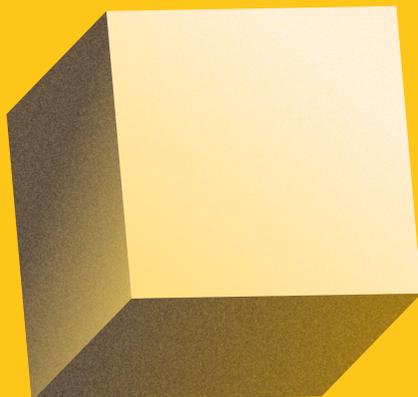


THE HINDU ANALYSIS

24th March 2024
by saurabh pandey



Q.

Water diplomacy is way forward in maintaining relationship between countries in the era of Anthropocene. Discuss (250 words)

Ans.

Anthropocene era means the bad impact on the Earth's ecosystem by human activities. By these activities we have depleted the finite water resource drastically as well. Factors contributing to the continuous depletion of water includes both physical and economic ones, such as - rapid urbanization, industrialization, unsustainable agricultural practices, erratic rainfall pattern, climate change, pollution, inadequate water management approaches etc.

Why concerning?

- * Acc. to 'World Resource Institute's' data - nearly 17 countries comes under extremely high water stress crisis.
- * India is also not an exception to this problem, falls under the water stressed nation, with its water capacity expected to reduce from 1341 m^3 by 2025 and 1140 m^3 by 2050.

Reasons behind water depletion :-

(i) Water table going down due to increased tubewell / borewell density.

(more discharge of ground water than its recharge)

(ii) Dumping of sewage and other grey waters directly into rivers resulting in lowering down the quality of water.

(iii) Reduced storage of water (rain) in reservoir / wetlands / waterbodies due to piling of silt.

Currently the world is experiencing countless meteorological extremities ranging from intense heat waves to turbulent floods, which increase water insecurity ^{by} many folds.

To overcome this problem, the world order needs to foster improved cooperation via water diplomacy, as - Out of UNESCO's 194 state member & 12 associate members, 153 countries can be classified as water-sharing nations.

Role of Water Diplomacy

* By using water diplomacy among nations, will help in fostering improved resource sharing.

* Following and framing of new universal

principles for international water law.

- * Keeping in mind the intricate relation b/w water, climate change and international stability, a collaborative governance is required for effective and equitable water sharing among nations.
- * Inclusion of research, academia and industry to implement & deploy of new technologies.
- * Extensive cross border networks with civil societies and academic networks for facilitating political ~~processes~~ processes to prevent, mitigate & resolve water related disputes.

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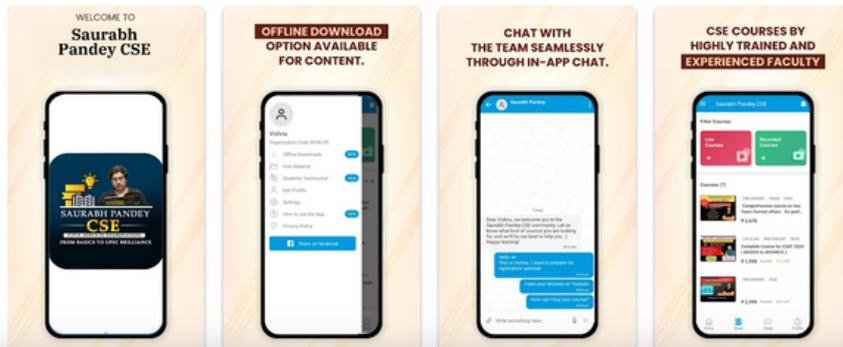
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The screenshot shows the homepage of saurabhpandeyupsc.com. At the top, there is a navigation bar with a logo for 'SAURABH PANDEY CSE' and a search bar. Below the navigation bar, there are menu items: Home, Courses, Pages, More, About UPSC Exam, Current-Affairs Pointers, and Join Us. A 'Get Started' button is also visible. The main section is titled 'Popular Courses' and features four course cards:

- Agriculture For General Studies**: A Prelims Module course, LAUNCHED, for Target Prelims 2024. It covers 'Basics and current affairs' and 'Agriculture for General studies'. BY Saurabh pandey sir.
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A gene for visual mating choices in butterflies found

A particular gene plays a critical role in visual preference for mate choice between closely related *Heliconius* butterflies. The findings provide insight into how visually guided behaviours can be encoded within the genome. Combining behavioural trials with genetic mapping, gene expression, and population genomic analyses, researchers found that *H. Melpomene* and *H. timareta* have evolved the same preference for red wing patterns. A single gene was more highly expressed in *H. cydno*.



The hindu analysis by saurabh pandey sir



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A model suggests Europa's icy crust is at least 20 km thick

Scientists have estimated the icy crust of Jupiter's moon Europa to be at least 20 km thick by simulating the formation of its multi-ring impact structures. The researchers modelled various sizes of impacts on Europa, with different ice shell thicknesses and thermal gradients. From these simulations, they found that impacts caused graben-like features to form only when the ice shell was at least 20 km thick. The findings could inform future space missions that will investigate the habitability of Europa.

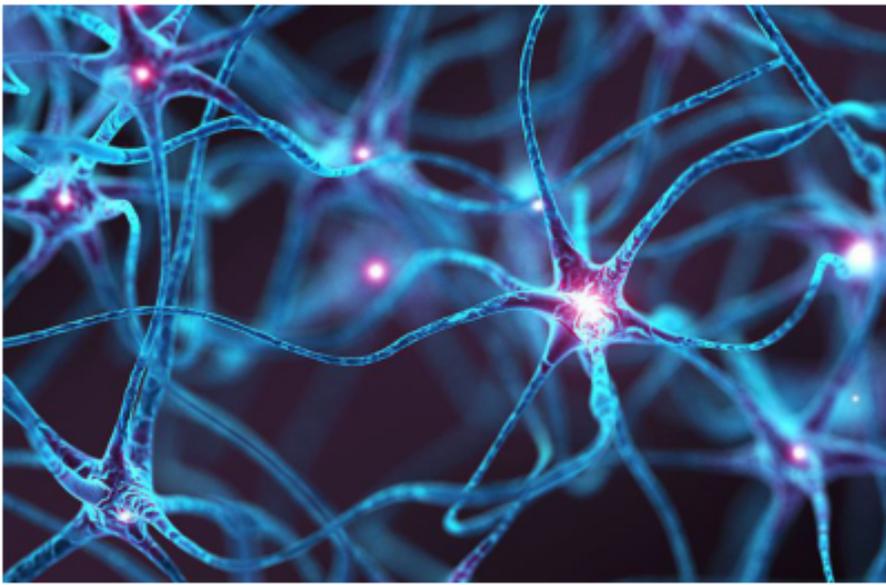


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ICE IN MOON

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Gel for resealing the nervous system after neurosurgery

Scientists have engineered a tough, sticky biomaterial that can reseal areas of the nervous system opened during surgery involving the brain and spinal cord, minimising the risk of a dangerous surgical complication. Their material avoids the need for standard sutures used in the operating room and displayed promising performance during tests involving rodents, pigs, and human nervous system tissue. Current approaches reseal the membrane with sutures.

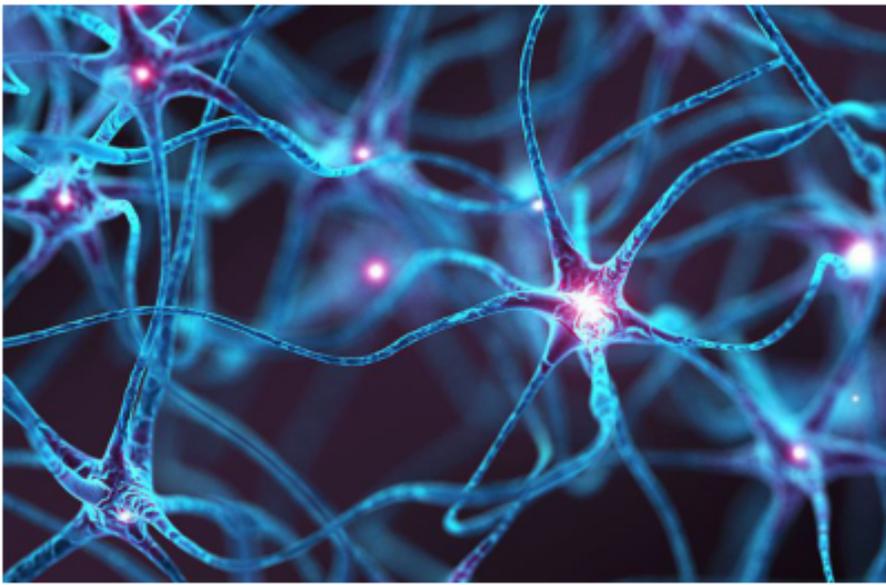


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Role of Bacteria in cancer

- Researchers have found that a specific subtype of a microbe commonly found in the mouth can travel to the gut and grow within colorectal cancer tumours.
- This microbe is also a culprit for driving cancer progression and leads to poorer patient outcomes after cancer treatment.
- The Findings could help improve therapeutic approaches and early screening methods for colorectal cancer, which is the second most common cause of cancer deaths in adults .



AI helps classify neem fruits based on azadirachtin content

The Hindu Bureau

Researchers at the School of Biotechnology, Jawaharlal Nehru University, New Delhi have developed an Artificial Intelligence-based tool to predict the level of metabolite content in neem fruits as either low or high based on images of neem leaves and fruits. The AI-based approach makes the use of expensive and cumbersome analytical equipment like high-performance liquid chromatography (HPLC) redundant. The classification of fruits can be carried out in the field even by untrained people. The results have been posted on a preprint server; preprints are not peer-reviewed.

The key metabolite of neem fruits is azadirachtin, which is used as a biopesticide. However, azadirachtin content in the seed kernel varies from one tree to another. Since the fruits

with different concentrations of azadirachtin are mixed and bagged together in the field, the final azadirachtin content in each sack becomes low. Currently, there is no easy tool to evaluate the azadirachtin content level (high or low) in neem fruits inexpensively. Therefore, only a few fruits from each sack with varying azadirachtin content or from a single batch of multiple sacks are taken to determine the azadirachtin content using HPLC.

The team led by Dr. Binay Panda from JNU collected 1,045 neem leaves and fruits from trees across India and imaged them and also determined the content of five metabolites – azadirachtin, salannin, deacetylsalannin, nimbin, and nimbolide – from neem fruits using HPLC. Synthetic image augmentation while training using the deep learning frame-



The AI-based approach makes analytical equipment like high-performance liquid chromatography redundant. GETTY IMAGES

works ensured the sufficiency of images, which served the purpose during training. “We used images of leaves and fruits and with the corresponding HPLC-measured metabolite values within different deep learning-based frameworks to test for accuracy,” says Dr. Panda. “Eighty percent of the data comprised of images and their

corresponding metabolite values were first used for training, followed by 10% for model validation and the remaining 10% for model testing.”

The sensitivity

The sensitivity of the AI model to correctly determine and classify the fruits into low or high metabolite content was 83% and 82%

for low and high azadirachtin classes, respectively when only the azadirachtin model was used. Using the same model, the specificity was 79% and 85% for low and high azadirachtin classes, respectively. “But when all five metabolites for the leaf and fruit images were considered, the sensitivity in predicting low and high classes was boosted by about 9% and 6%, respectively. Using the multi-analyte model, the specificity was boosted to 100% for both low and high classes,” Dr. Panda says.

“Our model makes it possible to use fruit and leaf images alone to predict the azadirachtin content class in fruits without having to use HPLC.”

Dr. Panda is not sure what parameters in the images of leaves and fruits were likely used by the model to determine the metabolite content in the fruits

and classify them as either high or low classes. “There must be specific fruit and leaf features that are governed by metabolites, which change depending on the concentration of the metabolites,” he says.

The researchers have built an Android App called Fruit-in-Sight using the best predictive model.

“All that the fruit pickers need to do is take a picture of the leaf and fruit of a neem tree, and the App will instantly tell them whether to pick or not pick the fruits from the tree based on its azadirachtin content class prediction,” Dr. Panda says.

“This will help empower villagers to pick fruits from suitable trees with high azadirachtin content.”

He adds that the App is a simple yet powerful enough tool to help boost the efficiency of the neem industry without any additional cost, time, or effort.



The hindu analysis by saurabh pandey sir



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Anaemia prevalence in eight States found to be overestimated

The overall prevalence of iron deficiency was just 18.4%, it was highest among adolescent girls (31.5%) followed by adult women (27.7%), and elderly women (13.6%); even among anaemic women, only about a third was due to iron deficiency

R. Prasad

A study across eight States in India involving 4,613 participants that included adolescents (647 girls and 674 boys), adults (931 women and 927 men) and elderly (714 women and 720 men) has found that prevalence of anaemia has been overestimated by previous surveys. While the NFHS surveys measured haemoglobin using finger prick-based capillary blood, the latest multi-institutional study carried out by a team led by Dr. Anura Kurpad from St. John's Medical College, Bengaluru, used venous blood to measure haemoglobin and iron status through ferritin.

Capillary blood haemoglobin will be an underestimate of the true value as the red blood cell count in the capillary blood will be a little lower than venous blood due to a phenomenon called plasma-skimming. Also, tissue fluid gets mixed with capillary blood while drawing the blood sample leading to dilution and thus a reduction in haemoglobin value.

The study found that anaemia prevalence was predominantly of the mild variety. Overall, 18.4% of the entire sample were mildly anaemic, 14.7% were moderately and 1.8% were severely anaemic. As expected, the overall prevalence of anaemia was higher in women compared with men. The prevalence of moderate anaemia was significantly higher in women (22%)



Blood diagnosis: The WHO recommends that anaemia be diagnosed from venous blood and not capillary blood. SPECIAL ARRANGEMENT

Red blood cell count in the capillary blood is a little lower than venous blood. Tissue fluid gets mixed with capillary

Venous blood reveals true anaemia prevalence

The NFHS surveys measured haemoglobin using capillary blood leading to overestimation of anaemia

blood while drawing the blood sample leading to dilution, thus reducing the haemoglobin value

Anaemia prevalence was found to be predominantly mild across eight States. 18.4% were mildly anaemic, 14.7% moderately anaemic, and 1.8% severely anaemic

Anaemia prevalence was 44%, 41% and 45% in adolescent girls, adult and elderly women, respectively. As per the NFHS surveys, anaemia prevalence was 60.8% for women and 62.6% for

adolescent girls

The prevalence of anaemia among women was highest in Assam (78.3%) and lowest in Meghalaya (14.6%)

Only about a fifth of anaemia in elderly women was due to iron deficiency, and 45% among adolescent girls

The major proportion of anaemia is from unknown causes. But iron deficiency is wrongly assumed to be main driver of anaemia in India

Providing iron supplementation for the entire population needs reconsideration, particularly as excess iron intake can be harmful

compared with men (7.6%). Anaemia prevalence was 44%, 41% and 45% in adolescent girls, adults and elderly women, respectively. In the case of adolescent boys, adults, and elderly men, anaemia prevalence was 24%, 21% and 37%, respectively.

In comparison, the prevalence of anaemia was much higher as per the NFHS surveys that used capillary blood – 60.8% for women, 62.6% for adolescent girls, 26% for men and 31.8% for adolescent boys.

As per the present study, the prevalence of total anaemia was very high in the state of Assam (69.8% overall; 78.3% for women) followed by Odisha (55% overall; 63% for women).

At 12.1% overall and 14.6% for women, Meghalaya had the least anaemia prevalence, followed by Telangana (16.9% overall; 24.6% for women), West Bengal (19.5% overall; 28% for women), Tamil Nadu (23.7% overall; 32.4% for women), Gujarat (33.9% overall; 44.2% for women), and Madhya Pradesh (45.4% overall; 55.9% for women).

Interestingly, the prevalence of iron deficiency for the whole group was just 18.4%. The prevalence of iron deficiency was 16.0%, 10.7% and 11.2% for adolescent boys, adults, and elderly men, respectively. Even among anaemic women (42.6% with all grades of anaemia), only about a third was due to iron defi-

ciency. Among elderly women (40.9% with all grades of anaemia), only about a fifth had iron deficiency. Only in the case of adolescent girls did anaemia due to iron deficiency become relatively high at 45%. The major proportion of anaemia in all groups was associated with 'unknown causes'.

Even in the case of Assam where the prevalence of anaemia was highest (69.8% overall; 78.3% for women), iron deficiency was only 12.3% overall and 18.9% in women. In the case of Tamil Nadu where the prevalence of anaemia was 23.7% overall and 32.4% for women, iron deficiency was rather high at 22.8% overall and 38.2% in

women. Interestingly, while Assam had the highest prevalence of anaemia (69.8% overall) and Meghalaya had the least anaemia prevalence at 12.1% overall, iron deficiency as a driver of anaemia was comparable and low in both States – Assam (12.3% overall) and Meghalaya (12.6% overall). "Only one-fourth of 42% of women with anaemia were due to iron deficiency. Yet, everybody assumes that iron deficiency is the main cause of anaemia in India," says Dr. Kurpad. "Though anaemia is caused by multiple factors including vitamin B12 and folate deficiency, and inflammation, the focus has primarily been only on iron deficiency."

Dr. Kurpad stresses that policies to provide iron supplementation for the entire population of India have to be reconsidered, particularly due to the dangers of excess iron intake. "It is not easy to excrete iron, and too much iron can cause oxidative stress on all organs," he cautions. "The focus should also be on reducing inflammation, which is best achieved naturally through increased consumption of fruits and diversity in diet to improve the intake of all nutrients," he says.

"Due to climate change, the protein, vitamin and mineral content in cereals is dropping," he says. "It's time we diversify from cereals to millets which are more resilient. Though phytates in millets can reduce absorption, millets contain higher amounts of iron and calcium leading to increased net intake."



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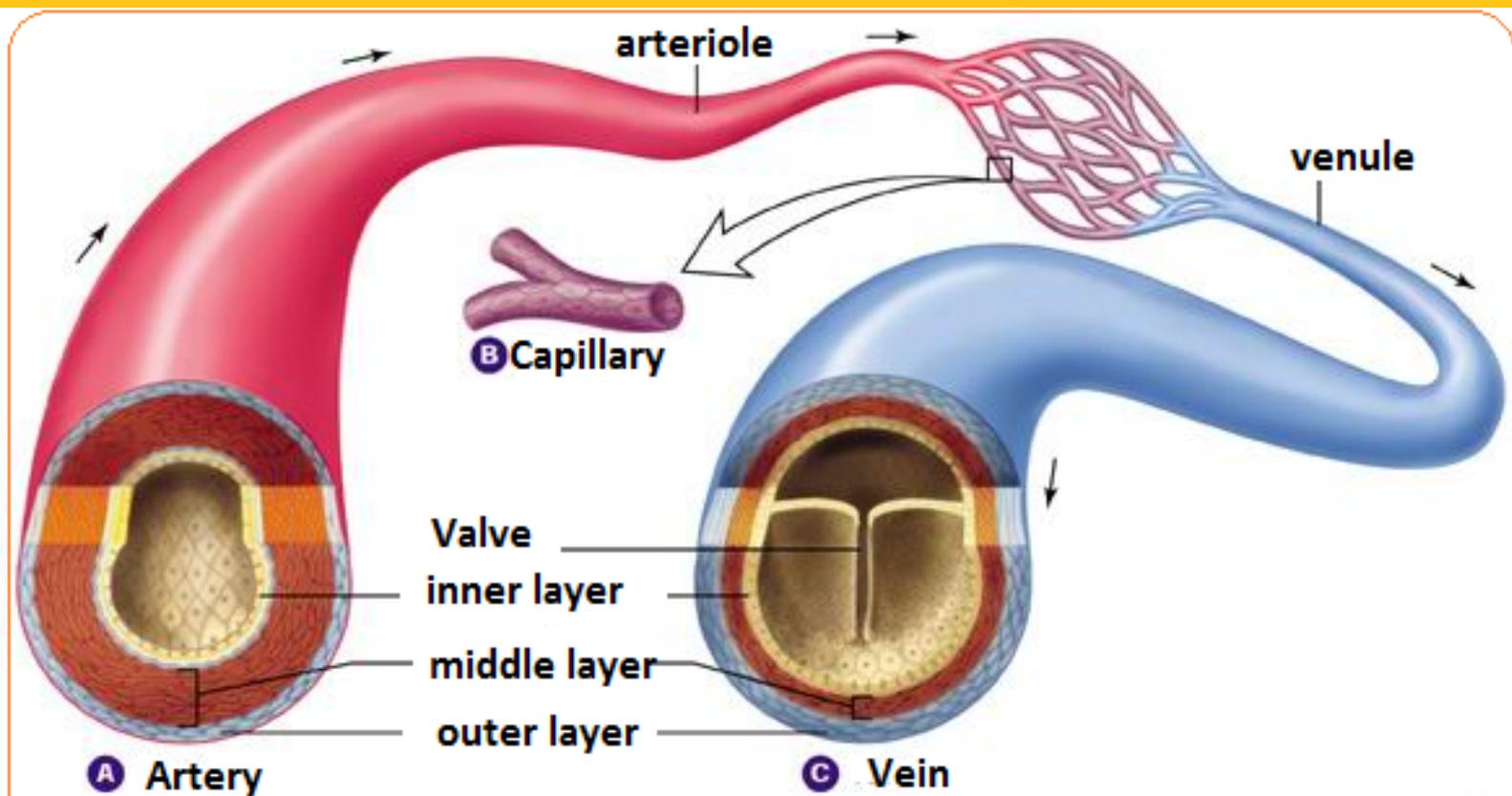
Capillary and venous blood

Artery vs Vein vs Capillary

- Blood vessels are small tube-like structures that transport blood inside your body.
- Arteries carry oxygenated blood away from your heart. They have thick walls and a muscular layer that keeps your blood moving. The aorta is the largest artery in your body
- Artery vs Vein. Arteries carry blood away from the heart, and veins carry blood towards the heart. With the exception of pulmonary blood vessels, arteries carry oxygenated blood and veins carry deoxygenated blood. Arteries have thick walls with muscle tissue. Veins have thinner walls and use valves to keep your blood flowing.



The hindu analysis by saurabh
pandey sir



At any given moment, about 30% of the blood in your systemic circulation will be found in the arteries, 5% in the capillaries and 65% in the vein.



- **Artery vs Capillary.** Arteries carry blood from your heart to your organs. Capillaries transport blood between arteries and veins. Arteries are the largest blood vessels with the thickest walls, and capillaries are the smallest.

What is a Vein?

- **Veins carry deoxygenated blood towards your heart and are often located close to your skin. Veins don't have a muscular layer like arteries do, so they rely on valves to keep your blood moving**





What is a Capillary?

- Capillaries connect your arteries to your veins. Capillaries are the smallest type of blood vessel. They can be as tiny as 5 micrometers, which is less than a third of a hair's width.
- A capillary wall is only one cell in thickness. The capillary wall is made of endothelial cells and allows oxygen, nutrients, and waste to pass to and from tissue cells.

Venous Blood

1. Venous blood is deoxygenated blood that flows from tiny capillary blood vessels within the tissues into progressively larger veins to the right side of the heart.
2. Venous blood is the specimen of choice for most routine laboratory tests. The blood is obtained by direct puncture to a vein,



Arterial Blood

- Deoxygenated blood is pumped from the right side of the heart to the lungs, where it takes up oxygen. The now oxygenated blood is pumped through the left side of the heart via arteries.
- The most common reason for the collection of arterial blood is the evaluation of arterial blood gases.

Capillary Blood

- Capillary blood is obtained from capillary beds that consist of the smallest veins (venules) and arteries (arterioles) of the circulatory system.
- The venules and arterioles join together in capillary beds, forming a mixture of venous and arterial blood.

Who may vote from home in LS elections?

Is this the first time such a facility has been rolled out? Why are activists calling for the rules to be amended?

Saumya Kalia

The story so far

The Election Commission has extended its 'vote-from-home' facility to persons with disabilities and senior citizens aged 85 and above for the Lok Sabha elections. This move will allow more than 85 lakh senior citizens and 88.4 lakh persons with disabilities to cast their votes through postal ballots.

Who is eligible?

Efforts to make participation inclusive thus far have been contained to the polling site, with a focus on setting up ramps, separate queues, wheelchairs and parking facilities. The postal ballot-home voting facility was amended to include senior citizens and people with disabilities; the benchmark disability should be not less than 40% of the specified disability as certified by the concerned authority. "Generally the tendency has been that the senior citizens want to participate in the process and walk to the booth. But this time, we have given them options to vote in their homes," Chief Election Commissioner Rajiv Kumar said. Those who opt for it this year are not eligible to vote directly at the polling station on polling day. The scheme is also "useful" as senior voters may not prefer to step out during the summer heat, an Andhra Pradesh official told *The Hindu* earlier. The Lok Sabha elections will be held between April 19 and June 1, when spells of heatwaves are likely to hit most parts of the country.

Has it been tried out before?

Vote from home was previously tried out during Assembly elections in select regions, allowing people with disabilities, senior citizens and people affected by COVID-19 to avail the facility. The ECI this year has, however, increased the upper age limit of elderly voters, from 80 to 85 years. The ECI also extended the postal ballot option to media personnel covering 'polling day activities' with authorisation letters from the Election Commission, and those part of essential services such as metros, railways and health care. The option is also open for service voters, such as personnel of the armed forces posted away from their hometowns, Central Armed Police Forces personnel deployed away from home, Central and State police personnel on election duty, and polling personnel and embassy staff on postings.

"Ideally, if people with disability have the option to vote from home, they should be allowed to submit this form online too," says an activist

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How may voters avail of the facility?

The key to the process is Form I2D, which is a letter informing the Assistant Returning Officer (ARO) that the person may not be in a position to go to the polling station to vote. The form can be downloaded online from the ECI website or collected from the office of the representative district officer of a parliamentary constituency. The form has to be filled and submitted within five days of notification of the polling date.

While it is a great initiative, Dr. Satendra Singh, a doctor and disability justice activist, says the policy may have to be tweaked for awareness gaps and procedural snags. Electors are required to deposit the form to the Booth Level Officers (BLO) or the ARO, a "problematic" requirement for people with disabilities.

"Ideally, if people with disability have the option to vote from home, they should be allowed to submit this form online too," he says. Once filed, two polling officials, accompanied by a videographer and a security person, will visit the elector's home and oversee the postal ballot voting process. The voter will receive an intimation about the date and approximate time of visit via SMS or through post. The home voting option will be attempted twice. The polling team will schedule a second visit if the elector fails to be at the given address during the first visit. During the visit, the polling team is expected to follow the protocol under the Conduct of Elections Rules, 1961. Each team of poll officers is required to (a) issue postal ballot to each of the Absentee Voters assigned to it, (b) brief the elector about the procedure to be followed for voting through postal ballot, (c) make sure that the elector votes without anyone influencing his/her choice, and ensure the secrecy of voting, according to a November 2022 communique for the vote-from-home facility. People with blindness or physical infirmity are allowed to nominate a companion and take their assistance while home voting.

What are the challenges?

Dr. Singh foresees some logistical hiccups, in coordinating requests, scheduling and moving paraphernalia around. Moreover, "do we have the machinery to fulfil this mammoth task?" he asks. The scheme will also need a "massive level of awareness generation," both among voters and polling officers, to attune the facilities to people's needs. The Election Commission has launched a Voter's Guide, outlining the procedures and procedural details available to



The hindu analysis by saurabh pandey sir



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