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India not a magnet for global science, says Ramakrishnan

Some key pain points in Indian science are delayed release of funds every year, research scholars not being paid scholarships for as long as a year, and whimsical ways science policies are changed with little discussion with scientists

R. Prasad

With the U.S. terminating several research programmes, firing thousands of federal scientists, and cancelling important, high-value federal research grants – $8 billion already and further cuts of almost $18 billion next year for National Institute of Health (NIH), proposed cuts of about $5 billion next year to National Science Foundation (NSF), proposed cut of nearly 25% to NASA's budget for 2026, and billions of dollars cut in grants to several universities – many U.S. scientists are planning to move to other countries.

According to an analysis carried out by Nature Careers, U.S. applications for European vacancies shot up by 32% in March this year compared with March 2024. A Nature poll found that 75% of respondents were "keen to leave the country".

'Not competitive'

The European Union and at least a handful of European countries have committed special funding to attract researchers from the U.S. But since the committed funding is dwarfed by the scale of funding cuts by the U.S., and the funding is already highly competitive in Europe, senior scientists from the U.S. may not move to Europe in large numbers.

"There will be a few scientists who will move, but I do not see a mass exodus. Firstly, salaries in Europe are well below those in the U.S. Secondly, moving is always difficult both professionally and personally. Finally, the U.S. is still the pre-eminent scientific country, and that will be hard to walk away from. I say this as someone who actually did move from the U.S. to England over 25 years ago, with a salary that was just over half what I was making there," Nobel Laureate Venkatraman Ramakrishnan, professor at the MRC Laboratory of Molecular Biology, Cambridge, U.K., says in an email to *The Hindu*.

In comparison, India has only a handful of institutions, such as IISc, NCBS, TIFR, IISERs, and IITs, that can possibly attract U.S. scientists. According to him, even the renowned institutions in India are "world class only in some very specific areas".

"I do not see India as a general magnet for international science," Prof. Ramakrishnan adds.

Though funding for science in India has increased in absolute terms, the percentage of GDP allocated to R&D has actually reduced. India's gross expenditure on R&D is estimated to be 0.6-0.7% of GDP in 2025. Specifically, with long-term assured funding for basic research, which is absolutely necessity to attract researchers based in the U.S., not guaranteed by existing programmes, can India take advantage of the situation in the U.S.? "India's R&D investment as a fraction of GDP is much less than China's and is about a third or less of what many developed countries have, and far below countries like South Korea. It will not be competitive without a substantial increase," Prof. Ramakrishnan says.

Lack of funding

Prof. Ramakrishnan says: "Neither the funding, the infrastructure, nor the general environment in India is attractive for top-level international scientists to leave the U.S. to work in India. There may be specific areas (e.g. tropical diseases, ecology, etc.) where India is particularly well suited, but even in these areas, it will be easier for scientists to do field work there while being employed in the West." Given a choice between some European country or India, he strongly vouches for Europe as being "far more attractive as a scientific destination".

Though funding for science in India has increased in absolute terms, percentage of GDP allocated to R&D has reduced

Some of the key pain points in Indian science are the delayed release of funds every year, research scholars not being paid scholarships for as long as a year, and whimsical ways in which science policies are changed with little discussion with scientists. Even the Ramalingaswami re-entry fellowship, which aims to support the return of early-career life scientists with at least three years of international postdoctoral training, has faced abrupt policy changes. Currently, there are no national policies to attract senior scientists from other countries. "If India is serious about attracting Indian scientists abroad to return, it needs to provide far better incentives. China has shown that with sufficient investment and a stable commitment, it can be done," he says.

Funding in India is available mainly from the government agencies such as DBT, ICMR, DST, and SERB, with negligible private funding. In 2021, the government announced ₹50,000 crore for the Anusandhan National Research Foundation, which will replace SERB. In December 2024, Minister of State (Independent Charge) of the Ministry of Science & Technology and Earth Sciences, Dr. Jitendra Singh, in a written reply to the Lok Sabha, said that a budgetary provision of only ₹14,000 crore had been made by the government for 2023-2028. The balance ₹36,000 crore will have to be sourced through "donations from any other sources", including public and private sectors, philanthropic organisations, foundations, and international bodies. "In many developed countries, the ratio of private to public investment is almost two or more. In India, it is almost the opposite. This is really a failing on the part of Indian industry," Prof. Ramakrishnan adds.

Years ago, Singapore successfully attracted senior scientists to move permanently or as visiting fellows. He attributes this to high salaries with low taxes and excellent scientific infrastructure. On the societal front, Singapore is clean and well-run with first-rate schools, healthcare, mass transit, and safety, and has become a desirable destination for scientists from developed countries, he adds. On the other hand, scientists moved from Germany to the U.S. and other countries in the 1930s because they were in significant personal danger.

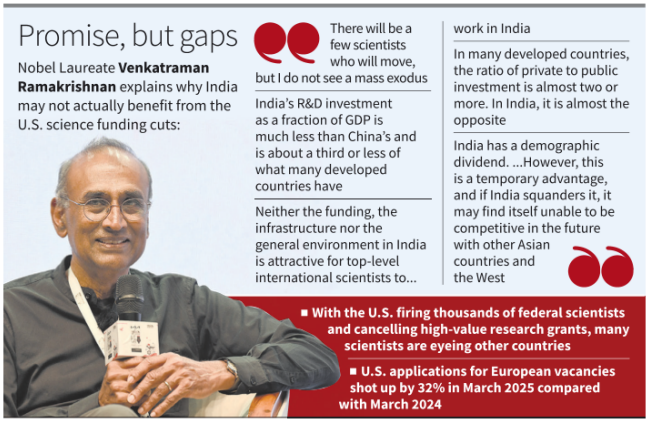
'Temporary advantage'

To attract senior scientists from other countries and to encourage talented people already working in India, he stresses two critical aspects: scientific and social. "India needs a strong, stable commitment to science, which means not only much more funding but also more stable funding, much better infrastructure, and, just as importantly, insulating science from politics and excessive bureaucratic rules and regulations." About the social factors, he says: "The other detriment to attracting scientists (especially non-Indians) from abroad is India itself. Today, well-off Indians have essentially seceded from public spaces in India. Today, the streets are filthy and full of trash, the sidewalks are not navigable, and the air is unbreathable in most cities... Which non-Indian would want that sort of life for themselves and their children?"

He is, however, full of praise and appreciation for researchers in India contributing to science despite several challenges.

"I have many scientific friends in India, and I am always amazed by how they manage to do such good work in such difficult conditions, and yet be so cheerful. Young Indians are so bright and enthusiastic, but they are being let down by the country as a whole. India has a demographic dividend – it is one of the few large countries with a youthful population."

"However," he cautions, "this is a temporary advantage, and if India squanders it, it may find itself unable to be competitive in the future with other Asian countries and the West."



For the sake of peace, at the cost of war

Treaty on the Non-Proliferation of Nuclear Weapons

While Iran has long proclaimed adherence to the NPT's basic tenets and benefited from them vis-à-vis civilian nuclear technology, its covert activities in violation of the treaty's safeguards have progressively undermined trust and led to an international crisis that is still unfolding

Vasudevan Mukunth

Through history, Iran's relationship with nuclear weapons has had four phases. In the first it was a model state. When the UN opened the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) for signatures on July 1, 1968, Shah Reza Pahlavi signed it on the first day and ratified it two years later as part of his efforts to increase access to nuclear power in Iran under the White Revolution.

Until the late 1970s, Iran enjoyed a good reputation under the NPT by furthering its goals to restrict the use of nuclear energy for peaceful purposes. Then the Islamic Revolution toppled the Shah in 1979 and the Ayatollah assumed supreme power in the new Islamic Republic. This launched the second phase, more like several phases of ambiguity, lasting from 1979 until 2002. The driving concern in these periods was whether Iran would build nuclear weapons. Will it? Won't it?

While Ayatollah Khomeini had been ambivalent towards nuclear weapons, Saddam Hussein's use of chemical weapons during the Iran-Iraq war spurred him to reconsider his deterrence strategy. Thus, until the early 2000s, there were indications that Iran was amassing technical know-how of nuclear weapons but no overt signs that it was actually building one.

But then in 2002, a group of dissidents called the National Council of Resistance revealed to the world that Iran had been secretly pursuing a nuclear weapons programme for at least two decades in the form of a nuclear enrichment facility in Natanz and a facility to produce heavy water in Arak. Since Iran had not declared the existence of these facilities under the NPT, it became *persona non grata* under the treaty.

The incident effectively launched the third phase in 2005, when inspectors of the UN International Atomic Energy Agency (IAEA) said Iran was not complying with its obligations to report evidence of past weapons-related activities. This was also a diplomatic failure since Iran had signed its Additional Protocol with France, Germany, and the U.K. in 2003 to allow more intrusive inspections of its facilities in exchange for diplomatic support and cooperation in multilateral fora. But in 2006, Iran said it would stop implementing the Protocol over frustration that its assurances were not being taken seriously.

Until the early 2000s, there were no overt signs Iran was building nuclear weapons. But in 2002, a group of dissidents revealed that Iran had been secretly pursuing a nuclear weapons programme at an enrichment facility in Natanz and a facility to produce heavy water in Arak. AP

The IAEA's conclusion invited the UN Security Council to launch punishing sanctions from 2006 to 2014. This period also coincided with the rule of Iran's hardline President Mahmoud Ahmadinejad, who doubled down on what he called Iran's right to enrich uranium for civilian use even as he contended with a national economy significantly weakened by the sanctions. It was not until Hassan Rouhani succeeded him in 2013 that Iran indicated its willingness to return to the negotiating table in return for sanctions relief.

The result was the historic Joint Comprehensive Plan of Action (JCPOA) agreement between Iran and the P5+1 group in 2015. Although it imposed a slew of restrictions on Iran that took the Islamic nation far beyond its obligations under the NPT – which was still in effect – Iran complied in exchange for lifting the sanctions. In fact in many respects Iran returned to being a model state, serving a reminder that rational diplomacy à la the NPT during the Cold War could achieve non-proliferation. But all of this came to nought for reasons that are hard to understand, but increasingly tempting to guess at, when in 2018 the new U.S. President Donald Trump unilaterally withdrew from the JCPOA and restored "maximum pressure" sanctions.

Iran responded at first by resorting to what it said were mechanisms under the deal that allowed it to disobey enrichment limits when resolving disputes. But, by 2022, Iran had blown past its JCPOA safeguards when it became clear it had enriched uranium to within a hair's breadth from the level required to make an atomic weapon. Should Iran exit the NPT by coming in possession of such a warhead, it could spark a regional arms race and strike a profound blow to the treaty's credibility. West Asian states such as Saudi Arabia may be compelled to seek nuclear weapons of their own.

Earlier this month, Israel launched air strikes against Iran's nuclear establishment as part of its insistence that Iran must never possess nuclear weapons while also touting its "right to self-defence". It had the U.S.'s backing under the returning Trump administration. Russia and China have demanded stronger sanctions while denouncing Israel. European nations have refused unilateral military action fearing the collapse of the non-proliferation regime itself. Their fear is not unwarranted: Article X of the NPT gives Iran the right to withdraw citing "extraordinary events" that jeopardise its interests, grounds for which Israel's aggression has now created.

Iran's twisting relationship with the NPT over the years has been a roller coaster of compliance and contention. While it long proclaimed adherence to the treaty's basic tenets and benefited from them vis-à-vis civilian nuclear technology, its covert activities in violation of the NPT's safeguards progressively undermined trust and led to an international crisis that is still unfolding.

Evolving perspectives

Both the IAEA's and the Security Council's evolving perspectives in this time echo the international community's split approaches towards Iran: pressure versus engagement. Nonetheless, the major powers agree on one point: Iran must not be allowed to obtain nuclear weapons. President Masoud Pezeshkian has also said Tehran is not seeking them but as long as Israel's campaign continues, Iran's path to diplomacy is blocked and it will keep one hand on the nuclear option.

The situation today remains fluid and dangerous. Iran has advanced its nuclear capability to an unprecedented degree while still officially forswearing nuclear arms. The coming months will determine whether a new diplomatic understanding can be reached to bring Iran back into fuller compliance, and thus ease sanctions, or whether the NPT itself will be tested by a potential withdrawal. Since Iran has repeatedly asserted its right under the treaty to the peaceful use of nuclear energy, the U.S. had previously proposed in the Oman talks to set up a low-enrichment facility in a third country to supply just the reactor fuel to Iran. Israel's onslaught has left these talks in a limbo, however.

International monitors have stressed that should Israel continue its bombing, which seems likely, the world may face either a nuclear-armed Iran or a war to prevent it. This is unfortunate because the NPT was created to prevent just these outcomes.

THE GIST

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A dire Strait

Hormuz Strait

As tensions rise between Iran and Israel, global oil trade may come under strain if the Islamic nation blocks the passage of ships through the crucial waterway

Sruthi Darbhamulla

PHOTO CREDIT: ISTOCK

A crucial choke point for the world's oil supply may become another casualty of the Iran-Israel war. The Strait of Hormuz, a channel less than 100 km in width, separates Iran from the Arabian Peninsula, connecting the Persian Gulf with the Gulf of Oman and the Arabian Sea. It, however, occupies an outsize importance on the global stage, serving as a key passage for oil and natural gas from the littoral nations of the Persian Gulf, such as Saudi Arabia, Iraq, Kuwait, the UAE, Qatar, and Iran to the rest of the world. Around a quarter of the world's total oil supply passes through this channel, which is 55km to 95km in width. On average, the Strait witnessed an oil flow of 20 million barrels per day in 2024.

The Strait lies next to Iran, which is presently engaged in an escalating conflict with Israel after the latter bombed key nuclear and military sites on June 13, 2025. Iran retaliated with missile strikes.

In the past, Iran has threatened to shut down the Strait in times of conflict, and ships have been targeted through the jamming of signals and other retaliatory measures. In the Iran-Iraq war from 1980 to 1988, tankers and cargo ships in the Gulf region were attacked by both countries, leading to U.S. intervention and the escort of Kuwaiti tankers by their warships. Concerns have arisen that Iran may follow the playbook of this war, dubbed the Tanker War.

Similar threats

Iran had issued similar threats to shut down the canal in 2011-12 following Western oil and banking sanctions. However, the situation de-escalated before any such attempt. The spectre of Strait shutdown resurfaced in 2019, after the U.S. withdrew from the Iran nuclear deal and issued heavy sanctions on Iran, leading to a period of tense relations between the two countries. On July 19, 2019, Iran captured *Stena Impero*, an oil tanker sailing under the British flag, as it passed through the region, to retaliate for the British capture of its vessel. Further, it shot down a U.S. surveillance drone, claiming that it had crossed over into its territorial waters.

Thus, while a complete shutdown has no historical precedent, disruptions in the global oil trade is expected as the Israel-Iran war continues. Shipping companies such as Nippon Yusen KK have instructed vessels to exercise caution while passing near the Iranian coast.

Delays and increased costs of shipping may also drive up oil prices. The price of Brent crude – a global benchmark – saw a brief spike, although it has now stabilised, dipping 2.33%, to settle at $77.01 a barrel. Oil prices had risen by around 3% after Israeli strikes on Iran.

While alternate sea routes are not convenient, land-based pipelines may help tide over some challenges. These include pipelines operated by Saudi Arabia's national establishment, ARAMCO, and the UAE. Iran, too, operates the Goreh-Jask pipeline and the Jask export terminal in the Gulf of Oman.

There has been a slight decline in the volume of oil shipped through the Strait of Hormuz since 2022, in part owing to a policy adopted by OPEC+ countries to cut down on the production of crude oil. The Strait, however, still remains a central figure. According to a brief by the U.S. Energy Information Administration, Saudi Arabia moves the largest volume of crude oil and allied products through the Strait of Hormuz. More than 80% of the oil supply through the Strait of Hormuz is destined for Asian ports.

India's oil supply is heavily reliant on the region, with around 40% of its crude oil imports and 54% of its liquefied natural gas imports travelling through the Strait of Hormuz. Indian oil exports may also be disrupted by the regional strife, with domestic demand taking precedence in the event of a shortfall. Union Minister for Petroleum and Natural Gas, Hardeep Singh Puri, noted that of the 5.5 million barrels of oil consumed daily in India, 1.5 million pass through the Strait. Mr. Puri has indicated that India will consider other options, including imports from West Africa, if the Strait is blocked.

As trouble brews in West Asia, all eyes are on the Strait of Hormuz.

What's the biggest challenge in DNA analysis?

What are short tandem repeats? Why is STR the most widely used genetic marker for identifying humans? Why is sample quality, data analysis, and its interpretation important? How can contamination or degradation of samples be overcome?

Bindu Shajan Perappadan

The story so far:

At least 270 people, most of them passengers, were killed on June 12 when Air India flight 171, a London-bound Boeing 787-8 Dreamliner, crashed less than a minute after taking off from Ahmedabad airport. Following the accident, deoxyribonucleic acid (DNA) analysis is being used to identify the remains of those killed. In the past week, DNA samples from victims' family members have been collected, matched and most remains have already been identified.

How do DNA samples help?

DNA fingerprinting identifies individuals by analysing unique regions of their DNA. While human DNA is 99.9% identical, the remaining 0.1% includes unique sequences called short tandem repeats (STRs), which are crucial for forensic investigations. DNA profiling focuses on specific regions called genetic markers, with STRs being the preferred markers due to their variability among individuals, except monozygotic twins (identical twins).

"Currently, STRs are the most widely used genetic markers for human identity determination and paternity testing. Their use makes it possible to clarify most legal and forensic cases with a generally very high degree of certainty. Identification of human remains is generally performed by comparing the genetic profile of the remains with that of first-degree relatives, usually the parents," explained Dr. Rakesh Mishra, director, Tata Institute for Genetics and Society. DNA is the molecule that carries the genetic instructions of all living organisms. It's essentially the blueprint that determines an organism's characteristics and how it functions and is passed from parents to offspring. DNA profiling can be used in the identification of skeletonised or highly decomposed human remains. Identification is usually carried out by comparing the genetic profile from the remains with the genotypes of reference samples from relatives, most commonly the parents of the victim, according to an article titled, 'Identification of the Remains of an Adult Using DNA from Their Deciduous Teeth as a Reference Sample'.

'The integrity of the DNA sample dictates the accuracy of the result'

Identity verification: Hospital staff collecting DNA samples of the relatives of the victims of the Air India crash in Ahmedabad on June 13. VIJAY SONEJI

What is the process followed to collect, store and match samples during a disaster?

In the case of accident victims, DNA samples may be degraded and contaminated which is the biggest challenge that forensic experts face even though DNA samples can be preserved for a long time. Samples are ideally frozen at minus 20°C, or, in the case of soft tissues (skin, muscles, etc.), they may be stored in 95% ethanol.

"In an accident of this magnitude samples of tissue, nails, bone, body fluid and blood etc. can be used to identify and establish family relation. Technology available today is powerful and sensitive which aids in easy identification," said Dr. Mishra. He added that only trained forensic experts are made to collect samples to ensure that there is no contamination. These samples are then stored in temperature regulated, sterile conditions and matched swiftly.

"In this case, establishing family pattern is enough. The STR process is used in this case to establish family relationship. Through this family pattern is established and based on this identity is ascertained," he said.

Experts noted that after sample collection, using Polymerase Chain Reaction (PCR) the extracted DNA is amplified with specific primers targeting the STR regions of interest. The amplified DNA fragments are separated based on size using gel electrophoresis. The size and number of repeats in each band are analysed to generate the distinctive DNA profile with advanced computerised systems. The generated profile is then compared to other DNA profiles in a database to find any matches.

What are the difficulties in the process?

An article titled, 'Challenges and solutions in DNA fingerprinting: Sample quality, data analysis, and interpretation', noted that DNA fingerprinting, which is a pivotal tool in forensic science, paternity testing, and genetic research, faces significant challenges in sample quality, data analysis, and interpretation. It states that the sample quality is the bedrock of DNA fingerprinting. "The integrity of the DNA sample dictates the accuracy of the result. Challenges arise from various sources, such as environmental degradation, contamination, and the complexity of handling mixed or limited DNA samples. These issues can lead to ambiguous or erroneous results, posing significant obstacles in forensic investigations," it states. It adds that continued training and education of those in the field is vital.

Contamination, interpretation challenges, including ethical concerns, privacy issues, and the potential for misinterpretation of results is acknowledged in this paper. It recommends the use of advanced techniques for DNA collection and recovery, developments in software for more precise data analysis, and the implementation of standardised protocols for interpretation. It also highlights the role of automation in enhancing accuracy and the importance of professional training.

When has DNA fingerprinting been crucial?

Several mass fatality events, including natural disasters and terrorist attacks, have forced authorities to use DNA analysis to establish identity. Most recent include the 2004 Indian Ocean tsunami, the 2009 Victorian Bushfires (Australia) where severely burned or fragmented bodies had to be identified, and the 2014 MH17 crash (Ukraine) which resulted in the loss of all 298 people on board. DNA fingerprinting was also used to identify victims of the 9/11 terrorist attacks. Beside this, it is also a standard tool for identifying individuals in various criminal cases.

What is IIT-D's feat in quantum communication?

What is quantum key distribution? What are the possible applications of quantum communications?

Vasudevan Mukunth

The story so far:

On June 16, the Ministry of Defence said in a statement that IIT-Delhi scientists together with the Defence Research and Development Organisation (DRDO) demonstrated quantum communication over a distance of more than one km in free space.

What is quantum communication?

When two or more photons, the subatomic particles of light, are created in just the right way, measurements made on one photon will instantly determine the result for the partner photon, too – even if the photons are far apart. This phenomenon is called quantum entanglement. Quantum communication is an umbrella term for any scheme that uses the concepts of quantum physics, but especially entanglement, to make a given communication channel leak-proof. In one scheme, like the one the IIT-Delhi team demonstrated, entangled photons carry information from a source to two stations. If any third party intercepts one of the photons, the other photon will immediately be disturbed as well and the channel will be revealed as insecure. In short, quantum communication can be used to create communication channels that are protected against computational attacks since any attempt to tap the quantum channel will itself be revealed. Thus they have great value in defence settings. An important method in quantum communication is quantum key distribution (QKD).

> The greater goal is to distribute secure keys to receivers anywhere in India by beaming photons through the atmosphere with the help of satellites

How does QKD work?

If Bala has a message for Selvi that he wants only Selvi to receive, a simple way is to send a letter. At the address, the postal worker will deposit the letter into a letterbox. The location of the letterbox is public knowledge, but only Selvi will have the key to access it. The key is private knowledge. Receiving email works similarly: Bala will send an email to Selvi's email ID (public knowledge) and Selvi will use her password (private knowledge) to access it.

QKD is a specialised form of quantum communication whose sole purpose is to help Bala and Selvi possess identical secret keys. Once they both have the key, they can unlock and read the messages they send each other. Note that QKD doesn't encrypt the message itself: that's achieved using traditional algorithms like Advanced Encryption Standard (AES). Instead QKD helps both parties acquire the key to unlock that encryption in a secure way. There are two kinds of QKD. In the classic prepare-and-measure way, Bala prepares single photons in some predetermined states and Selvi measures them. In entanglement-based QKD, a source creates entangled photon pairs and sends one photon to Bala and the other to Selvi.

What did the IIT-Delhi team do?

The IIT-Delhi team, led by Prof. Bhaskar Kanseri, transmitted keys through the air using entanglement-based QKD, across a distance of one km in the IIT campus. This is a step up from transmitting photons through an optical fibre. The greater goal here is to establish reliable QKD between a ground station and a satellite orbiting the earth hundreds of kilometres up. This way the satellite can distribute keys to receivers anywhere in India by beaming photons through the atmosphere. Notably, the test demonstrated "a secure key rate of nearly 240 bits per second with a quantum bit error rate of less than 7%". When the photons reach Bala and Selvi, they will measure each particle. Since they're entangled, the measurements have to match up. In this case the measurements disagreed <7% of the time, which is considered acceptable for the present scheme. Common sources of error include turbulence in the air, detector noise, and artificial lighting.

Previously, Prof. Kanseri's team had demonstrated a quantum communications link between Vindhyachal and Prayagraj in Uttar Pradesh in 2022. In 2024, they established a QKD scheme through more than 100 km of an optical fibre link.

What next?

The IIT-Delhi team demonstrated the technology in the presence of dignitaries from the DRDO, the institute, and the Directorate of Futuristic Technology Management. After the event, Minister of Defence Rajnath Singh said India had "entered into a new quantum era of secure communication which will be a game-changer in future warfare." These changes entail a quantum network with multiple nodes maintaining quantum communications. To help scientists develop such technologies, the Indian government approved the National Quantum Mission in 2023 with an outlay (2023-2031) of ₹6,000 crore. Quantum communication has important civilian applications too, especially in the banking and telecom sectors.

How will Israel-Iran conflict impact India?

What is India's stand on the escalation in West Asia? Will Indian workers in Israel and Iran get affected? What's happening on the evacuation front? What about trade ties? What are the financial and geopolitical implications? What happens if Iran closes the Strait of Hormuz?

Suhasini Haidar

The story so far:

As the latest Israel-Iran conflict crossed the one-week mark, the Indian government began to bring back Indian citizens from both countries, fearing a further escalation. In a sudden attack on June 13, Israel launched strikes on Iranian nuclear installations, assassinated top generals, and bombed several cities across the country. Iran's response has been more robust than expected, as it too has launched barrage after barrage of ballistic missiles on military targets and research facilities in Israel.

How has India reacted to the conflict?

Prime Minister Narendra Modi received a call from Israel Prime Minister Benjamin Netanyahu on June 13, briefing him on the attack by Israel on Iran's nuclear facilities, in several cities including Tehran, where senior Iranian generals were assassinated through targeted strikes. The strikes were a clear violation of international law, Iran argued at the UN Security council, as even Israel claimed they were "pre-emptive" and not in retaliation to an attack. In a statement, the government said Mr. Modi had "shared India's concern and emphasised the need for early restoration of peace and stability in the region." In a call with Iranian Foreign Minister Abbas Araghchi, External Affairs Minister S. Jaishankar expressed the "deep concern of the international community at the turn of events," and urged against retaliation, and for diplomacy. Mr. Jaishankar also spoke to Israeli Foreign Minister Gideon Sa'ar. The Ministry of External Affairs (MEA) statement played safe, calling for dialogue and diplomacy, while making no criticism of Israel for launching the strikes. It also disassociated from a statement of the Shanghai Cooperation Organisation (SCO), that includes China, Russia, Iran, Pakistan, Belarus and Central Asian states, that had condemned Israel's "aggression".

Last week, India had abstained in a UN resolution for a ceasefire on Gaza. Every other member of the BRICS, SCO and SAARC and even all G-7 members minus the U.S. had voted in favour of the resolution critical of Israel's bombardment of Gaza. In a break from older positions, New Delhi has made it clear that India will not criticise Israel.

India has had declining levels of trade with both Iran and Israel in the last few years, due to tensions in the region

Escalating war: Israeli soldiers check the damage caused to a building from an Iranian strike in Beit She'an on Saturday. AFP

What about Indians caught in the conflict?

As the conflict escalated, the MEA and its embassies in Tehran and Tel Aviv put evacuation efforts, as part of what was named 'Operation Sindhu', on priority. Unlike the rest of West Asia, where nearly 10 million Indians reside, relatively fewer numbers live in Iran and Israel. There are about 10,000 students and professionals in Iran and about 25,000 workers, students and researchers in Israel, many of whom only moved recently to fill in for construction and caregiver jobs after Israel dismissed thousands of Palestinian workers in the wake of the October 7 terror attacks in 2023. The evacuation efforts are multi-pronged and require the cooperation of both governments to help Indians cross over to bordering countries and fly back. Iran has even opened its airspace, otherwise closed due to the war, to allow chartered flights carrying Indian citizens home. While it is important to keep them safe, the government has learnt from past conflicts that it is necessary to find work and study opportunities for those coming back, or they end up returning to the conflict zones.

Apart from the loss in remittances, what's at stake for India economically?

India has had declining levels of trade with both Iran and Israel in the last few years due to tensions in the region. After India bowed to the previous Trump administration's demand to cancel oil trade or face sanctions, its trade with Iran dropped from about $14 billion in 2017 to $1.4 billion last year. Tensions in the Gulf region post-attacks as well as Israeli operations on Gaza have also sent trade with Israel down from $11 billion in 2022 to $3.75 billion last year, the Indian embassy said. However, India's defence imports from Israel have soared in the past decade, from about $5.6 million in 2015 to $128 million last year.

However, where India will feel the pinch financially, is in trade route disruptions, especially if the Strait of Hormuz is closed as a pressure tactic by Iran, or due to intensified fighting. According to thinktank GTRI, this could sharply increase oil and LNG prices, given that 40-50% of India's energy imports come through the area. Shipping costs, security, and insurance premiums would rise, leading to more costly imports, less competitive exports, and inflation.

What are the geopolitical impacts of the conflict for New Delhi to worry about?

Dealing with the Israel-Iran conflict has always meant a tricky tightrope balance for New Delhi, given its strong ties with both countries. The balance is also required in view of the two polarised parts of the world they represent. The U.S. and G-7 countries have largely backed Israel strikes as its "right to defend itself". In a joint statement at the summit in Canada this week, they called Iran the "principal source of regional instability and terror" that can "never have a nuclear weapon".

U.S. President Donald Trump is mulling a decision to formally join the attack on Iran, but U.S. support to Israel is crucial and unquestioning, even if he doesn't. Mr. Trump's lunch invitation to Pakistan's Army chief General Asim Munir this week, and speculation that the U.S. may ask Pakistan for support in a possible operation in Iran, from logistics to overflight and refuelling and intelligence sharing, will make India's path more difficult.

On the other hand, the Global South, that has been very critical of Israel's war in Gaza, have also expressed sympathies with Iran during the current crisis. After the stand India took with the SCO, all eyes will be on what position Mr. Modi takes when he travels to Brazil for the BRICS summit of emerging economies on July 6-7. Apart from founders Brazil, Russia, India, China and South Africa, the BRICS grouping includes new members Iran, UAE, Egypt, Ethiopia, Iran, and now Indonesia (Saudi Arabia has yet to formally join), and India will face a harder challenge in separating itself from any statement that is issued there. There's also the possible cost to India's ties with the Gulf region that has to be factored in. For India, West Asia is not just the source of 40% of its remittances but also 54% of oil imports and the region accounts for over $170 billion in trade. A perceived pro-Israel shift has a reputational impact for India, that was the first non-Arab nation to recognise the Palestinian State. Finally, there is the impact of a prolonged Israel-Iran conflict on India's connectivity plans. Plans for the India Middle East Europe Economic Corridor had already run aground after the October 7 attacks given that it requires connectivity through Arab countries and through Israel to Haifa port. With the current crisis, India's investment in the Chabahar port project and the International North-South Transport Corridor for trade and connectivity to Afghanistan, Central Asia and Eurasia will be affected, and New Delhi's best hope is an early end to the conflict.

India set to integrate rare-blood donor registry with e-Rakt Kosh

The integration will allow those with rare blood groups to access a centralised system; the challenge is to ensure that the country has a steady, motivated group of donors who stay connected to the blood banks, says the Director of ICMR-NIIH

Bindu Shajan Perappadan
CHANDRAPUR (MAHARASHTRA)

In what would be a life, time and cost saving move for people with rare blood groups in India, the Union Health Ministry is looking at integrating the national Rare Donor Registry with the national online platform for blood bank management and blood availability information, e-Rakt Kosh.

The integration will allow those with rare blood groups to access a centralised system developed under the National Health Mission (NHS), providing details of blood banks, blood availability, and blood donation camps across the country. Essentially, it will help people find blood and blood banks, and assist blood banks manage their stock and donors.

"The Indian Council of Medical Research-National Institute of Immunohaematology (ICMR-NIIH), along with four partnering institutes, created a database of 4,000 carefully screened donors tested for over 300 rare blood markers. It helps doctors find rare and specially matched blood quickly. Rare Donor Registry of India (RDRI) platform has been developed to help patients across India," said Manisha R. Madkaikar, Director, ICMR -NIIH, and Centre for Research, Management and Control of Heamoglobinopathies (CRMCH).

This system is useful as the registry includes ultra-rare types such as Bombay, P-Null and Rh-null. K. BHAGYA PRAKASH

More access

She said the integration project would be taken up soon and offer more access and support to those with rare blood groups.

"The challenge is to ensure that we have a steady, motivated group of donors who stay connected to the blood banks," she said.

Explaining how this registry for rare blood group helps, Dr. Madkaikar said that this system helped find rare matches as the registry included ultra-rare types such as the Bombay blood group, P-Null, and Rh-null blood group. It also helps ensure safer transfusions where matches are available for patients missing multiple antigens (common in thalassemia and sickle cell) to prevent complications.

"The group has also developed a special blood screening kit tailored for Indian patients and it uses DNA test (multiplex PCR) to quickly identify rare blood types," Dr. Madkaikar said.

She added that in the past, this registry has transformed nearly impossible searches into life-saving solutions, and with its integration and reach, India could work towards ensuring that no life is lost due to lack of blood.

Working the area of effectively managing haemoglobinopathies, the ICMR-NIIH has developed a point-of-care test to detect life-threatening blood related genetic disorders.

"The Health Technology Assessments (HTA) led by Department of Health Research (DHR) and ICMR-CRMCH and NIIH helped cut the cost of sickle cell diagnostic kits from ₹350 to under ₹50 per test, saving the government nearly ₹1,857 crore," said a note issued by the ICMR-CRMCH.

"India has developed testing for Haemophilia A and Von Willebrand Disease and now World Federation for Hemophilia has shown interest in procuring these tests for deployment in countries where the disease is prevalent. For India this new rapid, visual card testing device has made testing possible even at primary health centers," Dr. Madkaikar said .

This upgraded testing is cheaper than what is currently available.

India has about 1.4 lakh haemophilia patients which is the second highest globally after Brazil. Haemophilia is a rare genetic disorder where the blood doesn't clot properly due to a deficiency in clotting factors.

The technology for the POC test for these conditions was transferred to the Bengaluru-based biotechnology firm Bhat Biotech which commercialised it under the brand name BioScan in August 2023.

‘Priority is to ensure forest lease holders get entitlements’

Abhinay Lakshman
NEW DELHI

Even as joint security forces continue operations across several States to meet Union Home Minister Amit Shah’s resolve on a ‘Naxal-*mukt* Bharat’ by March 2026, Chhattisgarh Chief Minister Vishnu Deo Sai said his government’s “foremost priority is to ensure that every forest land lease holding family received their rightful entitlements”.

An official told *The Hindu* that this flows from the government’s thinking that “there is a clear correlation between FRA (Forest Rights Act) enforcement and reduced Naxal activity”. The Forest Rights Act, 2006, recognises and vests forest rights with Scheduled Tribes and forest-dwelling communities.

“The approach is holistic, combining rights recognition, economic empowerment, and security measures to strengthen tribal self-governance and counter extremism,” the official said, adding, “Reports from the ground indicate that in districts with robust FRA implementation, Naxal recruitment has dropped. Gram Sabhas now resolve many local disputes without Maoist interference, showcasing the positive impact of tribal self-governance.”

In conflict-prone areas, granting habitat rights has strengthened trust between tribal communities and the administration. FILE PHOTO

Ownership transfer

In response to questions on FRA implementation in the Bharatiya Janata Party (BJP)-ruled State, the Chief Minister told *The Hindu* that his government had streamlined the ‘*fauti naamantaran*’ – the process of transferring ownership of land after the death of the leaseholder as well, “so that legal heirs face no hurdles”.

“By simplifying and streamlining the process of ‘*fauti naamantaran*’, we have made sure that after the demise of a lease holder, their legal heirs face no hurdles in claiming their rightful ownership,” Mr. Sai said.

“With their names now officially recorded, they not only become the lawful owners of the land but also gain easier access to various government schemes and benefits,” he said, adding that the streamlined process had “provided forest rights holders with a new foundation of economic, social, and familial security”. “It has boosted the confidence of our rural and tribal communities and strengthened their trust in the government,” the CM said.

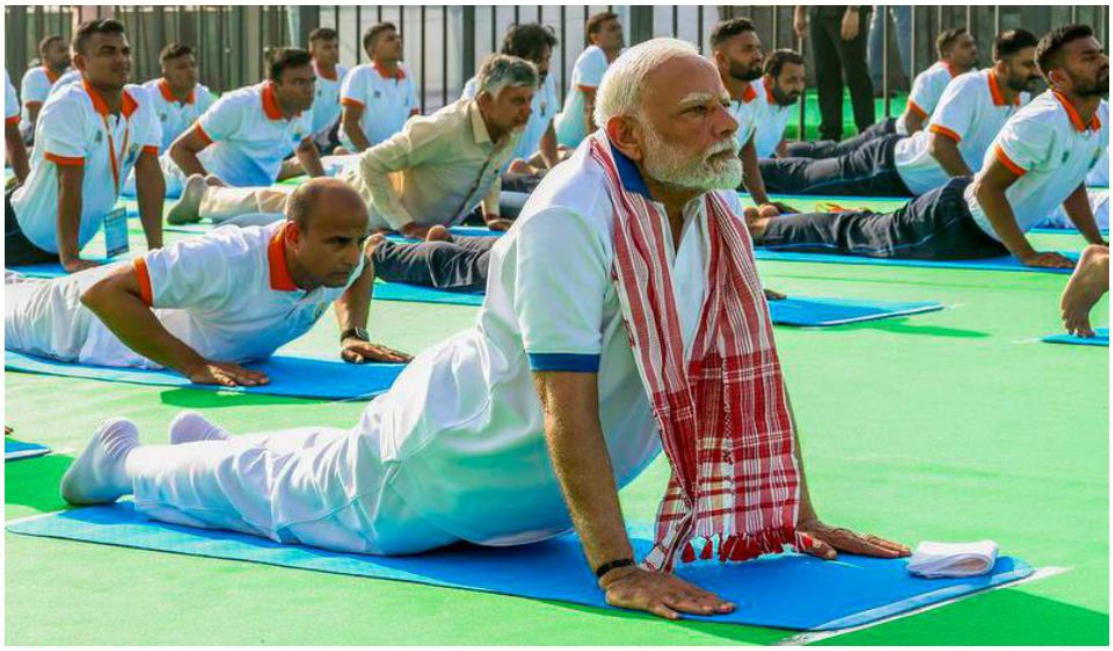
This thinking is also reflected in the State government’s 2025 policy for the surrender and rehabilitation of Naxals and victims of violence, which has provisions to give land titles, financial aid, and livelihood assistance to surrendered Naxals and victims, the State government official further said.

“By recognising land and forest rights, the government has addressed long-standing tribal grievances, which Naxals previously exploited for recruitment. In conflict-prone areas such as Abujhmad, granting habitat rights has strengthened trust between tribal communities and the administration,” the official said.

The State government has especially focused on granting community rights titles under the FRA, data showed, with officials adding that Chhattisgarh had been granted over 4,300 Community Forest Resource Rights (CFRR) titles in the past 1.5 years.

Public data from FRA implementation further showed that while, as of 2018, individual rights titles under the FRA were more than twice the number of community titles granted, the dataset for the last one year showed community titles outnumbering individual titles.

This comes in the backdrop of the Union government trying to give a fresh push to the implementation of the FRA across the country by funding the setting up of over 300 FRA cells to facilitate the law’s implementation. It is the first time the Union government is setting up mechanisms to help in the implementation of the law, which was hitherto largely in the domain of State governments.



Pose for peace: Prime Minister Narendra Modi and Andhra Pradesh Chief Minister N. Chandrababu Naidu perform yoga during the 11th International Day of Yoga celebrations in Visakhapatnam on Saturday. PTI

Yoga is the pause button, should guide the world from stress to solutions: Modi

B. Madhu Gopal
VISAKHAPATNAM

With the world facing unrest and instability, yoga is the "pause button that humanity needs to breathe, balance, and become whole again", Prime Minister Narendra Modi said on Saturday as he led the celebrations of 11th International Day of Yoga in Visakhapatnam.

Yoga offers a pathway to peace in such times, Mr. Modi said while addressing a massive gathering at the event.

Calling upon every nation to integrate yoga into their lifestyle and public policy, the Prime Minister appealed to the global community to let the day mark the beginning for "yoga for humanity", where "inner peace becomes global policy". Yoga should guide the world from conflict to cooperation, and from stress to solutions, Mr. Modi said.

The Prime Minister calls for marking this year's International Day of Yoga as the beginning of 'yoga for humanity'

More than three lakh people gathered in Visakhapatnam for the mass yoga demonstration, according to Andhra Pradesh Chief Minister N. Chandrababu Naidu. Commending the Prime Minister for popularising yoga across the world, Mr. Naidu said that yoga has become a people's movement in the State, referring to the month-long Yogandhra campaign which concluded on Saturday.

'From me to we'

The theme of this year's celebrations – Yoga for One Earth, One Health – reflects the fact that the health of every entity on the earth is interconnected, Mr. Modi said. Human well-being depends on the health of the soil that produces our food, the rivers that supply water, and the animals that share our ecosystems, and the plants that nourish us.

Mr. Modi explained: "Yoga teaches us that we are not isolated individuals but integral parts of nature. Initially, we learn to care for ourselves but gradually this care expands to our environment, society and plants. In other words, yoga transitions individuals from 'me' to 'we'. This spirit of 'me to we' encapsulates the spirit of India, which forms the foundation of service, dedication, and co-existence."

Highlighting research on the science of yoga across the world, the Prime Minister had a special word of praise for the evidence-based research being conducted at the All India Institute of Medical Sciences (AIIMS), Delhi. Yoga has shown significant impact in the treatment of cardiac and neurological disorders, as well as improving women's health and mental well-being, Mr. Modi said. He added that, through the National Ayush Mission, the message of yoga and wellness is being advanced across the country, with digital technology playing a significant role in this regard.

The global popularity of the 'Heal in India' mantra, highlighting India's emergence as a leading destination for healing, is also growing, the Prime Minister said. Reduction of oil usage, avoiding an unhealthy diet, and practising yoga should be a fitness mantra, he said.

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