

The Hindu Important News Articles & Editorial For UPSC CSE

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- Firey Aerospace's Blue Ghost Mission 1 successfully landed on the Moon, supporting NASA's Artemis program and commercial lunar exploration.

In a first, private spacecraft lands upright on moon

Associated Press
WASHINGTON

A U.S. company successfully landed its spacecraft on the moon on Sunday, marking only the second private mission to achieve the milestone – and the first to do so upright.

Firefly Aerospace's Blue Ghost Mission 1 touched down shortly after 3.34 a.m. U.S. Eastern Time (0204 IST) near Mons Latreille, a volcanic formation in Mare Crisium on the moon's northeastern near side.

"Y'all stuck the landing, we're on the moon," an engineer at mission control in Austin, Texas, called out as the team erupted in cheers.

CEO Jason Kim confirmed that the spacecraft was "stable and upright" – in contrast to the first private landing last February, which came down sideways.

"We're on the Moon!" Nicky Fox, associate administrator for NASA's Science Mission Directo-

rate, rejoiced.

The first image from the lander revealed the rocky, pockmarked terrain it had to autonomously navigate in order to select its touchdown spot, having slowed down from thousands of miles per hour to just two mph.

Nicknamed "Ghost Riders in the Sky," the mission is part of a NASA-industry partnership aimed at reducing costs and supporting Artemis, the programme designed to return astronauts to the moon.

Size of a hippopotamus

The golden lander, about the size of a hippopotamus, launched on January 15 on a SpaceX Falcon 9 rocket, capturing stunning footage of the earth and the moon along its 2.8 million mile journey.

It shared a ride with a Japanese company's lander set to attempt a landing in May.

Blue Ghost carries 10 instruments, including a lunar soil analyser, a radi-



The mission is aimed at reducing costs and supporting Artemis, the programme designed to return astronauts to the moon. AP

tion-tolerant computer and an experiment testing the feasibility of using the existing global satellite navigation system to navigate the Moon.

Designed to operate for a full lunar day (14 earth days), Blue Ghost is expected to capture high-definition imagery of a total eclipse on March 14, when the earth blocks the sun from the moon's horizon.

On March 16, it will record a lunar sunset, offering insights into how dust levitates above the surface under solar influence –

creating the mysterious lunar horizon glow first documented by Apollo astronaut Eugene Cernan.

Hopping drone

Blue Ghost's arrival will be followed on March 6 by fellow Texas company Intuitive Machines' IM-2 mission, featuring its lander Athena.

In February 2024, Intuitive Machines became the first private company to achieve a soft lunar landing – also the first U.S. landing since the crewed Apollo 17 mission of 1972.

However, the success was tempered by a mishap: the lander came down too fast and tipped over on impact, leaving it unable to generate enough solar power and cutting the mission short.

This time, the company says it has made key improvements to the hexagonal-shaped lander, which has a taller, slimmer profile than Blue Ghost, and is around the height of an adult giraffe.

Athena launched on Wednesday aboard a SpaceX rocket, taking a more direct route toward Mons Mouton – the southernmost lunar landing site ever attempted.

Until Intuitive Machines' first successful mission, only five national space agencies had accomplished this feat: the Soviet Union, the United States, China, India and Japan, in that order. Now, the U.S. is working to make private lunar missions routine through NASA's \$2.6 billion Commercial Lunar Payload Services programme.

Analysis of the news:

- **Firey Aerospace's Successful Lunar Landing:** The U.S. company landed its Blue Ghost Mission 1 on the Moon on March 3, 2024.
- **First Upright Private Landing:** Unlike the previous private mission, which tipped over, Blue Ghost remained stable and upright.
- **Landing Site:** Touched down near Mons Latreille, Mare Crisium on the Moon's northeastern near side.
- **NASA Partnership:** Part of NASA's Commercial Lunar Payload Services (CLPS) program to support Artemis missions.
- **Scientific Goals:** Carrying 10 instruments, it will study lunar soil, radiation, and navigation.
- **Future Lunar Missions:** Intuitive Machines' Athena lander to attempt a southernmost landing on March 6.

Researchers from the University of Kerala discovered two new jumping spider species from Shendurney Wildlife Sanctuary, marking the first record of the *Epidelaxia* genus in India.

Research team discovers two more species of jumping spiders in wildlife sanctuary in Kerala

Sarath Babu George
THIRUVANANTHAPURAM

A collaborative research involving the University of Kerala reported the discovery of two new species of jumping spiders belonging to the genus *Epidelaxia* from the Shendurney Wildlife Sanctuary in the State. This was the first time the genus had been recorded from India, extending its known range from Sri Lanka to other parts of the subcontinent.

The research team behind the find included Asima A. and G. Prasad from the Department of Zoology of the University of Kerala; John T.D. Caleb from Sa-

veetha Medical College & Hospitals, Chennai; and Mathew M.J. from the Centre for Arachnology Research at Bharata Mata College, Kochi. Their work, published in the February issue of *Zootaxa*, a peer-reviewed journal, not only added two new species to the region's checklist but also shed light on the rich biodiversity of the Western Ghats.

The two new species, *Epidelaxia falciformis* sp. nov. and *Epidelaxia palustris* sp. nov., were discovered during field expeditions to Kulathupuzha in Kollam in December 2022 and April 2023.

These are distinctively



Epidelaxia falciformis sp. nov. and *Epidelaxia palustris* sp. nov. from the Shendurney Wildlife Sanctuary. SPECIAL ARRANGEMENT

characterised by their striking physical features, which include a prominent yellow triangular-shaped mark on the prosoma (the front part of the body) of females and unique traits

of the copulatory organs in both males and females. Males of *E. falciformis* have a brown carapace with a yellow-brown stripe, while males of *E. palustris* feature a pale brown band

along the side of their bodies. The females exhibit similar colouration, with the added feature of white orbital setae around their eyes.

Size variation

The researchers added that the species varied slightly in size, with *E. falciformis* measuring 4.39 mm while the *E. palustris* measured 4.57 mm (males) and 3.69 mm (females). These spiders were described as highly adapted to their environment, inhabiting the dense foliage of the Western Ghats. The genus was previously considered endemic to Sri Lanka.

- This finding extends the genus' known range beyond Sri Lanka, highlighting the rich biodiversity of the Western Ghats.

Epidelaxia falciformis

- Discovered in Kulathupuzha, Kollam, during a field expedition in December 2022.
- Males measure 4.39 mm in length.
- Identified by a brown carapace with a yellow-brown stripe.
- Females feature a yellow triangular-shaped mark on the prosoma.
- Unique copulatory organ traits distinguish the species.
- Highly adapted to the dense foliage of the Western Ghats.
- First recorded instance of the *Epidelaxia* genus in India.

The Euclid space mission recently discovered an Einstein ring in galaxy NGC 6505, 590 million light-years away.

Euclid space telescope discovers new 'Einstein ring' in nearby galaxy

All Einstein rings have great scientific value, but Altieri's ring is extra special because it has been observed in a well-studied nearby galaxy, NGC 6505. Only five other gravitational lenses at similar distances have been found so far. Altieri's ring is composed of the distorted images of another galaxy 4.5 billion lightyears away

Smriti Mahajan

More than a century ago, Albert Einstein predicted that massive objects like large galaxies and clusters of galaxies act like giant lenses in space by bending light from distant objects. As seen from an observer on the earth, a rare alignment of a background object with such a lens in the foreground can lead to a visual spectacle, because of the lensing, the observer sees arc-like structures skirt the foreground lens. Sometimes these arcs are arranged in a circular pattern, which is called an Einstein ring.

Altieri's ring
Recently, the Euclid space mission of the European Space Agency (ESA) spotted an Einstein ring in the galaxy NGC 6505, just 590 million lightyears from the earth. This may sound like a long distance, but on the astronomical scale, the galaxy is verifiably in our cosmic backyard. An astronomer named Bruno Altieri first noticed this Einstein ring in September 2023 in a blurry image captured by Euclid, which ESA had launched only two months earlier.

The image was unfocused by design because in the initial days of the mission, scientists were taking data to test if all of Euclid's systems were functioning properly. Subsequent images of the galaxy yielded focused images, using which scientists confirmed the presence of the ring. It has since been nicknamed Altieri's ring in honour of the scientist who stumbled upon it.

A quirk of the light
Einstein predicted that light will not travel on a straight path when moving in the vicinity of massive objects. He argued that a large object distorts spacetime—the fabric of space and time around it—just like the curvature of a hammock is determined by the mass of the person sitting in it.

This idea forms the basis of Einstein's famous general theory of relativity, which the American physicist John Wheeler summed up perfectly in the following words: "matter tells spacetime how to curve, and curved spacetime tells matter how to move."

The massive object in the foreground, called a gravitational lens, distorts and amplifies the light coming from background sources in the same way a magnifying glass distorts the path of light scattered by a background object, like small lettering on a piece of paper.

That said, a gravitational lens is not as perfectly shaped as a magnifying glass and may produce multiple images of the background object. The number of images depends on the relative distance between the lens and the observer.



In the middle of this image, the fuzzy-looking bulb of light in a warm shade of yellow extends around a small bright spot, nestled within a thin light circle that appears to be drawn closely around it. The circle is an Einstein ring. ESA/EUCLID/EUCLID CONSORTIUM/NASA

between the lens and the background object, and the latter's alignment with the lens.

This quirky cosmic phenomenon is called strong gravitational lensing. The multiple images can appear in a variety of configurations around the lens and can assume slightly different shapes and sizes depending on the distribution of matter in it.

An Einstein ring is a special case of strong gravitational lensing. Astronomers discovered the first Einstein ring in 1998, more than 80 years after Einstein predicted their existence. An Einstein ring is created when a gravitational lens distorts light coming from a distant background object, like a star or a galaxy, in such a way that the multiple images created in the foreground form a circular pattern around the lens. This requires a near-perfect alignment between the distant object, the lens, and the observer.

A new set of eyes

All Einstein rings have great scientific value, but Altieri's ring is extra special because scientists have observed it in a well-studied nearby galaxy, NGC 6505. Scientists have found only five other gravitational lenses at similar distances so far. Altieri's ring is composed of the distorted images of another galaxy 4.5 billion lightyears away.

Since NGC 6505 has been known to astronomers since the 19th century, the

An Einstein ring is a case of strong gravitational lensing. Astronomers discovered the first ring in 1998, 80 years after Einstein predicted their existence

ring's discovery shows how turning new telescopes to old targets can still yield valuable new knowledge.

The study of Einstein rings can also provide new insights into the universe's expansion and provide opportunities to test the theory of general relativity and investigate distant objects that are otherwise obscured.

They can also help astronomers understand the nature of dark matter, a mysterious form of matter that comprises around 30% of the total mass-energy budget of the universe yet remains undetected because it doesn't interact with the normal matter of which you and I are made. The presence of dark matter can only be inferred from the gravitational effect it has on matter surrounding it—or by bending light around itself.

One of a kind, probably

Following the discovery of Altieri's ring in September 2023, Euclid scientists further investigated this system for more insights using other telescopes. This way, for example, data from the Keck Cosmic Web Imager (KCWI) obtained in March 2024

confirmed the lensed nature of the images.

Together with data from the archives of the Canada-France-Hawaii Telescope and the Dark Energy Spectroscopic Instrument, scientists also confirmed the total mass of stars and the distance to NGC 6505 and the lensed galaxy. They found that the latter is an old galaxy no longer forming stars.

While the discovery of Altieri's ring so early in Euclid's life is exciting for the mission, its scientists sounded caution in a paper published in *Astronomy & Astrophysics* on February 10: "... the exceptional nature of Altieri's lens means it is unlikely that Euclid will find another lens" closer than around 680 million light-years "with a ring as bright as that observed here."

Euclid began to scan the sky formally on February 14, 2024, and is expected to discover 100,000 new gravitational lenses in the universe. Its chances of discovering lenses so close to the earth, however, remain slim because of the smaller volume of the universe available to look in.

This said, the discovery of Altieri's ring highlights Euclid's potential and the role it can play in advancing our understanding of dark matter.

(Smriti Mahajan is an astronomer and science communicator promoting STEM education through astronomy. mahajan.smriti@gmail.com)

THE GIST

Recently the Euclid space mission spotted an Einstein ring in the galaxy NGC 6505. An astronomer named Bruno Altieri first noticed this Einstein ring in September 2023 in a blurry image captured by Euclid, which ESA had launched only two months earlier.

Einstein predicted that light will not travel on a straight path in the vicinity of massive objects. A massive object in the foreground of a light source acts as a gravitational lens, distorting and amplifying light in the same way a magnifying glass distorts the path of light.

Euclid began to scan the sky formally on February 14, 2024, and is expected to discover 100,000 new gravitational lenses. Its chances of discovering lenses so close to the earth, however, remain slim because of the smaller volume of the universe available to look in.

Gravitational Lensing and Einstein Rings

- Massive objects like galaxies bend light from distant objects, creating a lensing effect.
- Sometimes, the bent light forms a circular pattern called an Einstein ring.

Einstein Ring

- An Einstein Ring is a cosmic phenomenon predicted by Albert Einstein's General Theory of Relativity.
- It occurs when light from a distant object, like a galaxy or star, passes through a massive foreground object, creating a circular ring-like structure.
- The foreground object acts as a gravitational lens, bending and magnifying the background light.
- A perfect Einstein Ring forms when the observer, lens, and background object are perfectly aligned.
- The first Einstein Ring was discovered in 1998, over 80 years after Einstein's prediction.

- ▶ It helps astronomers study dark matter, cosmic expansion, and distant galaxies.

Discovery of a New Einstein Ring

- ▶ The Euclid space mission recently discovered an Einstein ring in galaxy NGC 6505, 590 million light-years away.
- ▶ This ring was initially detected in an unfocused image during early mission testing.
- ▶ The ring's existence was later confirmed with clearer images.

Euclid Space Mission

- ▶ Launched by the European Space Agency (ESA) on July 1, 2023, to study the dark universe.
- ▶ Primary goal is to investigate dark matter and dark energy, which together make up 95% of the universe.
- ▶ Equipped with a 1.2-meter telescope, it captures high-resolution images and spectra of distant galaxies.
- ▶ Operates from the Sun-Earth L2 orbit, about 1.5 million km from Earth.
- ▶ Expected to map billions of galaxies, creating a 3D cosmic map spanning 10 billion years.
- ▶ Mission duration is six years, with potential extensions based on scientific findings.

Significance of Gravitational Lensing

- ▶ Light bends due to the distortion of spacetime by massive objects, as predicted by the general theory of relativity.
- ▶ Gravitational lenses can magnify and distort distant galaxies, creating multiple images.

Scientific Importance of the Discovery

- ▶ The new Einstein ring helps scientists study the universe's expansion and dark matter.
- ▶ Dark matter, which makes up 30% of the universe's mass-energy, interacts only through gravity.
- ▶ Euclid aims to discover 100,000 gravitational lenses, though finding similar nearby rings is unlikely.

- ➔ In a small window of time around February 28, seven planets aligned in the night sky, creating a rare spectacle.

WHAT IS IT?

Planetary parade: worlds on show

Vasudevan Mukunth

In a small window of time around February 28, people on the earth were in for a visual treat as seven planets, plus the moon, lined up in the night sky. These events are called planetary parades because the planets seem to line up, one behind the other, in the night sky in the order of their distance from the sun.

Depending on the number of planets involved, planetary parades can be common or rare. For example, a parade of three or four planets occurs once every few years, whereas a parade of seven or eight planets is very rare. The parade around February 28 was of the latter variety, involving seven planets: Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune.

The closer planets were visible to the naked eye, but the farther ones, especially Uranus and Neptune, required telescopes to see.

The next such line-up is only expected in 2040,



Planetary parades are not particularly significant to scientists but they can create a visual spectacle. GETTY IMAGES

involving six planets.

Planetary parades are not particularly significant to scientists. The reason why they happen is simple: the planets of the solar system all orbit the sun in roughly the same plane, called the ecliptic plane. So as they move in their orbits, every once in a while some of them will be visible together from the earth. This wouldn't have been possible if the planets were moving around in different orbits.

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For feedback and suggestions

for 'Science', please write to
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with the subject 'Daily page'

What is Planetary Parade?

- A planetary parade occurs when multiple planets align in the night sky as seen from Earth.
- These alignments happen because all planets orbit the Sun in the same plane, called the ecliptic plane.
- The planetary parade on February 28, 2024, involved seven planets: Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune.
- Closer planets were visible to the naked eye, while Uranus and Neptune required telescopes.
- Parades involving three or four planets occur every few years, but seven- or eight-planet alignments are rare.
- The next major planetary parade will happen in 2040, involving six planets.

➔ The ₹122-crore embezzlement at NICB's Mumbai branches over six years highlights severe failures in internal controls, compliance, audits, and oversight in urban cooperative banks (UCBs).

Urban cooperative banks urgently need to get their act together

That ₹122 cr. was embezzled from the safe of two of NICB's Mumbai branches with impunity over the last 6 years without getting detected is a telling commentary on the failure of the lines of defence, internal - staff, compliance, risk management, internal audit and external - statutory auditors

NEWS ANALYSIS

K. Ram Kumar

French writer Jean-Baptiste Alphonse Karr once said "the more things change, the more they stay the same."

This observation could apply to Urban Co-operative Banks (UCBs), going by the rate at which they have been getting into a spot, including frauds, over the last quarter century or so and the hardship it caused to their depositors and borrowers.

While painting all UCBs with the same brush may be not be fair as there are many financially sound and well-managed banks, it is the black sheep among them that harm the reputation of the sector.

With a ₹122-crore scam (as per current estimate) at the Mumbai-based New India Cooperative Bank (NICB) coming to light, the Reserve Bank of India (RBI) has its work cut out.

To save the monies of depositors with savings over the deposit insurance ceiling of ₹5 lakh, the RBI may have to find a white knight like it did in the case of the erstwhile fraud-hit Punjab and Maharashtra Cooperative (PMC) Bank.

The scale of PMC Bank scam in 2019 at ₹6,250 crore was much bigger compared with NICB.

In 2021, the central



Alarm bell: Such incidents adversely affect the UCB sector as it spreads negativity, says RBI's Marathe.

PTI

bank, in a first-of-its-kind rescue of an UCB, accorded approval to Centrum Financial Services Ltd. to set up a small finance bank (SFB) - later called Unity SFB - on the express condition it takeover PMC Bank.

Out of box

Although large depositors of PMC Bank will get their monies back piecemeal over an extended period of 10 years, this was an out-of-the-box solution to save their deposits.

So, whether RBI will once again turn to the aforementioned rescue model in the case of NICB or come up with some other unconventional solution – maybe ask the newly-floated umbrella body for UCBs (the National Urban



To save depositors monies, the RBI may have to find a white knight like it did in the case of the fraud-hit Punjab and Maharashtra Cooperative (PMC) Bank

Co-operative Finance and Development Corporation) to temporarily provide liquidity support – for putting the bank back on the rails, remains to be seen.

While NICB's small depositors (with deposits up to ₹5 lakh) will get their money back by mid-May 2025, provided they lodge their claim with the Deposit Insurance and Credit

Guarantee Corporation (DICGC) through their branch by March 30, it will be a long haul for large depositors.

Banker-borrower nexus

That ₹122 crore was embezzled from the safe of two of its Mumbai branches with impunity over the last six years or so without getting detected is a telling commentary on the failure of the lines of defence, internal - staff, compliance and risk management, and internal audit and external - statutory auditors, at NICB.

During its snap inspection of NICB, the central bank's inspection team came across shortfall in cash at the two branches and other irregularities. This prompted the RBI to

place the bank under directions on February 13 (initially disallowing deposit withdrawal, but later allowing withdrawal of up to ₹25,000 per depositor), followed by supersession of the bank's board and appointing an administrator.

The Economic Offences Wing of the Mumbai Police is investigating the role of NICB's former head of accounts and the CEO.

They are also looking at why the spouse of one of the former directors relocated overseas.

Dynastic control

Satish K. Marathe, Director, Central Board of RBI, recently underscored the issue of dynastic control in some of the UCBs needs to be urgently addressed to ensure that depositors interests are protected.

"RBI is like a soldier on the front line. Internal lapses and wrongdoings are always first noticed by staff, management, auditors and the board.

"The Bank's Board of Management (of NICB) seems to be dysfunctional. Shareholders need to be vigilant," he said.

Mr. Marathe observed such incidents adversely affect the UCB sector as it spreads negativity.

Industry body's view

Jyotindra Mehta, director, National Federation of Urban Cooperative Banks and Credit Societies Ltd.

(NAFCUB), observed while the Federation wants to put together a revival plan for NICB, it has no information from RBI regarding its financial status.

Mr. Mehta emphasised that revival prospects for the bank will be brighter if a plan is worked out before depositor insurance claims are paid out by DICGC in mid-May.

He opined once majority of the depositors (about 90%), with deposits up to ₹5 lakh, take away their monies, a prospective saviour, including a small finance bank or a NBFC, may not find it attractive to takeover the bank.

NICB reported net loss in the last two financial years - FY24 (₹23 crore) and FY23 (₹31 crore).

RBI has powers to act

Co-operative bankers say following the 2020 amendment to the Banking Regulation (BR) Act, 1949, RBI has been equipped with adequate powers to straighten errant UCBs out.

Further, amendment to Section 45 of the Act enables the RBI to reconstruct or amalgamate a bank, with or without implementing a moratorium, with the approval of the Central government.

Early action can go a long way to preserve depositors' trust in these Banks, the bankers said.

(The writer is with The Hindu businessline)

Problems with Urban Cooperative Banks (UCBs)

- ➔ **Fraud and Mismanagement:** UCBs have frequently faced financial irregularities, including frauds such as the ₹122-crorescam at New India Cooperative Bank (NICB) and the ₹6,250-crore Punjab and Maharashtra Cooperative (PMC) Bank scam.
- ➔ **Weak Governance:** Many UCBs suffer from poor internal controls, ineffective boards, and conflicts of interest, leading to financial instability.
- ➔ **Dynastic Control:** Some UCBs are controlled by family-dominated groups, affecting decision-making and increasing the risk of corruption.
- ➔ **Inadequate Oversight:** Internal audits, risk management mechanisms, and statutory audits often fail to detect irregularities intime.
- ➔ **Liquidity Issues:** Many UCBs lack the financial strength to withstand economic shocks, affecting depositors' confidence.
- ➔ **Delayed Action:** Authorities often act only after large-scale frauds are exposed, leading to depositor panic and financial instability.

Way Forward

- ➔ **Stronger Regulatory Oversight:** The RBI should enhance supervision, conduct more frequent inspections, and enforce strict compliance measures.
- ➔ **Governance Reforms:** Improve board accountability, implement independent audits, and eliminate dynastic control.
- ➔ **Timely Intervention:** Early detection of financial stress can help prevent large-scale frauds and protect depositors' money.
- ➔ **Revival Strategies:** Encourage mergers with financially sound entities, including small finance banks and NBFCs, to ensure stability.
- ➔ **Deposit Protection:** Ensure prompt disbursement of insured deposits and consider innovative rescue models like Unity Small Finance Bank.

UPSC Mains Practice Question

Ques : Discuss the challenges faced by Urban Cooperative Banks (UCBs) in India, highlighting governance issues and regulatory gaps. Suggest measures to enhance their financial stability and depositor confidence. (250 Words /15 marks)

Centring care in India's economic policy

The Union Budget for 2025 allocated a record ₹4,49,028.68 crore to the Gender Budget (GB), marking a 37.3% increase from FY24 and accounting for 8.86% of the total Budget. This rise is primarily due to the inclusion of the PM Garib Kalyan Anna Yojana, which accounts for 24% of the GB, rather than being driven by substantial investments in care infrastructure or new gender-responsive schemes. Despite this increase, critical investments in care infrastructure remain absent, reinforcing the persistent invisibilisation of care work in India's economic planning. While the Economic Surveys of 2023-24 and 2024-25 highlight care infrastructure as central to women's empowerment, the current Budget misses the opportunity to make tangible investments to strengthen India's care economy in line with its socio-economic realities.

Globally, women spend an average of 17.8% of their time on unpaid care and domestic work (UCDW), with women in the Global South bearing higher burdens. India is especially concerning, as Indian women shoulder 40% more of this burden than their counterparts in South Africa and China. The International Labour Organization reports that 53% of Indian women remain outside the labour force due to care responsibilities, compared to just 1.1% of men, underscoring entrenched inequities. For poor and marginalised women, this burden is severe as women in low-income families often juggle 17-19 hours of daily tasks, balancing paid work with domestic duties, intensifying 'time poverty', and eroding their well-being.

Feminist economists from the Global South emphasise that unpaid work in these regions encompasses a broader range of tasks compared to the Global North, extending beyond household care giving to include



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Globally, women spend an average of 17.8% of their time on unpaid care and domestic work, with women in the Global South bearing higher burdens

work on family farms, water and fuel collection, cleaning, and cooking. Limited access to essential infrastructure – such as water, clean energy, and sanitation – means women spend up to 73% of their time on these unpaid activities. For example, women spend nearly five hours daily collecting water, compared to 1.5 hours for men. Climate change exacerbates this burden, with water-related unpaid labour in India projected to reach \$1.4 billion by 2050 under a high-emissions scenario. This stems from low public investment in care infrastructure and entrenched social norms that assign care work to women.

Solutions ahead

The Economic Survey 2023-24 highlights that direct public investment equivalent to 2% of GDP could generate 11 million jobs while easing the care burden. Applying the expanded 'Three R framework' – Recognise, Reduce, Redistribute, and Represent – can ensure policies are both contextually relevant and transformative. The first step is recognising the full spectrum of UCDW women perform. India's 2019 Time Use Survey marked a milestone in acknowledging this issue, revealing that women spend an average of seven hours daily on UCDW. Despite the policy benefits that these surveys carry, their costs can make implementation challenging. One solution is to integrate Time-use modules into existing household surveys.

The second step is reducing the UCDW burden through time-saving technologies and expanded access to affordable care infrastructure. The Centre has acknowledged gaps in access to essential services by extending the Jal Jeevan Mission (JJM) until 2028, aiming for 100% potable water coverage. However, funding delays and underutilisation hinder implementation. While the scheme's Budget declined by 4.51% from last year's Budget Estimates (BE), it saw a 195% jump

over Revised Estimates (RE), highlighting allocation-spending gaps. With less than half of villages having functional household tap connections, JJM requires stronger implementation and water sustainability measures.

Expanding childcare centres, eldercare support, and assistive technologies would ease women's care burden, and boost their workforce participation.

The third key step is redistributing care work – from the home to the State and within households. The newly announced ₹1 lakh crore Urban Challenge Fund, with ₹10,000 crore allocated for FY 2025-26, can be transformative. This will finance up to 25% of bankable projects, encouraging private and public sector participation in urban redevelopment, water, and sanitation initiatives. By leveraging this fund, India can scale up pilot care infrastructure models already under way through the Smart Cities Mission. Taking inspiration from Bogotá's Care Blocks, which centralise care giving services to reduce women's unpaid work, this approach aligns with the fund's broader goal of sustainable urban development.

Finally, women's representation in decision-making and implementation is crucial for creating gender-transformative policies. Excluding women from this leaves them vulnerable to policies that fail to address their lived realities. In fact, involving women in decision-making processes enhances their effectiveness significantly, sometimes by six to seven times.

With the Centre's emphasis on Nari Shakti as a driver of economic growth, India has the opportunity to set a global example for a gender and care-sensitive economy. However, the current Budget falls short by not prioritising care as a central pillar. A more deliberate, well-funded strategy is necessary to ensure that care work is not treated as an afterthought but as a core component of inclusive growth.

GS Paper 02 Governance : Laws, Institutions & Bodies Constituted For The Vulnerable Sections

PYQ: UPSC CSE(M) GS-1 2016) Women empowerment in India needs gender budgeting. What are requirements and status of gender budgeting in the Indian context?

Context :

- The Union Budget for 2025 allocated ₹4,49,028.68 crore to the Gender Budget (GB), which is 37.3% more than the previous year and makes up 8.86% of the total Budget.

Primary reason for the significant increase in the Gender Budget (GB) for 2025

- **Inclusion of PM Garib Kalyan Anna Yojana (PMGKAY):** This welfare scheme accounts for 24% of the total Gender Budget.
 - **Example:** The free food grain distribution under PMGKAY, aimed at ensuring food security for vulnerable women-led households, significantly inflated the Gender Budget.
- **Broadening the Definition of Gender-Responsive Schemes:** The inclusion of non-traditional gender-related welfare programs increases the allocation.
 - **Example:** Programs like Poshan Abhiyaan (nutrition for women and children) and Ujjwala Yojana (LPG subsidies) are now categorized under the Gender Budget.
- **Increased Focus on Welfare Distribution Over Structural Investments:** The rise is driven by consumption-based welfare rather than care infrastructure.
 - **Example:** Higher allocations for schemes providing direct benefits like the Pradhan Mantri Matru Vandana Yojana (maternity support) rather than investment in childcare centers.
- **Political Commitment to "Nari Shakti":** Emphasis on women's empowerment as a core pillar of economic growth.
 - **Example:** The Budget's narrative aligns with promoting women-led development under the "Nari Shakti Vandan Adhiniyam" (Women's Reservation Bill).
- **Inclusion of Large-Scale Social Security Programs:** Integrating social protection schemes under the Gender Budget increases the total value.
 - **Example:** Pradhan Mantri Awas Yojana (PMAY) allocations, where a significant portion targets women beneficiaries, contribute to the budget rise.

Impact investments in care infrastructure

- **Limited Direct Investment in Care Services:** Despite the rise in overall allocation, no substantial funding is directed toward expanding childcare, eldercare, or healthcare services.
 - **Example:** There is no new budgetary provision for increasing anganwadi centers or community-based eldercare facilities.
- **Invisibility of Unpaid Care Work:** The focus on consumption-based schemes overlooks the need to reduce and redistribute unpaid care responsibilities.
 - **Example:** While food security programs like PMGKAY provide relief, they do not alleviate the physical and time-intensive care work that women perform daily.
- **Missed Opportunity for Systemic Reform:** The absence of targeted funding means there is no structural change in care-related infrastructure despite policy acknowledgments.
 - **Example:** The Jal Jeevan Mission (JJM), which could reduce women's water-fetching burden, faced a 4.51% budget cut, limiting its expansion.
- **Inadequate Support for Working Women:** Without investments in affordable care services, women's participation in the formal workforce remains restricted.
 - **Example:** Lack of childcare facilities prevents many women from rejoining the labor market after childbirth.
- **Uneven Urban-Rural Access:** Existing care infrastructure investments are urban-centric, leaving rural women without essential support systems.
 - **Example:** The Urban Challenge Fund focuses on urban care models, while rural areas lack similar investments, exacerbating time poverty for women in low-income households.

Majority of Indian women remain outside the labour force

- **Unpaid Care and Domestic Work (UCDW) Burden:** Indian women perform a disproportionate share of unpaid care work, limiting their time and ability to engage in paid employment.
 - **Example:** According to the ILO, 53% of Indian women remain outside the labour force due to care responsibilities, compared to just 1.1% of men.
- **Lack of Care Infrastructure:** Inadequate access to childcare, eldercare, and basic services increases women's household workload, preventing workforce participation.
 - **Example:** Less than half of Indian villages have functional tap water under the Jal Jeevan Mission, requiring women to spend hours fetching water.
- **Gendered Social Norms and Stereotypes:** Deep-rooted cultural expectations frame women as primary caregivers, discouraging their entry or return to the workforce.

- **Example:** Women in low-income households juggle 17-19 hours of unpaid and paid work, reinforcing time poverty and limiting job opportunities.
- ➔ **Lack of Formal Sector Opportunities:** There are limited job options offering flexible work and safe working conditions suited to women's needs, particularly in rural areas.
 - **Example:** Women's participation in India's formal economy remains low due to insecure jobs and a lack of family-friendly policies.

Measures does the Economic Survey 2023-24 propose to reduce the unpaid care work burden

- ➔ **Increased Public Investment in Care Infrastructure:** Advocates for direct public investment equivalent to 2% of GDP to expand care services and reduce the unpaid care burden.
 - **Example:** This investment could create 11 million jobs while providing essential care support like childcare and eldercare facilities.
- ➔ **Integration of Time-Use Surveys in Policy Planning:** Recommends integrating Time-Use modules into existing household surveys to recognise and measure the extent of unpaid care work.
 - **Example:** Data from India's 2019 Time Use Survey revealed that women spend an average of 7 hours daily on unpaid care tasks.
- ➔ **Expanding Access to Time-Saving Technologies:** Emphasizes improving access to time-saving infrastructure like clean water, sanitation, and energy to reduce the physical burden on women.
 - **Example:** Extending the Jal Jeevan Mission aims to achieve 100% potable water coverage by 2028, easing the water-fetching burden.

Way forward:

- ➔ **Enhance Care Infrastructure Investment:** Prioritize increased funding for community-based childcare, eldercare, and healthcare services, especially in rural areas, to reduce women's unpaid care burden and improve workforce participation.
 - ➔ **Implement Gender-Sensitive Policy Planning:** Institutionalize time-use surveys for evidence-based policymaking and integrate care responsibilities into labor policies to promote equitable access to formal employment for women.
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