

**Currently | 3rd July 2026**

- 1. Vikram-1: India's First-Ever Privately Developed Orbital Rocket Gears Up for Launch**  
**Source: The Hindu | Page: 6 | GS-3: Science & Technology (Space Technology | Private Space Sector)**
- 2. NIMHANS Opens Database to Aid Research on Sleep Disorders Among Stroke Patients**  
**Source: The Hindu | Page: 6 | GS-3: Science & Technology (Health Technology | Medical Research)**
- 3. Mandsaur Model for HPV Vaccination (Editorial)**  
**Source: The Hindu | Page: 8 | GS-2: Health | Governance | Women & Child Development | Social Sector**
- 4. A Hold on AI (UN Preliminary Report on Artificial Intelligence)**  
**Source: The Hindu | Page: 10 | GS-3: Science & Technology (Artificial Intelligence | Global Governance)**
- 5. I-2SEA: Submarine Cable Project Linking India, Malaysia & Singapore**  
**Source: The Hindu | Page: 17 | GS-3: Science & Technology (Digital Infrastructure | Telecommunications)**

# Vikram-1, India's first-ever privately developed orbital rocket, gears up for launch

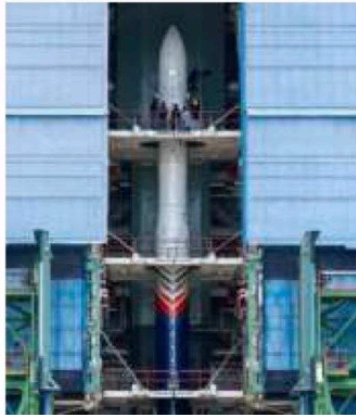
**The Hindu Bureau**

BENGALURU

India's first privately developed orbital-class rocket is all set for its maiden launch.

On Thursday, private space launch company Skyroot Aerospace, based in Hyderabad, announced that the launch window for Vikram-1's first test flight, named Mission Aagaman, is between July 12 and August 4.

It said that Test Flight-1 is targeted for no earlier than July 12, subject to the completion of assembly and testing operations at the launch site at the Satish Dhawan Space Centre in



Vikram-1 sits on a launch pad at the Satish Dhawan Space Centre in Sriharikota.

Sriharikota, as well as weather, safety and range clearance. The launch window extends till August 4.

The company said that Mission Aagaman, meaning 'the arrival', marks its

second mission following the successful suborbital flight of Vikram-S, the first private rocket to reach space from Indian soil, on November 18, 2022.

It said that this would be a partially commercial flight, with the company planning to commence full commercial flights after one or two successful demonstrations to orbit.

All stages of the Skyroot's Vikram-1 have been successfully integrated and stacked at the launch pad. The mission will gather critical data across propulsion, stage separation, guidance, navigation, control and overall vehicle performance.

Consider the following statements with regard to involvement of private entities in India's space programme :

1. The Indian National Space Promotion and Authorisation Centre (IN-SPACe) is an autonomous agency formed to facilitate participation of private entities.
2. Agnikul Cosmos launched the world's first flight using 3D-printed rocket engine.
3. Skyroot Aerospace has developed liquid fuel for GSLV.

Which of the statements given above is/are correct ?

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 2 only
- (d) 1, 2 and 3

## 1. **Context :: (GS-3: Science & Technology | Space Technology | Private Space Sector)**

Skyroot Aerospace has announced the 12 July–4 August 2026 launch window for Mission Aagaman, the maiden flight of Vikram-1, India's first privately developed orbital launch vehicle.

## 2. **Core Content**

### I. **Vikram-1 & Mission Aagaman**

- \* **Developed by Skyroot Aerospace.**
- \* **Mission Aagaman:** Maiden flight of Vikram-1 from Satish Dhawan Space Centre (SDSC-SHAR), Sriharikota.
- \* **Designed to place small satellites into Low Earth Orbit (LEO: 160–2,000 km).**

### II. **Orbital Rocket**

- \* **Launch vehicle capable of achieving orbital velocity (~7.8 km/s) to place satellites into orbit.**
- \* **Suborbital rockets reach space but do not enter orbit.**
- \* **Vikram-S (2022):** Suborbital | **Vikram-1:** Orbital.

### III. **Significance**

- \* **Reflects the success of Space Sector Reforms (2020).**
- \* **Strengthens India's private space ecosystem and commercial launch capability.**
- \* **Enhances India's position in the global small-satellite launch market.**

## 3. **UPSC Value Addition**

### I. **Key Institutions**

- \* **Indian National Space Promotion and Authorisation Centre (IN-SPACe):** Regulates and promotes private space activities.
- \* **NewSpace India Limited (NSIL):** Commercial arm of the Indian Space Research Organisation (ISRO).

# NIMHANS opens 'database' to aid research on sleep disorders among stroke patients

**Afshan Yasmeen**

BENGALURU

A team of researchers from NIMHANS, Bengaluru, and the International Institute of Information Technology (IIIT), Hyderabad, has developed the first open-access Asian database of overnight sleep studies in patients with ischemic stroke.

The database, which has been made publicly available, is expected to support research on sleep disorders in stroke survivors and help improve post-stroke care.

The dataset, named iS-LEEPS (Polysomnography Dataset for Sleep Analysis in Ischemic Stroke Patients), has been published in the Nature Portfolio



The database comprises 100 overnight polysomnography (PSG) recordings collected at the NIMHANS. SUDHAKARA JAIN

journal *Scientific Data*. It comprises 100 overnight polysomnography (PSG) recordings collected at the NIMHANS between September 2018 and December 2021.

Each recording includes manually scored sleep stages, respiratory events,

oxygen desaturation episodes, periodic limb movements and clinical information, all annotated, according to the American Academy of Sleep Medicine's 2017 guidelines.

Srijithesh P.R., professor of neurology at NIMHANS and one of the cor-

responding authors of the study, told *The Hindu* that the project was conceived to address a major gap in sleep medicine research. "Sleep-disordered breathing is extremely common after ischemic stroke, but researchers have had very limited access to large, well-annotated datasets from stroke patients... We wanted to create a high-quality resource that researchers across the world can use," he said.

"Sleep... plays an important role in brain repair, memory consolidation and functional recovery after stroke. If sleep disorders... are not recognised and treated, they can adversely affect rehabilitation and even increase the risk of recurrent stroke," he said.

## 1. **Context : (GS-3: Science & Technology | Health Technology | Medical Research)**

The National Institute of Mental Health and Neuro Sciences (NIMHANS) and the International Institute of Information Technology (IIIT), Hyderabad have launched **iSLEEPS**, Asia's first open-access sleep database for ischemic stroke patients to strengthen research and improve post-stroke care.

## 2. **Core Content**

### I. **iSLEEPS Database: Polysomnography Dataset for Sleep Analysis in Ischemic Stroke Patients.**

- \* Contains 100 overnight Polysomnography (PSG) recordings (2018–2021), published in Scientific Data (Nature Portfolio).
- \* Records sleep stages, breathing disorders, oxygen desaturation, limb movements and clinical data.

### II. **Why is it Important?**

- \* Addresses the lack of high-quality sleep datasets in Asia.
- \* Supports Artificial Intelligence (AI)-based diagnosis and global research.
- \* Early detection of sleep-disordered breathing improves rehabilitation and lowers the risk of recurrent stroke.

## 3. **UPSC Value Addition**

### I. **Key Terms**

- \* **Polysomnography (PSG):** Gold-standard overnight sleep test for diagnosing sleep disorders.
- \* **Ischemic Stroke:** Caused by blockage of blood supply to the brain; accounts for about 85% of all strokes.

# A shot at life, Mandsaur's model for HPV vaccination

The birth of Savita (name changed) in Mandsaur district, Madhya Pradesh, 14 years ago was a moment of celebration for her family. The Banchhada community she was born into – a denotified tribe in Madhya Pradesh traditionally associated with sex work – welcomes the birth of girls, who are often viewed as future breadwinners. Yet, when a team of human papillomavirus (HPV) vaccinators recently approached Savita's family, they were apprehensive. "Will she be able to work?" they asked candidly, worried about the vaccine's future impact.

Their hesitation was neither unexpected nor isolated. Although cervical cancer is the second most common cancer among Indian women, preventive health-care initiatives often grapple with low levels of awareness and social stigma. Cervical cancer vaccination faces a distinct set of challenges – low cultural sensitivity around sexual health and gender bias, coupled with vaccine hesitancy – making it a pressing public health concern.

In light of this, the Government of India launched a nationwide cervical cancer campaign on February 28, 2026, providing free HPV vaccinations to 1.15 crore girls aged 14-15 years. India bears a quarter of the global cervical cancer burden, reporting over 1.2 lakh new cases and 80,000 deaths annually. Since nearly 95% of cases are caused by high-risk HPV strains, vaccination offers a significant preventive breakthrough.

## From data to coverage

To implement the programme effectively and inclusively, the Mandsaur district administration adopted a data-driven, decentralised and adaptive strategy. For exhaustive coverage, the most vulnerable and often overlooked populations were targeted first.

Girls from difficult-to-reach communities – Banchhadas, nomadic tribes, urban slums, and school dropouts – became the starting point. These "missed populations" are at greater risk of falling off the radar of government service delivery.

At the grassroots, the challenge is often not vaccine hesitancy but data invisibility. Leveraging



**Aditi Garg**

Collector and District Magistrate, Mandsaur, Madhya Pradesh

This district in Madhya Pradesh has demonstrated effective grassroots strategies for HPV vaccination delivery

multiple government databases – Rashtriya Bal Swasthya Karyakram (RBSK), SAMAGRA MP (a citizen-centric social security platform by the Government of Madhya Pradesh) and Ladli Laxmi Yojana hyper-localised target lists were created. Fragmented records were transformed into actionable intelligence. Door-to-door surveys and tracking through SAMAGRA IDs ensured that eligible girls did not fall through statistical gaps. School and anganwadi enrollment gaps over the years were meticulously analysed to prepare village-level Master Line Lists. Rapid identification of 'low-coverage/high-resistance' areas enabled coordinated micro-planning. Mapping vulnerable groups geographically also enabled customising communication strategies, tailored to cultural sensitivities.

## Reducing barriers through 'nudges'

Behavioural insights played a pivotal role in grassroots' saturation. The district relied on the "Nudge Approach" that helped design an environment where vaccination became the default choice. This helped in effectively breaking down grassroots barriers such as reluctance, inertia, social discomfort. Health-care workers informed families that their daughters were 'due for vaccination', rather than asking them to choose to vaccinate. Families who refused vaccinations received repeated counselling visits by health-care teams. Schools and local bodies arranged transportation to eliminate logistical barriers, simplifying access.

Misinformation hoaxes and myths around vaccine-induced infertility resulted in initial resistance. To counter rumours, the administration launched targeted awareness campaigns involving Gen-Z influencers and youth icons. National-level athletes, young doctors, students, religious leaders and media personalities voluntarily joined the effort to promote vaccination and dispel misconceptions.

Social norms and peer networks served as powerful "behavioural nudges". Local events publicly felicitated vaccinated families and recognised vaccinated girls as peer champions. Gram panchayat and ward-level data sharing sparked both collaboration and competition. Recognition was given to both top performers

and the most improved. "Digital nudges" and red-flag reminders for frontline workers enhanced monitoring and accountability.

At the cutting-edge implementation level, resistance often manifests as delay, doubt, and discomfort rather than outright refusal. Vaccinations were conducted exclusively under medical supervision at visible health-care facilities, normalising the practice of adolescent girls' vaccination. Experiences of women affected by cervical cancer were shared to create emotional resonance and encourage informed decision-making. Counselling sessions reduced stigma and replaced distrust with dialogue.

## Strategy to impact

The HPV campaign was further integrated with on-going health-care programmes. Routine immunisation days, antenatal care clinics and the Pradhan Mantri Surakshit Matriwa Abhiyan sessions were used to promote HPV awareness and conduct vaccination drives. When women accessed one service, they became more receptive to another, creating avenues for 'bundling' of health-care service delivery.

The results were significant. In less than 40 days, Mandsaur achieved 100% of its vaccination target – 493 vaccination sessions were conducted through 12 permanent and 27 temporary vaccination sites across the district. Girls who met the criteria, from 893 villages and 190 urban wards, were mobilised, moving from planning on paper to protecting the population.

The magnitude of India's health-care challenge must be met with the measure of its grassroots' actions. Policy design must bridge the yawning gap between intended outcomes and empirical ground realities. Behavioural and systemic "nudges" in implementation can leverage the human tendency to opt for preset choices. Dovetailing health-care data and grassroots innovations tailored to regional realities can bridge the last mile and deliver the final dose.

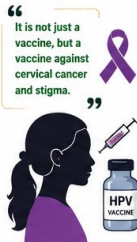
By moving from coverage to care, from data to impact, Mandsaur turned a formidable public health challenge into a collective mass movement. The district's inclusive vaccination campaign demonstrated how a simple shot in the arm can truly become a fair shot at life.

# MANDSAUR MODEL FOR HPV VACCINATION

GS-2: Health | Governance | Women & Child Development | Social Sector

## 1. CONTEXT

Mandsaur district, Madhya Pradesh, achieved nearly 100% HPV vaccination coverage in the National HPV Vaccination Programme (launched Feb 2026) through community participation, behaviour change and digital tracking—emerging as a replicable model.



## 2. HUMAN PAPILLOMAVIRUS (HPV): BASICS

- HPV (Human Papillomavirus) is a group of 200+ viruses transmitted mainly through sexual contact.
- High-risk types 16 & 18 cause ~70% of cervical cancer cases worldwide.
- Low-risk types 6 & 11 cause genital warts.
- Persistent infection with high-risk HPV can lead to cervical cancer over 10–20 years.
- Cervical cancer is one of the few cancers that is preventable through vaccination, early screening and treatment.

## CERVICAL CANCER: KEY FACTS



- 2<sup>nd</sup> most common cancer among women globally.
- ~6.6 lakh new cases & ~3.5 lakh deaths in 2022 (Globocan 2022).
- In India: ~1.23 lakh new cases & ~77,000 deaths (2022).
- Highly preventable & treatable if detected early.

## 3. HPV VACCINES AVAILABLE

| Vaccine    | Type         | Covers                               | Manufacturer             |
|------------|--------------|--------------------------------------|--------------------------|
| Cervavac   | Quadrivalent | HPV 6, 11, 16, 18                    | Serum Institute of India |
| Gardasil-4 | Quadrivalent | HPV 6, 11, 16, 18                    | MSD                      |
| Gardasil-9 | Nonavalent   | 9 HPV types (6, 11, 16, 18 + 5 more) | MSD                      |

## 4. INDIA'S NATIONAL HPV VACCINATION PROGRAMME (2026)

- **Launched:** February 2026
- **Target Group:** 14-year-old girls (one full cohort per year)
- **Target:** 1.15 crore girls annually
- **Vaccine Used:** Gardasil-4 (Quadrivalent)
- **Cost:** Free of cost at government health facilities
- **Delivery Platforms:** Schools, health facilities & outreach sessions
- **Digital Platform:** U-WIN for registration, tracking & monitoring

## 6. WHY IS IT IMPORTANT?



**Public Health Impact**  
Prevents cervical cancer, reduces mortality and healthcare costs.



**Gender & Equity**  
Protects young girls, promotes gender equality and women's health.



**Demographic Dividend**  
Healthy women contribute to a productive and developed society.



**SDG Alignment**  
Supports SDG-3 (Good Health), SDG-5 (Gender Equality) and SDG-10 (Reduced Inequalities).

## 7. CHALLENGES



Vaccine hesitancy due to myths and misinformation.



Cultural stigma around sexual health.



Reaching remote and hard-to-reach areas.



Follow-up doses and long-term monitoring.



Ensuring sustained political and administrative support.

## 8. WAY FORWARD



Scale up the Mandsaur model across all districts.



Strengthen school-based vaccination and community awareness.



Engage parents, teachers and local leaders continuously.



Integrate HPV vaccination with adolescent health services.



Use U-WIN for robust digital monitoring and real-time data-driven decisions.

## 5. MANDSAUR MODEL – KEY STRATEGIES



**Community Mobilisation**  
Involvement of ASHA, Anganwadi workers, achool teachers, local leaders.



**Behaviour Change & Counselling**  
Addressed myths, stigma and fears through door-to-door visits and parent counselling.



**School Engagement**  
Active coordination with schools for consent, communication and vaccination drives.



**Digital Tracking**  
Real-time beneficiary tracking through U-WIN ensured no child was left behind.



**Convergence:**  
Health, Education & Women & Child Development departments worked together.



**Nudges over Coercion**  
Positive reinforcement, reminders and peer influence created trust and voluntary uptake.



**Outcome:**  
Nearly 100% coverage in the first phase.

## 9. UPSC MAINS VALUE ADDITION



### Governance & Delivery

- Last-mile delivery through community participation and convergence.
- Digital public infrastructure (U-WIN) improves transparency and accountability.
- Behavioural insights (nudge theory) enhance programme effectiveness.



### Health & Social Justice

- Preventive healthcare reduces disease burden and healthcare costs.
- Promotes reproductive health, dignity and gender justice.
- Aligns with Ayushman Bharat & National Health Mission goals.



### Inclusive Development

- Protects adolescent girls, especially from vulnerable and rural backgrounds.
- Strengthens human capital and supports demographic dividend.
- Ensures 'leaving no one behind'.



### Sustainability

- Long-term reduction in cervical cancer incidence and mortality.
- Builds a healthier, more productive and equitable society.

## PRELIMS FACTS

- HPV: Human Papillomavirus
- High-risk types: 16 & 18 (cause ~70% cervical cancers)
- Low-risk types: 6 & 11 (cause genital warts)
- India's Programme: Launched Feb 2026 for 14-year-old girls
- Target: 1.15 crore girls annually
- Vaccine Used: Gardasil-4 (Quadrivalent)
- Digital Platform: U-WIN
- Goal: Prevent cervical cancer, promote women's health



“ The Mandsaur model shows that vaccines work best when communities trust, understand and participate.

# A hold on AI

AI holds scientific promise, but it should not unfold unchecked

**T**he UN's Preliminary Report of the Independent International Scientific Panel on AI drives at a few fault lines in the rapid investment into and proliferation of AI technologies: the Global South-Global North divide, with the latter poised to take the lion's share of the benefits of the diffusion of advanced AI models in different industries; and the challenge poorer countries face in regulating models far more advanced than what their own AI ecosystems can develop. These divides force emerging countries to choose between capital-intensive undertakings to get a seat at the table, or to accept the hand dealt to them by the half-dozen companies whose decisions shape AI access and use. These divisions are all the more urgent when seen in the light of what makes a country a voice that matters in AI: abundant electricity, highly capitalised firms that employ scarce talent with high salaries, and a drive to plow through policy resistance with a competitive zeal to outdo last month's capabilities. While the report highlights AI technologies' transformative potential in scientific research, its development is far more rapid than that of social media – an industry that had time to act responsibly yet deformed public discourse and affected democracies, even as people were more or less able to tell what was going on in real time. It is unclear whether individual countries, even China or the U.S., have enough power to meaningfully arrest how AI develops.

AI firms acting irresponsibly have already caused harms that would not be tolerated in any other industry. AI models have ensnared teenagers and adults in parasocial fantasies that have sometimes turned fatal; they have flattened the world wide web, grievously injuring the news media's ability to deploy resources in their respective missions to inform the public; they have unleashed an epidemic of deepfakes, undermining trust in the written word and images alike; and they have deeply intertwined their promises of Artificial General Intelligence with global financial systems, with possible catastrophic economic consequences. The most important task for governments is how to hold these firms to account when needed, as taking a backseat on this conversation – even if industry leaders ignore the Global South's concerns – carries far greater costs. India has already experienced the cost of not asserting itself in the technology development of the decade: even as Anthropic's Mythos and Fable held out the tantalising promise of securing vast cyber systems, the U.S. pulled access, leaving the firms that had these models to ponder the risk of a different model succeeding at attacking their infrastructure. There is a limit to visions of AI as a geostrategic asset; much needs to be done to address its potential for broad damage.

## 1. **Context :: (GS-3: Science & Technology | Artificial Intelligence | Global Governance)**

The United Nations (UN) has released the Preliminary Report of the Independent International Scientific Panel on Artificial Intelligence (AI), calling for a globally coordinated approach to harness AI benefits while managing its risks.

## 2. **Core Content**

### I. **About the Panel**

- \* Independent International Scientific Panel on AI (AI Panel).
- \* Constituted under the United Nations General Assembly (UNGA).
- \* **Mandate: Provide independent, evidence-based scientific advice on AI opportunities, risks and global governance.**

### II. **Key Findings of the Report**

- \* AI has immense potential in science, healthcare and economic growth, but its rapid expansion is widening the Global North–South AI divide.
- \* Unequal access to computing power, data, finance and skilled talent may leave developing countries behind.
- \* Unregulated AI also increases risks such as deepfakes, misinformation, bias and cybersecurity threats.

### III. **Key Recommendations**

- \* Develop an inclusive global AI governance framework anchored in safety, transparency and accountability.
- \* Ensure greater participation of developing countries in AI rule-making and standard-setting.
- \* Promote international cooperation for responsible AI development and deployment.

# Submarine cable project linking India, Malaysia, Singapore unveiled

**The Hindu Bureau**

HYDERABAD

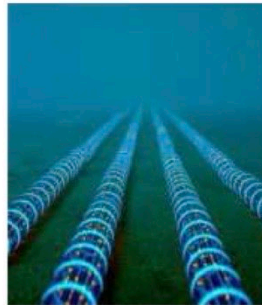
A consortium comprising Microsoft, Singtel, Tata Communications and AI connectivity platform Lightstorm will build a submarine cable system connecting India, Malaysia and Singapore.

“The facility is designed to cater to the rapidly-growing demand from hyperscalers, GPU infrastructure providers and enterprises running AI training and inference workloads across the India-Southeast Asia corridor,” Lightstorm said announcing signing of contracts to launch the

building of the cable system. No details of the proposed investment on the project were shared.

## Dual landings

I-2SEA, the cable system, would link India’s east coast, home to the fastest-growing AI and hyperscaler data centre clusters in Hyderabad and Chennai, directly to Singapore, the region’s cloud interconnect and AI hub as well as Malaysia’s emerging data centre corridor in Kuala Lumpur. It would have dual landings in India, with the one at Machilipatnam providing shortest subsea access to Hyderabad and



Picture for representational purpose only.

the other at a new diverse landing location in South Chennai.

“The I-2SEA consortium will operate under a joint build agreement. NEC Corporation has been appoint-

ed as system supplier and ASEAN Cablesip (ACPL) as marine installation partner. The system is now open for capacity commitments,” Lightstorm said.

I-2SEA is targeted to be ready-for-service in Q4 2029 and estimated length of the high-capacity cable is 3,600 km from Singapore to Machilipatnam with onward connectivity to Hyderabad.

“It is expected to deliver the fastest transmission on the Singapore/Malaysia-Hyderabad corridor, which is the most strategically critical city pair for AI workloads in the region,” the company said.

## 1. **Context : (GS-3: Science & Technology | Digital Infrastructure | Telecommunications)**

A consortium led by Tata Communications, Microsoft, Singtel and Lightstorm has unveiled the I-2SEA submarine cable project to enhance digital connectivity between India, Malaysia and Singapore, supporting the region's growing Artificial Intelligence (AI) and data centre ecosystem.

## 2. **Core Content**

### I. **I-2SEA (India–Singapore–Malaysia)**

\* 3,600 km high-capacity submarine fibre-optic cable connecting **Machilipatnam–Singapore via Malaysia**.

\* Dual landing stations in India: Machilipatnam and South Chennai for network resilience.

\* Expected to be operational by Q4 2029.

### II. **Significance**

\* Enables faster and secure international data transmission.

\* Supports Artificial Intelligence (AI), cloud computing, hyperscale data centres and digital economy growth.

\* Strengthens India's digital connectivity with Southeast Asia under the Act East Policy.