odisha coast ahead of their mass nesting. BISWARANJAN ROUT

Kerala Assembly calls for fresh UGC norms

The Hindu Bureau
THIRUVANANTHAPURAM

The Kerala Assembly on Tuesday unanimously adopted a resolution calling for the immediate withdrawal of the draft University Grants Commission (UGC) regulations of 2025.

The resolution urges the Centre to review the proposed norms and to introduce a fresh set of guidelines after thorough consultations with State governments, academics, and other stakeholders to ensure that the interests of all parties are adequately considered.

The move follows a call by Tamil Nadu Chief Minister M.K. Stalin, who urged other States to pass resolutions similar to the one re-



Pinarayi Vijayan

cently adopted by the Tamil Nadu Assembly.

The resolution, moved by Chief Minister Pinarayi Vijayan, flags the guidelines as inconsistent with India's federal structure and says it fails to reflect the principles laid down in the Constitution.

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Inaugural drama

Donald Trump is living up to his threats and promises

Republican Donald Trump has been sworn in as the 47th President of the U.S. after his decisive victory in the November 2024 election. He marked the start of his second innings with a slew of executive orders, actions and directives that set the tenor for his administration's policy agenda over the four years. Significant among these are the nearly 1,600 pardons issued to those prosecuted for their role in the riot at the U.S. Capitol in 2021, the U.S.'s exit from the Paris Climate Agreement and the World Health Organization, the ending of birthright citizenship, protected under the U.S. Constitution's 14th Amendment, for children of undocumented migrants and those on temporary visas, a proposed 100% tariff on BRICS nations – both of which could impact Indians considerably – and 25% tariff on Canada and Mexico from February 1, a declaration of national emergency on the U.S.'s southern border with Mexico, and reversing 78 executive orders and memoranda of his predecessor, Joe Biden. Striking optics of Mr. Trump's swearing-in was the positioning of tech bosses Elon Musk, Jeff Bezos, Sundar Pichai, and Mark Zuckerberg, prompting speculation on whether the incoming administration would have shades of a de facto "oligarchy"; and Mr. Musk, who is heading the new government's efforts to reduce waste and inefficiencies, giving a crowd what appeared to resemble a Nazi salute. As it stands, however, some, if not most, of these executive orders will face legal challenges – the attempted reading down of the 14th Amendment has already been challenged in court.

The note that the second Trump administration has struck in terms of its policy agenda appears to be innately hostile to the progressive agenda of the Democrats. To a considerable extent, that is to be expected, as the two parties diverge significantly on matters such as the economy, immigration and reproductive rights. Yet, previous Republican governments have often sought to build bridges with Democratic colleagues in Congress and at the State level, to find bipartisan consensus in key policy areas rather than risk deadlock and internecine conflicts over policy design and resource allocation. In this instance, however, the federal government trifecta and a sympathetic Supreme Court stacked with conservatives might mean that the Trump team needs to rely even less on support from across the aisle than it did during the Trump first term. Further, Mr. Trump appears to be emboldened by the breadth of his election victory to allow unconventional, even bizarre, policy priorities to enter the proposed agenda, including ideas such as the takeover of the Panama Canal, the de-recognition of transgender rights, threatening Denmark with a plan to takeover Greenland, and the prospect of travel bans for certain countries. Perhaps America is getting what it voted for.

The price of success

Kerala's rising maternal mortality ratio is not yet a cause for concern

There can be too much of a good thing, after all. The demographic transition that Kerala has heralded in the country has now delivered a sucker punch to the State, with its maternal mortality ratio climbing. Kerala led the shift to the phase of low fertility and low mortality in India, and got further, first. As the fertility level dropped, the number of births came down, thereby skewing the best maternal mortality rate (calculated as the number of deaths for every 1,00,000 live births) of the country, in Kerala. The State led the demographic transition by achieving the total replacement level fertility rate in 1987-88, and the other southern States followed in the mid-2000s. A TFR of 2.1 is considered the replacement level, indicating the number of children a woman must have in order for the society to maintain its size across generations. Below this level the population size falls. In fact, this has led to moments of anxiety, politically for the southern States that feel that with their sub-replacement level fertility rates, they will be at a disadvantage when it comes to the proposed delimitation exercise of Lok Sabha seats based on population figures. In theory, demographic transition occurs when a historical shift happens from high birth rates and high death rates to low birth and death rates, aided by advancements in education, economic development and technology. Such a transition is said to have occurred in most parts of the world, allowing the world to stabilise from the unprecedented growth forecast by Malthus, and then move on to reduce population growth, and birth rates. The theory posits four stages – moving from stable population to a rapid population growth, levelling out and finally, a decline.

Nations that have reached there, including South Korea, are struggling to revive population growth, and even incentivising childbearing does not seem to have the intended effect, as the fertility rate continues to drop. While it is impossible to stop a demographic transition in its tracks, governments must prepare for the trail of consequences that it will bring in its wake. There will be far-reaching economic and societal consequences as the proportion of the working-age population comes down and the aged population increases, placing an inordinate burden on the resources of nations. It is, therefore, important to strengthen public finances and social support systems in preparation for a growing elderly population. Health-care financing will have to be improved, and policies that support equal participation in household chores must be prioritised.

Sixteen years ago, this writer and other organisers of the Coalition for Partnership with India rejoiced at the final approval of the United States-India civil nuclear deal through the U.S. Congress. The long struggle for passage of the necessary U.S. legislation began in 2005, and it was only in late 2008 that the Coalition succeeded in working with the George W. Bush administration and U.S. Congressional leaders to make the deal legal under U.S. law.

The Coalition for Partnership with India was a loose association of businesses, Indian-Americans, and academics that supported U.S. approval of the deal in the face of fierce opposition that stipulated that the deal would promote the proliferation of nuclear weapons. As a consultant to the U.S.-India Business Council, this writer was privileged to recruit and act as a liaison among Coalition components, plan strategy, and advocate before the Congress.

A game-changing deal

The U.S.-India civil nuclear deal was a watershed moment and opened a whole new era in defence and strategic cooperation for the two democracies that had become estranged during the Cold War. Without the trust engendered by the willingness to cooperate in dealing with the most powerful and potentially most destructive technology ever seen, the present level of U.S.-India interaction on defence purchases and manufacturing, military exercises, technology transfer, intelligence sharing, and crisis management would never have occurred.

And yet, the energy and commercial promises of the U.S.-India deal have never been fulfilled. Those of us who supported and advocated for the deal envisaged the augmentation of the Indian civil nuclear sector with many plants being built using U.S. equipment, technology, and allied services. Employment would be created both in the U.S. and India. More electricity would be generated by plants to fuel Indian industry and benefit the average Indian. This energy would not generate greenhouse gases and help wean India away from an over-reliance on climate changing, and often toxic, fossil fuels. Even though U.S. President Barack Obama announced in 2016 that Westinghouse would build six new nuclear plants in India, this has not happened yet.

Jake Sullivan, in his last trip to India as U.S. President Joe Biden's National Security Adviser, announced, "... the United States is now finalizing the necessary steps to remove long-standing regulations that have prevented civil nuclear



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cooperation between India's leading nuclear entities and U.S. companies." Will this development be the mechanism that breaks the logjam that has prevented the U.S.-India deal from fulfilling its true potential? If only it were so simple.

At the conclusion of the civil nuclear deal in 2008, there were approximately 200 Indian entities on the so-called "Entity List" kept by the U.S. Department of Commerce. In general terms, U.S. companies are prohibited from doing business with companies on this list unless a special licence is granted. In practice, such licences are seldom granted. After the U.S.-India civil nuclear deal, all but a handful of Indian companies dealing with nuclear matters were removed from the list. This was one of the benefits of the deal. Among those remaining, were those that were mainly involved in research and development and thought to involve the risk of nuclear technology leakage into military uses and other security issues, including leakage to Russia and other adversaries of the U.S. Mr. Sullivan, in his speech in New Delhi, made oblique reference to this concern when he said, "As we see more and more new technologies diverted to unfriendly actors, the United States and India will also need to ensure that valuable dual-use technologies don't fall into the wrong hands. This means aligning our export control systems..."

Apparently, the Biden Administration decided that the few remaining Indian nuclear entities on the U.S. Entity list no longer present the kind of security concerns that landed them on that list in the first place. This is all well and good and can be considered progress, although it remains to be seen whether the security and foreign policy agencies under Mr. Trump will agree with that assessment. However, this is not the heart of the problem preventing the U.S.-India civil nuclear deal from reaching its full potential.

The liability risk issue

In 2010, India enacted the Civil Liability for Nuclear Damage Act. This Act was fuelled in Parliament by those who had lost the attempt to block the deal and their anti-foreigner rhetoric, including invocation of the infamous Bhopal/Union Carbide tragedy. The result was India departing from international civil nuclear liability norms and placing major liability obligations not on the operators of a civil nuclear facility but on the suppliers. Neither of the major U.S. suppliers – GE and Westinghouse – was willing to assume these liability risks, and neither

the U.S. nor India was willing at that time to step in to ameliorate these liability concerns.

The Indian Government did attempt later to provide some relief from liability risks in conjunction with the resumption of Russian participation in the Indian civil nuclear expansion. Through India's public sector General Insurance Corporation, and four other government companies, a 20-year insurance premium would be charged to cover the supplier's liability for an accident. The Russians accepted this risk amelioration in large part because their overseas civil nuclear entities are government owned, will have a defence of sovereign immunity, and in any case will be protected by the Russian government from liability that might otherwise put them out of business. And the Russians saw their increased participation in Indian civil nuclear development as bearing significant geopolitical dividends. The Russians are now moving forward with India on civil nuclear expansion. The U.S. companies have been unwilling so far to accept this insurance amelioration. Thus, the Trump administration will have to find means to cut the Gordian knot of liability before there will be significant U.S. company involvement in Indian civil nuclear expansion.

Hurdles such as technology, consumer costs

There are other significant barriers to the full involvement of U.S. companies in Indian civil nuclear expansion that have arisen since the 2008 conclusion of the U.S.-India civil nuclear deal. Civil nuclear technology has evolved rapidly. For U.S. companies to be fully involved, they must show that they can offer the latest technology. Most importantly, this technology and its implementing equipment must be offered at a reasonable price that will not increase electricity costs to the Indian consumer. Indian civil nuclear officials are acutely aware of the disastrous cost overruns that have doomed the latest civil nuclear facilities in the U.S. and left ratepayers to shoulder unwelcome costs without improvements in either quantity or quality of services.

All these challenges limit the full fruition of the U.S.-India civil nuclear deal. But they cannot be met by U.S. companies acting alone. The Trump administration can work with Indian and U.S. nuclear companies not just on regulatory issues but also those involving liability, technology, and cost as well. The hour is late, but the benefits to seizing the full promise of the U.S.-India civil nuclear deal will be tremendous.

Trump 2.0 as disruptor of the global legal order

Donald Trump's second term as President of the United States marks the start of a new 'Trumpian' era, defined by his leadership. Foreign policy experts expect that Mr. Trump will continue to embody the image of a disruptor. The international legal order is expected to experience substantial changes.

As the leading global power of our time, the U.S. has always maintained a complicated relationship with international law. The U.S. has played a vital role in establishing many key institutions and frameworks within international law, as well as in shaping their norms, priorities and agendas to align with American interests. This influence is evident across various areas of international law, including climate change law, space law, human rights law, and trade and investment law. At the same time, America has often followed a policy of exceptionalism, i.e., an attitude of being 'distinct' and thus an 'exception' to the law that binds all other nations. Thus, the U.S. has been criticised for violating or sidelining the same norms and institutions of international law that it helped create and expects other countries to follow.

The Trump 1.0 years

While this has been the case for many American presidencies, the Trump Presidency took it to a completely different level, almost waging a war on international law. Elected with the slogan of "America First", Mr. Trump's first term reflected what international law scholars Oona Hathaway and Scott Shapiro call a 'sovereignist view of international law' which often misconceives entering into multilateral treaties as putting unacceptable limits on sovereign authority. Mr. Trump's first term was marked by scepticism towards multilateralism and a preference for bilateralism, which is usually the case of emerging revisionist powers but strange for the incumbent superpower.

Accordingly, the Trump administration, in June 2017, famously walked away from the Paris



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Agreement on Climate Change. Washington also reneged on a key nuclear treaty with Russia and a nuclear deal with Iran. Mr. Trump also posed major challenges to the international trade regime by using tariffs and other protectionist measures, including against allied countries.

He continued blocking appointments into the World Trade Organization (WTO)'s Dispute Settlement Body's Appellate Body, which ultimately led to the organ becoming dysfunctional. Under his presidency, the U.S. withdrew from the Trans-Pacific Partnership (TPP) agreement that the Obama administration had so assiduously crafted and put an end to the North American Free Trade Agreement or NAFTA and negotiating a new trade agreement. Additionally, during the Trump first term, the U.S. withdrew from several international institutions such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), attempted to withdraw from the World Health Organization (WHO), and threatened withdrawal from the WTO.

Another onslaught

Mr. Trump's return to the White House could accelerate the weakening of the normative authority of multilateral institutions. While the U.S. rejoined many of the multilateral institutions under the Biden administration, it might again disengage from them. In fact, within hours of his inauguration, he reportedly signed executive orders initiating the U.S.'s withdrawal from WHO and the Paris Agreement. Mr. Trump has announced fresh plans to pursue unilateralism by raising tariffs, even if it triggers a trade war and violates WTO rules.

He has already announced that he may impose a 25% tariff on imports from Mexico and Canada. His belligerent onslaught on the Washington Consensus-based international trade and investment law model will continue unabated. Any hopes of the Global South of reviving the WTO's dysfunctional Appellate Body should be

President Donald Trump's renewed majority and control over the U.S. Senate and the House are likely to help him push forward his policies more effectively

abandoned. While some hoped that Mr. Trump's policies may translate into renewed U.S. isolationism and less interventionism, his recent statements belie such hopes.

His plans to annex Greenland and the Panama Canal, refusing to rule out coercive methods to do so, and include Canada as the 51st State of the U.S., are reminiscent of the 18th-19th century era of great powers acquiring sovereign territories through conquest and gunboat diplomacy. In the post-UN charter era, which considers the prohibition of using force and self-determination as central tenets, such ambitions may embolden other revisionist states such as China and Russia to embark on similar quests for obtaining territory.

As scholars such as Marko Milanović have pointed out, even if Mr. Trump ultimately does not use force, these statements potentially violate the norm of non-intervention under Article 2(7) of the UN Charter, further challenging the international order. The statements made by his allies, such as Elon Musk (who is part of the Trump administration), commenting on the internal politics and laws of allied countries such as the United Kingdom and Germany, have also irked many and could be construed as unacceptable intervention.

Other nations and the legal order

International lawyer Harold Koh has pointed out that the participants involved in the 'transnational legal process', including many officials within the U.S. itself, were able to blunt many of Mr. Trump's policies in his first term, particularly those affecting international law. However, with Mr. Trump's renewed majority and control over both the Senate and the House, it is more likely that he will be able to push forward his policies more effectively. In that case, other countries must cooperate to preserve the international legal order.

The views expressed are personal

The world has been changing for a while

One of the things one learns as a historian – and as a traveller – is that places change. I was in Chennai for the wonderful Lit for Life festival alongside a host of stellar thinkers and speakers and marvelled at the transformation of the city. I do not mean the airport that has been upgraded since I last came to Tamil Nadu, or the infrastructure that is changing daily life for Chennai's inhabitants, but something more fundamental.



Peter Frankopan

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Environmental change

In 2019, Chennai declared 'Day Zero', when water ran out. Many recognised that water management needed to be overhauled; some questioned the viability of a city that was unable to meet such basic needs. Five years on, the story could not have been more different: unseasonal and catastrophic storms and torrential rains left the city inundated. People were driven out of their homes not because of too little water, but too much.

We are living through a major environmental reorganisation and we can learn from previous episodes of disruption and change. The difficulty, as shown so clearly by the case of Chennai, is that it is not enough to prepare for droughts or for deluges, but to prepare for both.

Such lessons are particularly important today because of the scale of the climatic shifts that are taking place: no human has ever lived in such a warm world, nor one with such high concentrations of carbon dioxide in the atmosphere. Half of all fossil fuels have been burned by humans since Sachin Tendulkar made his Test debut for India. That does not feel so very long ago to me.

Environmental change is all the more challenging because it is just one of a set of revolutions that are transforming the world around us. New technologies are giving us new powers to communicate and share with each other, but also to rile, antagonise and threaten,

We are not so much on the cusp of a new era but have been in one for some time. And that is what change is all about – invisible, unnoticed and unremarkable

helping polarise political discussion.

The return of Trump

Ironically, while political leaders in some countries may think they are giving people what they want, the evidence suggests otherwise: in 2024, more people cast their votes at the ballot box around the world than in any year in history. While each country has its own story, one common trend was that political parties that were in power either found it almost impossible to remain in office and were voted out, or had their majorities sharply reduced.

There are many explanations as to why. But the most persuasive would seem to be that voters can see the world changing in front of their eyes and are hungry for ideas of how to best embrace the opportunities and how to cope with the disruptions of the modern age. That is best summed up by the return of Donald Trump to power, something that has been accompanied by question marks not just about the role of the U.S. in global affairs, but of its long-term role as a stabilising force.

Mr. Trump's well-publicised comments about buying Greenland, taking the Panama Canal, or using 'economic force' to compel Canada to join the U.S. can perhaps be taken with a pinch of salt. But India's ever-astute Minister of External Affairs S. Jaishankar is right to note that Mr. Trump's return to the White House may have "profound consequences for the global order." Indeed, added Mr. Jaishankar, "we may well be on the cusp of a new era."

Just look, then, at the case of TikTok. On Sunday, it began to shut down following outgoing President Joe Biden's decision that the Chinese company posed a threat to U.S. national security. With Mr. Trump's anti-China rhetoric, one might have expected this to be confirmed. Instead, he intervened to keep the company alive, at least for now.

That fits exactly within Mr.

Trump's sweet spot of being pragmatic and open to business – though it also shows his opportunism: Tik Tok would make a nice 'thank you' present for Elon Musk for his crucial support during the election, one that has the further advantage of keeping Mr. Musk busy. That Mr. Trump rode in to save a Chinese business, rather than destroy it, is instructive about how he thinks.

The road ahead for India

As for India, things look more complicated. The world looks different from when we saw the 'Howdy Modi' and 'Namaste Trump' events of 2019 and 2020. For one, it will be harder for Delhi to play the game of multiple alignments of being a leading part of both BRICS and the Quad, of getting oil from sanctioned entities, of buying U.S.-made Apache helicopters but also Russian S-400 air defence systems. India has made a virtue of trying to keep all options open. That will come under pressure in the next four years as Mr. Trump is the sort of leader who does not want his friends to have other friends.

The winds of change are blowing, in other words. Mr. Trump took office hours after the first proper breakthrough in West Asia, with many hoping that the devastation of Palestine is finally now over. He faces an Iran that is weaker and more exposed than perhaps at any time in the last 40 years, a Russia that has enfeebled itself economically, culturally and militarily through the invasion of Ukraine, and a China whose outlook on global affairs has moved substantially in the last decade. Of all of Mr. Trump's qualities, the most important is that he is lucky with his timing.

If you ask a historian, we are not so much on the cusp of a new era but have been in one for some time. And that, of course, is what change is all about – invisible, unnoticed and unremarkable. Luckily, historians can tell you a thing or two about that.

A sweet win for turmeric farmers

The National Turmeric Board needs adequate funds to fulfil its objective

STATE OF PLAY

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This year's Sankranti was particularly sweet for the turmeric farmers in Telangana as their nearly two decade-long demand for a National Turmeric Board (NTB), headquartered in Nizamabad, became a reality when Union Minister of Commerce and Industry Piyush Goyal inaugurated it on the day of the festival. Turmeric is widely cultivated in Nizamabad and parts of north Telangana along the Godavari river.

Mr. Goyal said the Board would boost exports of about 30 varieties of turmeric grown in 20 States, including Maharashtra, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, and Meghalaya. The Board has been entrusted with the task of promoting research and development of new products and exploring the scope for value addition to turmeric-related products for markets abroad. There are plans to leverage the medicinal value of turmeric extensively.

According to the Union government, in 2023-24, 3.05 lakh hectares were under turmeric cultivation in India, which produced 10.74 lakh tonnes of the crop. India accounts for 70% of global turmeric production with Telangana playing a key role in cultivation. In 2023-24, 1.62 lakh tonnes of turmeric and turmeric products valued at \$226.5 million were exported.

The demand for a Board began in 2006. The Swadeshi Jagran Manch, an organisation for the welfare of the farmers, asked for remunerative prices for turmeric and highlighted the need for an exclusive Board for the crop. According

to Kotapati Narasimham Naidu, founder-president of the Telangana Turmeric Farmers Association, the then Chief Minister, Y.S. Rajasekhara Reddy, responded positively to the demand and ensured that a Turmeric Research Station was established in 2007 at Kammarpally.

Turmeric farmers, who have seen highs and lows in crop production, continued to demand a Turmeric Board along the lines of the Spices Board, Tobacco Board, and Silk Board. They contended that it would bring in innovative farming technologies, add value to the crop, boost production, and improve remuneration for the crop.

The issue took a political turn in the 2019 general elections. The BJP candidate from the Nizamabad Lok Sabha constituency, Dharmapuri Arvind, a political debutant, signed a judicial bond paper saying he would quit as MP within days of winning if he was unable to get the Board established. This caught the attention of the electorate. The Bharat Rashtra Samithi (BRS) candidate, K. Kavitha, daughter of the former Chief Minister K. Chandrashekar Rao, faced a humiliating defeat from the constituency.

The BJP MP dragged on the issue, however. When the Centre announced a regional office of the National Spices Board, farmers were furious. A month before the Telangana

Assembly elections in 2023, Prime Minister Narendra Modi announced that the Board would be set up. A gazette was issued on October 5, 2023, announcing this, but it did not mention where the Board would be headquartered. This again led to another round of war of words between political parties. During the 2024 general elections, the Congress, the BJP, and the BRS argued about the failed promise.

The sudden announcement of the National Turmeric Board with its headquarters in Nizamabad has given the BJP a shot in the arm. But the Congress too tried to stake its claim in the development with its leaders calling for comprehensive support to farmers including a robust marketing system, godowns, cold storage facilities, and an assured minimum support price (MSP).

While the establishment of the Board is a watershed moment for the farmers in Nizamabad district, a lot needs to be done for its effective functioning. The first demand is a MSP for turmeric. Farmers have been worried that prices keep fluctuating. Last year, turmeric was sold in the Nizamabad agriculture market between ₹15,000 and ₹18,000 per quintal. Now, it is priced at ₹10,000 per quintal.

Putting in place robust infrastructure such as buildings for the Board, and training, research and development centres are the need of the hour. Farmers believe that the Research Centre at Kammarpally can be brought under the purview of the Board.

The purpose of the Board will be served only when there is decent budgetary allocation to meet all the needs. In the initial period, the Board needs to be closely monitored and given adequate funds so that the farmers' dreams are fulfilled.

Undocumented migrants in U.S.: vital workforce, low criminality

Nearly 80% of undocumented migrants currently in the U.S. have lived there for over a decade

DATA POINT

Nitika Francis
Vignesh Radhakrishnan

United States President Donald Trump introduced sweeping changes immediately after being sworn in, which could have a lasting impact on millions of undocumented migrants in the U.S. and the hundreds of thousands of people seeking entry at the country's borders. Mr. Trump pledged to "deport millions and millions of criminal aliens," referring to undocumented migrants living in the country.

While Mr. Trump has frequently claimed that former President Joe Biden allowed 15-20 million illegal immigrants into the country, official figures estimate that there are around 11 million (Chart 1). Other estimates suggest that there are 13-14 million illegal immigrants. But none of these comes close to Mr. Trump's assertions. Around 2.1 lakh Indians were included in these estimates (as of 2022).

Nearly 80% of the estimated 11 million undocumented migrants currently in the U.S. arrived before 2010. Chart 2 shows that 1.5 million of them entered decades ago, between 1980 and 1990.

Reports state that Mr. Trump has also dismissed top immigration court officials who are responsible for deciding who gets asylum and who does not. There are more than 3 million cases pending in immigration courts. In addition, Mr. Trump has shut down the mobile app CBP One, the sole platform for requesting asylum in the U.S.

Chart 3 shows that in just over a year, the backlog in immigration courts increased from 2.4 million to 3.5 million (Q4 of 2023-Q4 of 2024). Notably, the number of Indians attempting to enter the U.S. illegally has surged in recent years. A decade ago, U.S. border authorities stopped more than 1,500 Indian illegal migrants. This figure rose sharply to 96,917 in 2023 and

90,415 in 2024. There was a similar spike seen among Indians seeking asylum in the U.S.

Moreover, a Bill passed by the Senate empowers officials to detain and even deport undocumented migrants who are arrested for or charged with even non-violent petty crimes such as shoplifting. Mr. Trump has blamed migrants for fuelling violent crime in the country. But data show that the violent offending rate of undocumented migrants is significantly lower than that of U.S.-born citizens. The rate measures the frequency of criminal offenses committed by a specific population.

Chart 4 presents the rate of violent crimes committed in Texas between 2012 and 2018 by U.S.-born citizens, documented immigrants, and undocumented immigrants. The rate of violent crimes committed by undocumented migrants was half that of those committed by U.S.-born citizens and significantly lower than those done by documented immigrants.

A significant majority of undocumented migrants contribute to the U.S. workforce, particularly in construction and agriculture. With discussions of mass deportations gaining momentum, business owners in these sectors are increasingly concerned about finding viable alternatives.

A 2018 study by the Centre for Migration Studies of New York estimated that 5.5 million undocumented migrants are part of the U.S. workforce (Chart 5). If deported en masse, the most immediate impact would be felt on construction sites, in farms, and in restaurants. Essential services such as landscaping, laundry, auto repair, and safety and sanitation would also face severe disruptions.

The recent changes aim to deport undocumented migrants without a clear understanding of their numbers. Many have lived in the U.S. for decades, contribute significantly to essential services, and lead lives with relatively lower levels of criminal activity.

Illegal, yet indispensable

The data for Charts 1 and 2 were from the Office of Homeland Security Statistics, for chart 3 from the Congressional research service, for Chart 4 from a report by the National Institute of Justice, a U.S. government agency, published on September 12, 2024, and Chart 5 from the Centre for Migration Studies of New York



Futile wait: Migrants seeking asylum from Mexico, India and Ecuador waiting to be apprehended by U.S. Customs and Border Patrol officers after crossing over a section of border wall into the U.S. in Arizona. AFP

Chart 1: Estimates of illegal immigrants in the U.S. according to the Dept. of Homeland Security

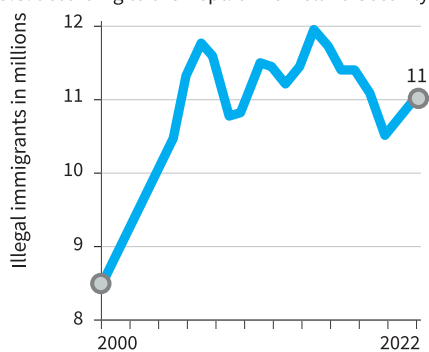


Chart 2: The chart shows the current illegal immigrant population estimates across various periods of entries

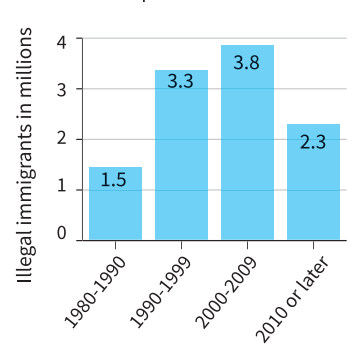


Chart 3: The chart shows the number of backlogged cases in immigration courts between Q2 of FY23 to Q4 of FY24

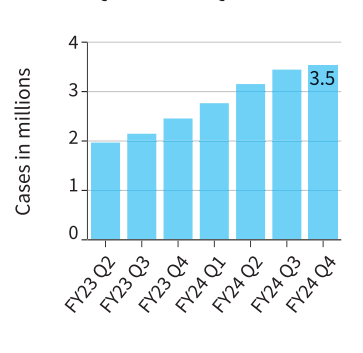


Chart 4: Rate of violent crimes committed in Texas between 2012 and 2018 by various groups

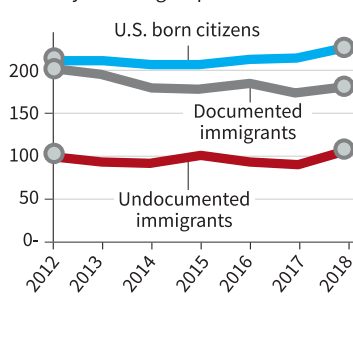
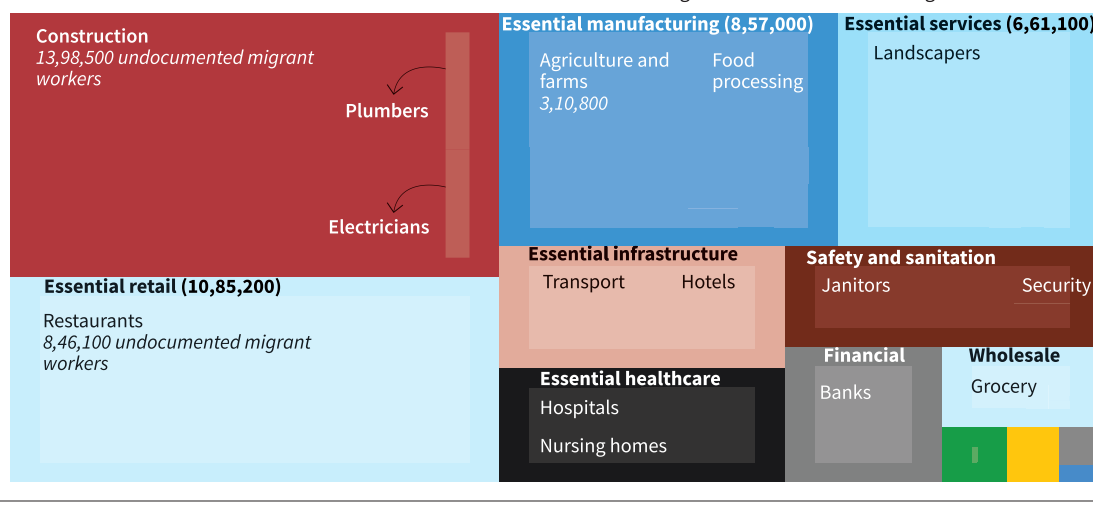


Chart 5: Chart shows the sectors in which the 5.5 million undocumented migrants worked as of 2018. Figures are estimates



Text & Context

NEWS IN NUMBERS

India's national sex ratio at birth in 2023-24

930 The government will organise celebrations to commemorate the 10th anniversary of the Beti Bachao Beti Padhao initiative. Beginning on Wednesday, the celebrations will continue till March 8, which is observed as International Women's Day. PTI

India's 2030 target for renewable energy production

500 in GW. The government is committed to increasing the production of renewable energy in the country by 2030 and meet 50% of the energy requirement from renewable sources, Union Minister Pralhad Joshi said on Tuesday. PTI

What do draft data protection rules state?

Will major tech companies such as Meta, Google, Apple, Microsoft, and Amazon be affected by the new rules on data localisation? How does Rule 22 augment Section 36 of the Digital Personal Data Protection Act, 2023? Will the new rules compromise end-to-end encryption of messages?

EXPLAINER

Aaratrika Bhaumik

The story so far:

The Ministry of Electronics and Information Technology on January 3, 2025, released the draft rules for implementing the Digital Personal Data Protection (DPDP) Act, 2023 – 16 months after the law was notified in August 2023. The Union government is currently soliciting feedback on the draft rules through a fiduciary framework that effectively precludes both public disclosure and the submission of counter-comments. “The draft rules, coupled with the existing legislation, are inadequate for establishing a comprehensive data privacy framework... Moreover, the government should consider submitting the rules to a parliamentary standing committee for scrutiny,” Amar Patnaik, advocate and former MP, told *The Hindu*.

What is the data localisation mandate?

The draft rules introduce a data localisation mandate that extends beyond the original scope of the legislation. Data localisation refers to measures that restrict the flow of data within a jurisdiction's borders. While the DPDP Act permits the government to limit personal data transfers, it confines such restrictions to specific notified countries.

In contrast, the rules propose the creation of a government-appointed committee to define which classes of data cannot be exported from India. This mandate will apply to significant data fiduciaries (SDFs), as designated by the government based on the volume and sensitivity of the personal data they process. Major tech companies, such as Meta, Google, Apple, Microsoft, and Amazon, are expected to fall within this classification. The localisation provision likely stems from the challenges law enforcement agencies face in accessing



GETTY IMAGES

cross-border data during investigations. In 2018, the Reserve Bank of India implemented a similar mandate, requiring payment data operators to localise their data within the country. Currently, financial, payment, and insurance data must be stored domestically, with copies of payment data allowed overseas solely to facilitate international transactions.

However, the government has clarified that the proposed committee is envisioned as a central body that will collaborate with other ministries and sectoral regulators to ensure the effective implementation of local data storage without disrupting industry operations. This approach could also help prevent ad hoc data localisation mandates from government departments working in silos. Union Minister of Information and

Broadcasting Ashwini Vaishnav earlier told media portals that the government plans to provide the industry with a two-year timeline to establish the necessary systems for compliance.

According to Aparajita Bharti, a founding partner at TQH Consulting, which advises tech companies on compliance with Indian laws, data localisation mandates could present substantial operational challenges for both large tech companies and start-ups. “It is extremely difficult for companies to segment different sets of data and determine the appropriate data centre for each tool. This will restrict business operations and result in higher operational costs,” she said.

What about executive overreach? Section 36 of the DPDP Act, read in

conjunction with Rule 22, empowers the Union government, through the designated authorised person, to demand “any” information from a data fiduciary or intermediary (entities processing personal data) in the interest of India's sovereignty, integrity, or national security. Experts have cautioned that such sweeping discretionary powers are susceptible to misuse, potentially enabling surveillance or the suppression of dissent.

Additionally, these provisions could compel social media intermediaries to compromise end-to-end encryption of messages – a concern raised by Meta-owned WhatsApp last year in its challenge to the Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021. Rule 22 prohibits companies from disclosing information about such government demands if doing so could “prejudicially affect the sovereignty and integrity of India or the security of the State.”

Apar Gupta, advocate and co-founder of Internet Freedom Foundation, told *The Hindu* that this provision stands in stark contrast to the recommendations of the Group of Experts on Privacy, headed by Justice (retd.) A.P. Shah, in 2012.

“The committee categorically recommended that individuals subject to interception should be notified. There is ample evidence of interception orders being misused by police departments under political influence. This provision effectively creates a giant backdoor for the government to requisition information without any checks and balances,” he said.

Ms. Bharti agreed, highlighting the absence of adequate restraints on the government. “The government should consider adopting safeguards akin to those under the Information Technology Act, 2000, to ensure that citizens are not left unaware of the nature and extent of data requisitioned by the government from data fiduciaries. Such expansive governmental discretion could also hinder commercial interests,” she said.

THE GIST

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▼ Section 36 of the DPDP Act, read in conjunction with Rule 22, empowers the Union government, through the designated authorised person, to demand “any” information from a data fiduciary or intermediary.

▼ The Union government is currently soliciting feedback on the draft rules through a fiduciary framework that effectively precludes both public disclosure and the submission of counter-comments.

What is the status of the Smart Cities Mission?

Why did the implementation of smart cities bypass local government and depend on Special Purpose Vehicles? What has happened to the mission in Shimla?

Tikender Singh Panwar

The story so far:

Almost a decade has passed since the Indian government announced the concept of “smart cities” as the new lighthouses of urbanisation. The June 2015 announcement of 100 smart cities aimed to create models of urban development. However, these lighthouses of urbanity have now been relegated to the annals of India's urbanisation history.

What went wrong with smart cities?

The smart cities initiative was based on the Internet of Things (IoT), a framework that works well in advanced capitalist countries where basic utilities are already in place. In contrast, in India, where basic services are still out of reach for many, “smart cities” essentially mean providing fundamental amenities to residents. The

plan included two key components – pan-city proposals which includes IT-enabled services like mobility and waste management; and Area-Based Development (ABD) which was restricted to specific zones within a city, focusing on retrofitting, redevelopment, and greenfield projects. Additionally, governance of these projects bypassed local governments, relying instead on Special Purpose Vehicles (SPVs) registered under the Companies Act, and managed like private companies. City councils were excluded, based on the assumption that private company-like structures could deliver better results.

What happened in Shimla?

Shimla was not included in the initial list of smart cities. However, after legal challenges posed by Shimla in the Himachal Pradesh High Court, Shimla was also granted the smart city tag.

Shimla's smart city plan adhered to guidelines, including pan-city initiatives and ABD projects. The city had proposed a mix of retrofit and redevelopment projects within ABD. The retrofit project had targeted improving city wide pedestrian crossings, vehicular mobility on circular roads, and three transport corridors in addition to underground ducting and parking provision. Additional features were also added that included eco-adventure tourism, and water security through storm water and spring water management. A total of 244 acres of land was supposed to be retrofitted. Redevelopment projects focused on Lower Bazar, Ganj Bazar, and Krishnanagar. The aim was to replace dilapidated, unsafe buildings with modern, resilient, earthquake-safe structures that could boost tourism.

The total estimated investment for Shimla was ₹2,906 crore, with funding

sources as follows – ₹897.80 crore from Public-Private Partnerships (PPP); ₹101.77 crore through municipal bonds; ₹205.57 crore from external borrowings; and ₹348.49 crore from State and Union government schemes, and the rest from other sources. However, as of now, according to the Smart City dashboard, only ₹707 crore (24% of the original budget) has been spent: ₹53 crore on completed projects and ₹654 crore on ongoing ones. The proposed PPP contribution has not yet materialised.

What has been the outcome?

None of the funds have been utilised for the redevelopment of the Lower Bazar, Middle Bazar, or Krishnanagar. Traffic congestion has worsened, and despite initial plans, non-motorised mobility remains neglected. Instead, funds were spent on flower pots worth ₹2 crore. Moreover, large, visually intrusive structures were erected for escalators that remain non-operational, obstructing Shimla's iconic valley views.

As the Smart City Mission approaches its final chapter, the lessons are glaringly evident. Projects devoid of meaningful urban governance and public involvement, are bound to fail. With no ownership or accountability, the smart city vision has faded into oblivion.

Tikender Singh Panwar is a former deputy mayor of Shimla and Member, Kerala Urban Commission.

THE GIST

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▼ Projects devoid of meaningful urban governance and public involvement, are bound to fail.

BUILDING BLOCKS

Why are antivenoms not easily accessible in India?

A landmark 2020 study by researchers from Canada, India, and the U.K. estimated that between 2001 and 2014, a staggering 1.2 million snakebite deaths and three-times as many cases of disability occurred in India

R.N.V. Krishna Deepak

In New Year's Day, five-year-old Mayuri lost her life to a snakebite in Uttara Kannada district in Karnataka. The delay in receiving antivenom and the unsafe conditions at her anganwadi tragically sealed her fate. She became one of the estimated 58,000 Indians who die every year from venomous snakebite, a terrible number that renders India the 'snakebite capital' of the world and highlights the scale of this preventable crisis. What makes snake venom so deadly, and how does antivenom neutralise its effects?

What are antivenoms?

Antivenoms, or antivenins, are life-saving medicines used to treat snakebites. They are produced by injecting small amounts of venom into animals, usually horses, which then produce antibodies as part of their immune response. These antibodies become antivenoms.

Snake venom is one of nature's most lethal weapons, a complex cocktail of toxic proteins, each tailored by evolution to immobilise, and in some cases to digest, prey and defend against threats. When a sufficient quantity of venom is injected during a snakebite, the toxins wreak havoc on the human body in multiple ways. Haemotoxins destroy blood cells and disrupt clotting. Neurotoxins block nerve signals and paralyse. Cytotoxins dissolve tissue at the bite site. The effects are often fatal without medical intervention.

Antivenoms are the frontline defence. They work by specifically binding to the venom toxins to render them ineffective, allowing the body's natural defence systems to clear them safely over time. But for antivenom treatment to succeed, responders need to know which snake species inflicted the wound and how much venom it injected.

Polyvalent antivenoms (PVAs) currently used in India target multiple species. However, their efficacy varies against less common snakes. Understanding each venom's complexity and the mechanisms of antibody production remains central to improving treatments.

How do antivenoms work?

The production of antivenom is a remarkable interplay of human ingenuity, animal resilience, and immunological mastery, dating back to the pioneering work of French physician Albert Calmette in the 1890s. He developed the first antivenom using horses, a practice that continues today.

To produce antivenom, healthy and mature venomous snakes are first captured from the wild by trained experts who then "milk" the snakes to extract the venom. Next, they immunise horses with increasing doses of venom over many weeks, allowing their immune systems to produce antibodies. The dose of venom injected into horses is critical: too little and the immune response will be weak; too much and the horse's body could be damaged.

Over time, the horses develop a robust immune response, producing antibodies that neutralise venom toxins. The antibodies thus produced are very



Dangerous process: A snake-catcher extracts venom from a cobra at the venom extraction centre of the Irula snake-catchers cooperative near Mahabalipuram in 2024. B. VELANKANNI RAJ

specific to the type of toxins injected, like a lock and its key. This process mirrors how humans develop resistance to familiar pathogens like the flu or common-cold viruses – through repeated exposure or vaccination. The experts extract these antibodies from the horse's blood and purify and formulate them as antivenoms.

Several companies in India, including Bharat Serums and Vaccines, Haffkine Bio-pharmaceutical Corporation, and ViNS Bioproducts, produce antivenom this way. The Irula tribe of Tamil Nadu plays a crucial role in this process. The Irular people are skilled snake-catchers and can safely extract venom from snakes in controlled environments. Their expertise ensures a steady supply of high-quality venom for antivenom production in India. Without their contribution, the supply chain for these drugs would collapse.

How common is snakebite in India?

India is home to more than 300 species of snakes, of which more than 60 are venomous, ranging from mild to high. The so-called Big Four – Indian cobra (*Naja naja*), common krait (*Bungarus caeruleus*), Russell's viper (*Daboia russelii*), and the saw-scaled viper (genus *Echis*) – account for most snakebite deaths. The venom extracted from these four species is used to produce PVAs in India.

On the flip side, this means other venomous snakes – including the king cobra, monocled cobra, banded krait, Sochurek's saw-scaled viper, hump-nosed viper, and several species of pit vipers – are not covered by existing PVAs and continue to pose significant risks. As a result, victims bitten by these species often receive ineffective treatment, leading to poor outcomes.

A landmark 2020 study by researchers

from Canada, India, and the U.K. estimated that between 2001 and 2014, a horrifying 1.2 million snakebite deaths and three-times as many cases of permanent disability occurred in India. The study also said one in 250 Indians were at risk of dying from snakebite before the age of 70.

These staggering mortality numbers reflect a pernicious combination of ecological, social, and systemic factors. People in rural India like agricultural workers are disproportionately affected and face a constant threat, particularly during the monsoon, when snakes become more active. Rapid, often unplanned urbanisation, poor garbage management, and urban floods have increased encounters between humans and snakes, making even city-dwellers vulnerable.

Why are antivenoms hard to get?

India is the world's largest producer and consumer of antivenoms in the world. However, access to timely medical care remains a significant challenge for many Indians. People in remote areas often undertake long journeys to reach a healthcare facility equipped with antivenoms.

Even when antivenom is available, improper administration and inadequate facilities exacerbate the crisis. Logistical issues, unequal access to care, superstitious beliefs, and cultural practices often delay proper treatment in many parts.

Antivenoms often need to be transported in cold storage, however, India's rural parts lack the supporting infrastructure and power supply. Facilities that 'make do' with the resources available can cause the antivenoms to degrade in storage and become ineffective.

The high cost of manufacturing antivenom limits accessibility for the economically-disadvantaged. This mismatch highlights the need for tailored solutions, underscoring the importance of targeted research and innovation.

How are antivenoms changing?

Antivenoms of the future are more promising. Researchers are using recombinant DNA technology to produce lab-engineered, synthetic antivenoms that are free from animal-derived proteins and offer greater safety and efficacy. Computer-designed proteins could accelerate development by helping researchers to optimise antibodies for different clinical settings.

For example, on January 15, researchers from Denmark, the U.K., and the U.S., led by 2024 Nobel laureate David Baker, reported successfully using Artificial Intelligence (AI) to design synthetic antivenoms. Their and other breakthroughs promise greater effectiveness, availability, and the potential to replace century-old methods to produce antivenoms.

Region-specific antivenoms are another promising avenue. The work of Karthik Sunagar at the Indian Institute of Science, Bengaluru, has already shed light on cross-species and geographic variability in venoms.

By mapping the toxins' compositions, scientists are attempting to create tailored antivenoms, holding the promise for more precise treatments. Portable venom-detection kits and rapid diagnostic tools are also helping guide effective antivenom use. With continued investment in research, public education, and infrastructure, India can address its snakebite crisis, with reason to hope tragedies like Mayuri's will become a thing of the past.

R.N.V. Krishna Deepak studies snake venoms using computational methods at Azim Premji University, Bengaluru.

From Page One

Trump declares end to birthright citizenship

The Quad Foreign Ministers are expected to discuss dates for the Quad Summit to be held in India later this year, while during the bilateral meeting Mr. Jaishankar and Mr. Rubio would discuss Mr. Trump's visit to India and taking forward the strategic partnership, as well as the concerns over immigration and tariffs.

Mr. Rubio will meet State Department employees and then hold talks with all Quad Foreign Ministers. The meeting of the Indo-Pacific grouping, that China has criticised, is significant as it is Mr. Rubio's first foreign policy engagement.

On Monday, Mr. Jaishankar was accorded a front-row aisle seat right in front of the podium where Mr. Trump took oath.

Mr. Rubio's decision to meet the Quad Foreign Ministers first is also important as it comes amid Mr. Trump's own outreach to China, including an invitation to Chinese President Xi Jinping for the inaugural ceremony on Monday, which Chinese Vice-Premier Han Zheng attended.

Mr. Rubio, known for his tough views on China, has been banned from travelling there and was sanctioned twice by Beijing over his comments criticising Chinese human rights violations. (With inputs from Reuters)

'Competent' to judge Indus Water Treaty dispute, says World Bank Neutral Expert

Jacob Koshy
NEW DELHI

The Neutral Expert (NE) appointed under terms of the Indus Water Treaty (IWT), 1960, decided that he was "competent" to decide on differences between India and Pakistan on the design of hydroelectric projects built on the Indus Treaty rivers. India, in a statement, on Tuesday "welcomed" the move.

The decision on January 7 by Michel Lino, the World Bank appointed NE, which was made public via a press release on Monday, however does not help resolve a demand by India in January 2023 to renegotiate the IWT but only keeps alive the differences between the two countries on the dispute resolution mechanism, laid out under

the terms of the treaty.

Last September, *The Hindu* had reported that India decided there would be no more meetings of the Permanent Indus Commission (PIC), made up of representatives of both countries until the IWT was renegotiated. The last meeting happened in Delhi in May 2022. Since January 2023, India has written four times to Pakistan to initiate talks on revising the treaty but is yet to receive a formal response.

Differing stance
The dispute resolution mechanism laid out under the terms of the IWT – as India interprets it – says that disputes must first attempt to be resolved by the PIC. If they do not succeed, the matter would be weighed by the World Bank-ap-



Work in progress on the Kishen Ganga Hydro Electric Power Project in North Kashmir district of Bandipora in 2012. NISSAR AHMAD

pointed Neutral Expert. If this fails too, the matter would be decided by a Court of Arbitration. However, while India has held that each step must be fully exhausted before both sides agree to moving on to the next step, Pakistan has moved on without waiting for India's concurrence.

Initially, both countries

seemed to agree on the World Bank appointing a "neutral expert". Pakistan in 2016 asked for a Court of Arbitration. The World Bank first ruled that having a neutral expert and court together could lead to "contradictory outcomes". However, in 2022, it facilitated the setting up of an expert as well as a chair-

man to the Court of Arbitration. India has refused to attend proceedings at the Court of Arbitration at The Hague. Pakistan has maintained that it is working within the terms of the treaty, whereas India says the treaty does not allow such parallel dispute mechanisms.

The press statement, issued on Tuesday, said that while the NE could under the terms of the treaty decide on technical disputes it did not invalidate the existing Court of Arbitration.

In the days ahead, Mr. Lino is expected to hear both India and Pakistan and decide on whether design parameters of the Kishenganga and Ratle hydroelectric projects conform with the IWT. (With inputs from Suhasini Haidar)

Kerala Assembly calls for fresh UGC norms

The document criticises the Draft UGC Regulations, 2025, for excluding State governments from key decisions, particularly the appointment of Vice-Chancellors and setting of qualifications and service conditions for faculty members.

It asserts that the power to establish and supervise universities rests with the State governments, as per the Constitution's Seventh Schedule. Referring to the 42nd Constitutional Amendment of 1977, the resolution also emphasises that the Centre's role should be limited to coordinating and setting standards for higher education.

Such guidelines, the resolution argues, undermine the democratic functioning of universities and give undue influence to central authorities, thereby sidelining the role of States, which contribute around 80% of the funding for higher education institutions.

The resolution also highlights the objectionable provisions in the guidelines that propose appointing Vice-Chancellors from the private sector, even potentially from commercial backgrounds, instead of prioritising academic expertise within universities. This, it cautions, could lead to the commercialisation of higher education.

Top court asks if poll ban on persons charged with crimes will cause irreversible damage

Krishnadas Rajagopal
NEW DELHI

The Supreme Court on Tuesday asked whether a ban on persons charged with heinous offences such as murder and rape from contesting elections will lead to irreversible damage if they are later found innocent after trial.

A Bench of Justices Surya Kant and N. Kotiswar Singh said there were also reliefs in law if elected persons were later found guilty of serious crimes.

Petitioner-advocate Ashwini Kumar Upadhyay submitted that the right to campaign and contest were not fundamental rights.

"There are only 5,000 seats up for election and over a billion people... Can we not find honest people



to contest in elections?" Mr. Upadhyay asked the court.

Justice Kant asked how many honest people come forward to contest, stressing national introspection.

Mr. Upadhyay said honest souls did not enter electoral politics as the system had collapsed.

The exchange happened when Mr. Upadhyay made an oral mentioning of his petition. The court agreed to list it for further hearing on January 27.

The petition will be

heard on January 27.

2020 order

In 2020, the Supreme Court had pronounced a judgment directing political parties to publish the entire criminal history of their respective candidates for Assembly and Lok Sabha polls along with reasons which goaded them to field suspected criminals over decent people.

The judgment pronounced by a Bench headed by Justice (now retired) Rohinton Nariman had directed parties to publish the information in local as well as national newspapers, including the parties' social media handles.

The judgment was a result of the court's alarm at the unimpeded rise of criminals in the country's political life.

Ties must be viewed from a long-term perspective: Beijing

Chinese Foreign Ministry was reacting to Jaishankar's recent remarks in Mumbai; China says both countries need to engage in cooperation

Press Trust of India
BEIJING

India and China should handle the bilateral ties from a "strategic height and long-term perspective" while implementing the common understanding reached by the leaders of the two countries, the Chinese Foreign Ministry said on Tuesday.

The Ministry was reacting to External Affairs Minister S. Jaishankar's recent remarks that the India-China relationship is trying to disentangle itself from the complications arising from the post-2020 border situation and more thought needs to be given to the longer-term evolution of the ties.

"We need to view and handle the bilateral rela-



Chinese Foreign Ministry spokesperson Guo Jiakun. FILE PHOTO

tions from a strategic height and long-term perspective, bring the relations back to the track of healthy and stable development, and find the right path for big, neighbouring countries to live in harmony and develop side by side," Chinese Foreign Ministry spokesperson Guo Jiakun told a media briefing here.

Delving into various aspects of New Delhi's rela-

tions with Beijing over past decades, Mr. Jaishankar, in his Nani Palkhivala memorial lecture in Mumbai on January 18, said "misreadings" by past policymakers, whether driven by "idealism or absence of realpolitik", has helped neither cooperation nor competition with China.

That has changed in the last decade, he said, adding that mutual trust, mutual respect and mutual sensitivity should remain the basis of the relationship between the two sides.

Responding to a question on Mr. Jaishankar's remarks, Mr. Guo said as two major time-honoured civilisations, developing countries and emerging economies, China and India need to focus on development and engage in cooperation.

WHO chief urges U.S. to reconsider its decision to exit

Bindu Shajan Perappadan
NEW DELHI

After President Donald Trump's announcement that the U.S. would exit the World Health Organization, Tedros Adhanom Ghebreyesus, Director-General, WHO, said he hoped the country would reconsider the decision.

In a statement on Monday, Dr. Ghebreyesus said, "We hope the United States will reconsider and we look forward to engaging in constructive dialogue to maintain the partnership between the U.S.A. and the WHO."

Mr. Trump cited the global health agency's "mis-handling" of the COVID-19 pandemic and other international health crises as reasons for the exit. Stating that American institutions have both contributed to and benefited from membership in the WHO, the global health agency expressed its regret over the announcement.

Dr. Ghebreyesus said the United States had been a founding member of the WHO in 1948 and had participated in shaping and governing the WHO's work ever since, alongside 193 other member states. For over seven decades, the WHO and the U.S. had saved countless lives and protected Americans and all people from health threats.

"Working together the world has seen the end of smallpox and brought polio to the brink of eradication," it added, stating that with the participation of the United States and other Member states, the WHO has over the past seven years implemented the largest set of reforms in its history.

India is also among the top 10 global contributors of core funding to the WHO and has committed to give more than \$300 million for the organisation's core programme of work from 2025 to 2028.

India, France to work together on maritime surveillance in IOR

The Hindu Bureau
NEW DELHI

India and France have agreed to explore opportunities for coordinated surveillance whilst deployed to counter threats to the maritime security in the Indian Ocean Region (IOR). The two countries also committed to supporting each other in maritime security engagements.

"Both sides agreed to strengthen existing mechanisms of cooperation such as implementation of the agreed framework of exchange of information through enhanced information exchange between Information Fusion Centre-Indian Ocean Region, Gurugram and Regional Coordination Operations Centre, Seychelles and Regional Maritime Information Fusion Centre, Madagascar in the IOR,"

Threats such as piracy, contraband smuggling and illegal fishing to be monitored

the Ministry of External Affairs said in a statement after the seventh India-France maritime cooperation dialogue held recently.

India and France agreed to develop a joint assessment of the threats to maritime security in the region; to counter illicit maritime activities, including piracy and armed robbery, maritime terrorism, contraband smuggling, illegal and unregulated fishing; hybrid as well as cyber security threats and marine pollution, the Ministry said. Officials said the efforts for coordinated surveillance will be to address these kind of threats.

India, France discuss civil nuclear issues ahead of PM's visit to Paris

Sahasini Haidar
NEW DELHI

India and France have agreed to boost cooperation in "high-end technology sectors", as senior officials held Foreign Office consultations in Paris, and discussed long-pending civil nuclear cooperation issues ahead of Prime Minister Narendra Modi's visit next month.

A delegation, led by Foreign Secretary Vikram Misri and including newly appointed Indian Ambassador to France Sanjeev Singla, met French Secretary-General for Europe and Foreign Affairs Anne-Marie Descôtes and French Foreign Minister Jean-Noël Barrot.

Mr. Modi will travel to Paris for a Summit for Action on Artificial Intelligence on February 10 and 11. Officials also discussed the Prime Minister's pro-



Foreign Secretary Vikram Misri with Secretary-General of the French Ministry for Europe and Foreign Affairs Anne-Marie Descôtes. PTI

gramme and bilateral agenda during the visit. Last week, a French Minister had announced that India will "co-chair" the summit.

Mr. Misri and Ms. Descôtes held a meeting of the India-France Special Task Force on Civil Nuclear Energy, which was decided during Mr. Macron's visit to India last January. In the joint statement issued a

year ago, the two sides had agreed to convene the Special Task Force "within three months".

Jaitapur project

In particular, talks between the two sides have not resolved issues on the much-delayed Jaitapur Nuclear Power Project in Maharashtra, despite a revised techno-commercial

offer being made by French energy company EDF (Electricite De France) in 2022.

India and France signed a civil nuclear agreement in 2008 and inked the first MoU for the 990-MW Jaitapur plant in 2009. Officials have said that the high project cost, time overruns and the continuing logjam over India's civil liability law (Civil Liability for Nuclear Damage Act, 2010) are among the issues still being discussed on the Jaitapur project, even as India and France look towards cooperating on Small Modular Reactor in the future.

In a statement issued after the talks, the Ministry of External Affairs said that the two sides held talks on a number of areas of bilateral cooperation including "defence, civil nuclear energy, space, cyber and digital and AI".

Indian fact checkers to keep working with Meta, for now

Platform's ties with fact checkers in India and other countries barring the U.S. will continue at least for a few months, an official of the firm had said on the sidelines of the WEF summit in Davos

Aroon Deep
NEW DELHI

Indian fact-checking organisations that work with Meta Platforms received a reprieve of a few months at least, as the Facebook and Instagram parent has decided to hold off on replacing them on its services.

In an interview with *Bloomberg* on the sidelines of the World Economic Forum's Davos meeting, Meta's head of global business, Nicola Mendelsohn, said that "for now", fact-checking partnerships outside the U.S. would remain intact even as the firm shifts to "Community Notes" in its home country.

There is "nothing changing in the rest of the world at the moment; we are still working with those fact checkers around the world", Ms. Mendelsohn said.

The statement comes as fact-checking organisations in India worry about their future as Meta casts them as a censorship-enabling institution. The shift has worried these firms as the partnership with Meta, which features their fact checks on posts featuring



A dozen organisations said Meta's fact-checking programme helped people flag false information. AFP

misinformation that has been flagged by the company's systems, is a significant source of revenue to finance their operations.

A dozen fact-checking organisations who operate in India said in an open letter also signed by many global fact-checking partners earlier this month that Meta's fact-checking programme "helped people have a positive experience on Facebook, Instagram and Threads by reducing the spread of false and misleading information in their feeds", and that flagging "false information in order to slow its spread, without censoring, was the goal".

The funding from these partnerships is substantial and their withdrawal will have a destabilising impact on smaller organisations.

One fact-checking editor who works with Meta said that the Facebook parent has not yet communicated what the future of these tie-ups will be. "We are trying to figure out what the next steps will be and it will all depend on what Meta tells us," the editor told *The Hindu*.

A six-month deal that Meta routinely signs with fact checkers is due to expire in the middle of this month around the world, and the firm has not indicated whether it will be ex-

tended or not. "If Meta decides to stop the program worldwide, it is almost certain to result in real-world harm in many places," the joint statement said.

Community notes

The Community Notes feature was first premiered on X and Mr. Zuckerberg has explicitly cited it as a model for Meta's future fact checking in the U.S. The feature works by letting a select group of users add annotations on posts and letting other users rate whether these notes are useful or not.

As *The Hindu* reported last year, the Community Notes model – at least the way X has implemented it – has faced issues with fact-checking political misinformation, as the architecture of the system requires that users who usually disagree on other annotations must agree on any given note for it to appear.

This system has, *The Hindu* found, prevented notes from appearing on multiple viral posts that featured false or misleading statements in the run up to the 2024 Lok Sabha election.

DRDO holds key test for hypersonic missiles

The Hindu Bureau
NEW DELHI

In a crucial milestone in the development of next-generation hypersonic munitions, the DRDO has successfully demonstrated a cutting-edge active cooled scramjet combustor ground test for the first time in India. This is the effort to develop a long-duration supersonic combustion scramjet powered hypersonic technology.

The key to hypersonic vehicles is scramjets, which are air breathing engines capable of sustaining combustion at supersonic speeds, the DRDO said. "The ground test of scramjet combustor showcased several achievements, demonstrating its potential for operational use in hypersonic vehicles, like successful ignition and stable combustion".

Trump effectively pulls U.S. out of global corporate tax deal

The U.S. President directs the Treasury to identify 'protective measures' on tax; collapse of 'Pillar 1' talks may revive digital services' levies

Reuters

President Donald Trump on Monday declared that a global corporate minimum tax deal "has no force or effect" in the U.S., effectively pulling America out of the landmark 2021 arrangement negotiated by the Biden administration with nearly 140 countries.

Mr. Trump, in a presidential memorandum issued hours after taking office, also ordered the U.S. Treasury to prepare options for "protective measures" against countries that have – or are likely to – put in place tax rules that disproportionately affect American companies.

The European Union, Britain and other countries have adopted the 15% global corporate minimum tax, but the U.S. Congress never approved measures to bring the U.S. into compliance with it. The U.S. has a roughly 10% global minimum tax, part of Mr. Trump's landmark 2017 tax cut package approved by Republicans.

But countries that adopted the 15% global minimum tax may be in a position to collect a "top-up" tax from U.S. companies paying a lower rate.

Mr. Trump's memo referred to such actions as "retaliatory."

"Because of the Global



First cut: The U.S. has a roughly 10% global minimum tax, part of Mr. Trump's landmark 2017 tax cut package. REUTERS

Tax Deal and other discriminatory foreign tax practices, American companies may face retaliatory international tax regimes if the United States does not comply with foreign tax policy objectives," the memo reads.

"This memorandum recaptures our nation's sovereignty and economic competitiveness by clarifying that the Global Tax Deal has no force or effect in the United States."

After years of stalled talks on global tax issues hosted by the Paris based-Organization for Economic Cooperation and Development (OECD) to end competitive reductions in corporate tax rates, former U.S. Treasury Secretary Janet Yellen agreed to the deal in October 2021.

Mr. Trump's Treasury nominee Scott Bessent said

on Thursday that following through with the global minimum tax deal would be a "grave mistake."

Sharing taxing rights

Another part of the OECD negotiations were aimed at a new arrangement to share taxing rights on large, profitable multinational companies with countries where their products are sold.

The effort was aimed at replacing unilateral digital services taxes that target largely American technology firms from Meta Platforms' Facebook to Apple.

But these so-called "Pillar 1" talks largely stalled and without U.S. participation, countries including Italy, France, Britain Spain and Turkey may be tempted to reinstate their digital taxes, risking retaliatory tariffs from Washington.

Notes from Davos

Chandrajit Banerjee

The first day of the 2025 World Economic Forum (WEF) meeting began with Alpine sunshine casting a golden glow over the snow-lined Promenade in Davos. By day two, the temperatures dipped further, but the bustling energy on the streets stayed undeterred.

This year's theme, "Collaboration for the Intelligent Age", feels tailor-made for India. As the fastest-growing economy, India is setting benchmarks in areas like digital transformation, renewable energy, and innovation. From transforming global fintech, green hydrogen leading the clean energy transition, and leading discussions at global fora such as G20 and QUAD, India's story aligns perfectly with the five interconnected priorities of the WEF - Rebuilding Trust, Reimagining Growth, Safeguarding the Planet, Investing in People, and Industries in the Intelligent Age.

India's delegation is impactful, with four Union Cabinet Ministers and two Ministers of State, and a strong presence of States, led by the Chief Ministers of Andhra Pradesh, Telangana and Maharashtra.

For over four decades, CII has proudly carried the Indian flag at Davos, showcasing the nation's and India Inc's evolving story on this global stage. Aligned to this year's WEF agenda, the curtains were also raised on CII's theme of "Partner with India Inc.: Subscribe to the Future". There is a strong India Inc. presence with over 80 industry leaders from across sectors and scale.

As I walked into the



Congress Centre for my meetings, it was equally abuzz, kicking off with the Crystal Awards and the opening concert. During the day, the centre witnessed parleys on geoeconomics, reimagining growth and mapping productivity solutions.

A notable highlight was the focus on rebuilding trust amid geopolitical tensions and policy shifts as US withdraws from the Paris Climate Agreement and the establishment of an "External Revenue Service". Safeguarding the Planet was a recurring theme as well. European Commission President Ursula von der Leyen declared, "The world is undergoing an energy transition that is unstoppable." India's leadership in renewable energy, green hydrogen, and sustainable living through Mission LIFE mirrors this sentiment which echoed on the streets of Promenade.

Walking back through the snow-laden streets, one thing was clear - India isn't just participating in Davos 2025, it is taking centre stage, redefining what collaboration in the Intelligent Age looks like - and perhaps converting a few delegates into *chai* enthusiasts along the way at the India Lounges - perfect places for an "India Adda".

(The writer is the Director General of Confederation of Indian Industry, CII)

Putin, Xi reiterate their close ties after Trump swearing-in

We jointly support the development of a more just, multipolar global order, and work to ensure indivisible security in Eurasia and the world, the Russian leader tells his Chinese counterpart

Associated Press
MOSCOW

Russian President Vladimir Putin spoke on Tuesday with Chinese President Xi Jinping and emphasised their close ties a day after Donald Trump was sworn in as the 47th U.S. President. The two leaders discussed their prospective contacts with Mr. Trump's administration during the video call, the Kremlin said.

They have developed strong, personal links that brought their relations even closer after Mr. Putin sent troops into Ukraine in 2022. China has become a



Timely ties: Vladimir Putin speaks with Xi Jinping via video call at the Novo-Ogaryovo state residence outside Moscow on Tuesday. AP

major Russian oil and gas customer and a source of key technologies amid sweeping Western sanctions on Moscow.

In the call with Mr. Xi,

Mr. Putin emphasised that Russia-China relations are based on shared interests, equality and mutual benefits, noting they "don't depend on internal political

factors and the current international environment."

"We jointly support the development of a more just, multipolar global order, and work to ensure indivisible security in Eurasia and the world," Mr. Putin told Mr. Xi.

Mr. Xi similarly praised their close cooperation, expressing his readiness to work together with Mr. Putin to "lead China-Russia relations to a higher level," and to "safeguard international fairness and justice."

He emphasised that Russia and China should "deepen strategic cooperation, and safeguard the legitimate interests of the two countries."

Trump's exit from Paris Agreement 'threatens' future of renewable energy

Jacob P. Koshy
NEW DELHI

On Monday, the first day of his second Presidency, Donald Trump signed an executive order to withdraw the U.S. from the historic 2015 Paris climate agreement.

The withdrawal of the world's second largest polluter would further undermine the losing battle to keep global emissions in line to prevent global temperatures from rising by more than 1.5 degrees Celsius, and the future of renewable energy, say experts.

In 2016, when Mr. Trump won the election and had moved to withdraw the U.S. from the pact, the exit did not formally take place, thanks to the way the Paris Agree-



Near miss: Donald Trump had tried to withdraw the U.S. from the Paris Accord in 2016 when he first came to power. AFP

ment rules were framed.

However, this time, the U.S. can exit within a year of formally conveying this to the UN, which Mr. Trump did on Monday.

"It remains to be seen how matters will play out this time. Despite President Trump's withdrawal, there have been large delegations of U.S. observers

who have participated in every climate meet and play a significant role.

Should Trump bar their participation in future meets things would be different," T. Jayaraman, Senior Fellow, Climate Change, M.S. Swaminathan Research Foundation, told *The Hindu*.

Given Mr. Trump's support for oil and gas drilling, experts say a greater cause of concern was over what his second term would hold for investments in renewable technology.

"Multilateral Development Banks are unlikely to continue focusing on climate finance, which is essential for developing countries. Given the veto the U.S. holds in the World Bank, it may force the World Bank to move away from climate financing," said Labanya Jena, sustainable finance specialist.

Other experts have warned of ecological consequences. "The bigger risk is the exploitation of sensitive regions such as Alaska, which are detrimental to global climate stability," said Manjeet Puri, of The Energy Resources Institute.

Sri Lankan media spotlights Dissanayake's 'balancing act' with Beijing and New Delhi

NEWS ANALYSIS

Meera Srinivasan
COLOMBO

Following Sri Lankan President Anura Kumara Disanayake's recent, four-day visit to China, analysis and commentary in local media pointed to the leader's "balancing act" with Beijing and New Delhi.

During Mr. Disanayake's state visit from January 14 to 17, close on the heels of his India visit in December 2024, he announced a \$3.7 billion investment – "one of our largest FDI's" – from Sinopec for a refinery in the southern Hambantota district. Meanwhile, addressing a public rally of supporters following his return, Mr. Disanayake said his government is discussing a joint venture with India to refurbish Second World War-era oil storage tanks in the eastern Trincomalee district and develop it as a hub.

Around Mr. Disanayake's visit, Sri Lanka and China issued a 21-point joint statement, covering various bilateral matters. Sri Lanka sought more Chinese investment, and the two sides committed to the early conclusion of a comprehensive free trade agreement. While the joint statement made no mention of Chinese marine research vessels calling at Sri Lankan ports, an issue New Delhi remains highly sensitive to, the two sides agreed to continue maritime cooperation, and "pool their strength to build a maritime community with a shared future."

In its coverage since, Sri Lankan media pointed to



A cartoon by Awantha Artigala, which was published in Sri Lanka's *Daily Mirror* newspaper recently. SPECIAL ARRANGEMENT

the comparable, red-carpet honour and ceremonial welcome accorded to Mr. Disanayake in both New Delhi and Beijing. In its latest editorial, *Sunday Times* observed that the two joint statements, issued with the governments of India and China, were "similar in content and intention".

'Wooing Sri Lanka'

"Both aspirants for global power status and leadership roles in the Global South are wooing Sri Lanka through a strategic lens: India through its 'Neighbourhood First and SAGAR' framework and China through the BRI," the editorial noted.

Meanwhile, Colombo-based analyst and disinformation researcher Sanjana Hattotuwa highlighted Sri Lanka's "careful diplomatic balancing" in both statements. Sri Lanka's joint statement with India focused heavily on "specific development projects" and "granular implementation details", while its statement with China emphasised cooperation in the Belt and Road Initiative

and broader economic frameworks, he observed.

Following announcements on agreements inked with China, some detractors slammed the Disanayake government for merely taking forward predecessor governments' initiatives with India and China, or for "compromising" Sri Lanka's interests.

Pubudu Jayagoda, from the Frontline Socialist Party – formed in 2012 by a breakaway faction of Mr. Disanayake's Janatha Vimukthi Peramuna – accused the government of allowing India to control Sri Lanka's north and east, and China to control the southern parts of the island, Tamil daily *Virakesari* reported on Tuesday.

Acclaimed Sri Lankan cartoonists, often among the boldest and most astute commentators on domestic politics and economy, too, expressed their take on the competing interests of India and China in their recent cartoons, highlighting the tricky balance act facing Mr. Disanayake, who has pledged to follow a non-aligned foreign policy.

In breakthrough, scientists find pressure sensor in fat tissue

Gautam Menon, a professor at Ashoka University who studies how cells sense and respond to mechanical forces, called it 'a major discovery.' It has also kicked up a new mystery. As its co-discoverer and 2021 Nobel laureate Ardem Patapoutian remarked, what could the sensor be sensing in fat?

Sayantan Datta

In a video uploaded to the internet in November, Ardem Patapoutian, who shared the medicine Nobel Prize in 2021, unbuttoned his cuff and pulled up his sleeve to reveal a tattoo near his elbow. As he flexed his arm, the tattoo came to life. The tattoo was of the PIEZO mechanosensitive channel – a class of proteins that helps us sense pressure – and the flexing demonstrated how the channel opened and closed in response to pressure.

Patapoutian, a molecular biologist and neuroscientist at the Scripps Research Institute, California, and Bertrand Coste, then a postdoctoral researcher in Patapoutian's lab, discovered the PIEZO ion channels in 2010.

Ion channels are proteins that have a pore in their structure. In response to certain stimuli, the protein's structure changes and the pore widens. When this happens, ions can flow through, changing the voltage across a cell's membrane. If the cell is a neuron, it can use the resulting electric signal to communicate with other neurons. This is how the human nervous system works.

The stimuli that open an ion channel are called its gates. When researchers say voltage-gated ion channels, they mean a particular channel opens when the voltage across a cell membrane changes. Since the ion channels discovered by Patapoutian and Coste were gated by pressure, they called them mechanosensitive ion channels.

They discovered two such channels and named them PIEZO1 and PIEZO2, both from the Greek word 'piezi' meaning 'pressure.'

Since their 2010 discovery, PIEZO channels have been implicated in our ability to sense touch and pain, to understand how our bodies are positioned in space (proprioception), to perceive our body's internal state (interoception), and to respire, urinate, form blood vessels, regulate bone density, and heal skin wounds.

Two new studies – which independent experts called "pivotal" and a "breakthrough" to this reporter – have now expanded the ambit of PIEZO channels' functions.

One, a preprint from the labs of Patapoutian and his colleague at Scripps Research, Li Ye, demonstrates the role PIEZO2 plays in sensing mechanical changes in fat tissue. The second study, published in the journal *Science* and led by Danijela Matic Vignjevic from the Curie Institute in Paris and Tae-Hee Kim from the University of Toronto, shows the importance of the two PIEZO channels in regulating the fate of stem cells in mouse intestines.

The papers lend credence to the idea that biochemical cues don't have a monopoly on regulating biological processes: many of them involve mechanical stimuli as well. The findings open "intriguing avenues for future research," says Namrata Gundiah, a professor of mechanical engineering at the Indian Institute of Science (IISc), Bengaluru, who studies how mechanical stimuli affect the movement of cells, said.

'What is it sensing in fat?'

The fat, or adipose, tissues in our bodies need to communicate with the brain to adjust the body's metabolism. Typically, scientists study how the brain communicates with adipose tissue through the sympathetic nervous system and how the adipose tissue replies through circulating chemical signals.

But the new Patapoutian et al. study, which is awaiting peer review, focused on a different link between the brain and adipose tissue: sensory afferents.

Neurons are a type of cell that make up our nervous system. Each neuron has two main parts: a cell body and a tail-like extension called the axon. The spinal cord has some cell clusters called the dorsal root ganglia (DRG). The axons of the neurons in these clusters are called sensory afferents. They enter tissues and sense various stimuli.

The researchers injected adipose tissues in mice with cholera toxin-B (CTB) that had been bound to molecules that could glow if hit with light. CTB is a part of the cholera toxin, a set of proteins produced by the bacterium *Vibrio cholerae*. These proteins bind to certain compounds on the membranes of neurons. By injecting CTB in mice adipose tissues, the team could identify these tissues using the glow molecules and isolate them.

When the team looked for the most abundant ion channels in these neurons,



Ardem Patapoutian flexes a tattoo of the PIEZO mechanosensitive channel. ARDEM PATAPOUTIAN/BLUESKY

they found an unexpected candidate: PIEZO2.

PIEZO2 is known to be a specialised mechanosensitive ion channel: it is gated only by pressure, not other factors. It is thus safe to say these sensory afferents are sensing mechanical changes in adipose tissues.

Gautam Menon, a professor of physics and biology at Ashoka University who studies how cells sense and respond to mechanical forces, called this "a major discovery."

One question, however, remains unanswered: what is the source of these mechanical changes? As Patapoutian remarked on the social media platform Bluesky, "What is it sensing in fat?"

Scientists don't have an answer yet – but the rest of the study shows a way. When the team used genetic techniques to reduce the levels of PIEZO2 proteins in sensory afferents, they found that parts of the adipose tissue innervated by these afferents had larger cells. These parts also express more genes involved in metabolic processes that help the body produce heat and convert carbohydrates, proteins, and alcohol into fat. These changes have been previously reported to result from the removal of DRG – where the sensory afferents are rooted – in mice.

The researchers also showed that if the levels of PIEZO2 are artificially increased in mice whose DRGs have been removed, the changes of such removal can be reversed.

Taken together, the experiments suggest that different metabolic processes in adipose tissue cause mechanical changes in the tissue. The sensory afferents sense these mechanical changes through PIEZO channels and communicate them to the brain.

A gut feeling

In 1745, German physician Johann Nathanel Lieberkühn described in detail glands found between finger-like projections called villi in the small intestine. These glands house intestinal stem cells (ISCs) that have the ability to develop into other cell types required by the intestinal tract. The development process is tightly controlled and important to regenerate and maintain the gut lining.

The cells of these glands are arranged in a particular pattern on a network of proteins and other molecules called the extracellular matrix. The matrix helps keep the gland tissue stiff, which is another way to say the glands are potentially capable of sensing and

responding to mechanical stimuli. The ISCs also exert forces on other cells in the gland as they change into other cell types.

To understand how these mechanical forces affect the ISCs, researchers in the labs of Vignjevic and Tae-Hee Kim generated 3D miniature guts, called organoids, on Petri dishes. These mini-guts replicate the structure and function of the intestines in animals, albeit in simpler fashion. The researchers then used chemicals to inhibit PIEZO channels in the mini-guts, reducing the size of the organoids, the number of glands in each organoid, and the number of ISCs.

When they removed the PIEZO channels in the guts of living mice, the animals suffered from diarrhoea, showed blood in their stools, had lower body weight, and "died quickly," Kim said. The team concluded that "PIEZO channels in intestinal epithelia are essential" to maintain "adequate intestinal architecture and homeostasis."

The ISCs in mice whose guts lacked PIEZO channels also lost their ability to reproduce more ISCs and transform into other cell types. Instead, they became cells that divided rapidly and depleted away.

In subsequent experiments, the researchers modelled the mechanical forces on ISCs. In one approach, they modelled how the stiffness of the extracellular matrix changed; in the other, they studied the tension (the force exerted on an object when it is pulled) in the tissue. In the first approach, the scientists grew mini-guts – this time 2D – on artificial substrates whose stiffness they could control. Then they quantified the activation of PIEZO channels by measuring the amount of calcium in the cells of the organoids. When PIEZO channels open, they allow calcium ions to enter cells.

In their paper, the team reported the PIEZO channels were "more prone to activation" on stiffer substrates. Using atomic force microscopy, they found the area of the gland where the ISCs lived was stiffer than elsewhere. The researchers concluded the PIEZO channels were important for ISCs to sense and respond to stiffness.

In the second approach, the researchers engineered a "cell-stretching device" to stretch the mini-guts. At the same time they inhibited PIEZO activity using chemicals, they found that the number of ISCs dropped.

Taken together, the researchers concluded that PIEZO channels help ISCs

When PIEZO channels were removed from the guts of mice, the animals suffered diarrhoea, showed blood in their stools, lost body weight, and 'died quickly.' The team concluded that PIEZO channels are essential" to maintain 'adequate intestinal architecture and homeostasis'

sense mechanical changes in their surroundings, which in turn regulates their behaviour.

Kim said, "Stem cell activity is dysregulated in many gut diseases such as inflammatory bowel disease and cancer.

Thus, a better understanding of the mechanistic roles of PIEZO channels would help identify novel therapies against them."

The physics of biology

For Gautam Menon, the *Science* study "adds to the view that mechanical signals, as opposed to purely biochemical ones, play an important role in deciding stem cell fates."

Two decades ago, he said, the prevalent view was that the type of cells that stem cells turn into is determined only by biochemical signals in the form of small molecules. Since then, scientists have found more and more evidence that "the mechanical environment of cells and the forces that act on them" play an important role in deciding their fate, he added.

As the view has changed, researchers have confronted newer – and according to Menon, "harder" – questions. These include "measuring forces in a cellular context that is realistic and figuring out how these forces produce signals that cells can interpret."

The two new studies imply the PIEZO mechanosensitive ion channels might be the answer to the latter: these channels sense mechanical forces and open in response, allowing calcium ions to flow into cells. These ions can then trigger a series of changes within the cells that determine their fate.

Kim hopes the team's study motivates other researchers to investigate the roles of PIEZO channels in stem cells of other tissues, especially when there is tissue disease. This "would be critical for the development of more effective and targeted therapies," he said.

(Sayantan Datta is a science journalist and a faculty member at Krea University. dattasayantan95@gmail.com)



A Bank of America building in flames along Lake Avenue, Los Angeles, on January 8. AFP

Builders study LA homes that survived the wildfires

Associated Press

Emails and videos of burned buildings in Los Angeles next to those left standing have been flying back and forth among architects, builders, and fire safety specialists around the world.

Many experts say luck plays a part. After all, winds can shift 180° in a second, pushing fire away from one house and towards a neighbour's. But they also say there are many ways homes can be made less vulnerable.

Greg Faulkner of Faulkner Architects in California said there is a finite number of ways a fire can burn a house. "If you eliminate half of those, or three-quarters of them, that's not luck, that's increasing your odds."

People in fire country generally know that trees, landscaping, and wood fences near homes can be a fire risk. Architects and contractors are going beyond that, using newer materials and techniques in roofing, walls, and windows to keep buildings standing. The measures can add as much as 10% to the cost of homes.

Many of these experts no longer use wood siding. Where it is used, or still allowed, it needs to have a fire-resistant barrier underneath, often made of gypsum.

Stucco, a cement material, is fire-resistant. Arnold Tarling, who inspected buildings for four decades in Britain, said houses with stucco walls appeared to survive the fires better. Yet if more of them had had a layer of gypsum underneath, it would have given more protection from the heat, he said.

Double-pane windows also significantly

Architects and contractors are using newer materials and techniques in roofing, walls, and windows to keep buildings standing. The measures can add as much as 10% to the cost of homes

slow heat coming from the burning building next door. Tarling noted that one Malibu beachfront home, surrounded by gutted buildings, was intact because no windows faced a neighbor, so radiated heat couldn't penetrate it as easily.

Then there's the roof, when fire embers can land. Simpler roof lines can allow red-hot embers to slide off. Spanish Mission, for example, is an iconic LA style but the knee walls it uses create corners where embers can gather.

Many roofs in the US are covered in asphalt. Areas that are designated wildfire-prone in California – ever-growing in size – are required to use roofing that delays the transfer of heat to the building's inside.

Still, asphalt is a petroleum product. Some professionals prefer metal, which doesn't burn, although it conducts heat.

Maybe as important as which material is used on a roof is whether the roof offers fire a way to get in.

Contractors have been more careful over the years to make sure moisture doesn't build up in attics by making sure air circulates, using the vents visible on many roofs. But in a powerful fire, the flames can blow in through these vents.

Cesar Martin Gomez, an architect at the University of Navarra, Spain, noted that in some parts of Australia, new homes are required to have water tanks. "If each home has the ability to protect itself, fire won't be able to spread as much," he said.