

## ● POLITY

## ● ECONOMICS

## ● TECHNOLOGY

## ● ECOLOGY

## SCIENCE AND TECHNOLOGY

## NOBEL 2023: DUO ENABLED mRNA COVID VACCINES

**CONTEXT:** 2023 Nobel Prize in Physiology awarded for groundbreaking mRNA vaccine development against COVID-19

**BACKGROUND:** Royal Swedish Academy of Science announced the Nobel Prize in Chemistry winners, Dr. Karikó and colleagues, for their work on nucleoside base modification enabling COVID-19 mRNA vaccine development, highlighting the pandemic's transformative impact on vaccine technology.

## Nobel for Medicine

Hungarian biochemist Katalin Karikó and American physician-scientist Drew Weissman won the 2023 Nobel for Physiology or Medicine

■ The duo was awarded for their work that enabled the development of effective mRNA vaccines against COVID-19. Dr. Karikó is only the 13th woman to win the prize

■ mRNA stands for messenger RNA, which carries instructions from DNA to make proteins in cells. Scientists had realised in the late 1980s that mRNA could become the basis for a new kind of vaccine if some hurdles could be overcome

■ Dr. Karikó and Dr. Weissman published two more studies that set the stage for the use of an mRNA platform for a new kind of vaccine. In 2020, when the COVID-19 pandemic struck, mRNA vaccines were crucial in reducing the death toll



Katalin Karikó



Drew Weissman

developed a concept using modified mRNA to trigger an immune response against specific proteins.

- Immune System Challenge: Initially, the immune system recognized synthetic mRNA as foreign, hindering its effectiveness.
- Chemical Modifications: Research revealed that chemically modifying synthetic mRNA allowed it to enter cells without triggering an immune response.
- Groundbreaking Studies: Their studies in 2005 laid the foundation for mRNA vaccines, which played a crucial role in combating COVID-19.
- Future Potential: mRNA technology is now being explored for vaccines against various diseases, including influenza, dengue, cancers, and autoimmune disorders.

## mRNA Vaccines Working

- Introduction of mRNA: mRNA vaccines utilize a piece of mRNA corresponding to a viral protein, not the actual virus, to trigger an immune response.
- Protein Production: Cells use this mRNA to create the viral protein, which is recognized as foreign by the immune system.
- Antibody Production: As a response, the immune system generates antibodies to protect against future infections by the virus or pathogen.
- Long-term Immunity: Antibodies remain in the body, ready to recognize and neutralize the pathogen if exposed again.
- COVID-19 mRNA Vaccines: Currently, authorized mRNA vaccines like those for COVID-19 have been developed, setting a precedent for potential use against other diseases.

## HIGHLIGHTS

- Modified mRNA for Immunity: Dr. Karikó and Dr. Weissman

## ECOLOGY AND ENVIRONMENT

## GREEN WAR ROOM BEGINS OPERATIONS

**CONTEXT:** Delhi's 24/7 air pollution monitoring and complaint resolution center to commence operations from October 3.

**HIGHLIGHTS:** The 'Green War Room,' initiated in 2020, utilizes advanced air quality monitoring tools and a team of experts to oversee all contributors to Delhi's air pollution, aiding the city in implementing its anti-pollution action plan launched on September 29.



## ECONOMICS AND DEVELOPMENT

## THE NARRATIVE OF DEVELOPMENT AND POPULISM

**CONTEXT:** On September 14, the Prime Minister laid the foundation stone of projects worth over ₹50,700 crore in the election-bound State of Madhya Pradesh, including a petrochemical complex and 10 new industrial projects.

On September 18, a major Opposition party announced a monthly financial assistance of ₹2,500 to women, gas cylinders at ₹500, free travel for women in State transport buses, schemes promising an annual financial assistance of ₹15,000 for farmers, a housing scheme with a piece of land and ₹5 lakh for construction of house for homeless poor, 200 units of free electricity to each poor household, health insurance cover of up to ₹10 lakh and ₹5 lakh financial assistance to students from a poor background to pursue higher education.

The most common narrative is that development is the long-term ideal and populism is dubbed as myopic, with development-retarding effects. There are no two arguments on the need to achieve higher and better development outcomes. However, there exists a need to assess its trajectory and inclusivity to understand the implications for welfare and sustainability.

Equating development to visible mega-infrastructure could, over time, become a dangerous obsession for two reasons. First, the suitability of such projects for the specific geographic location or users is often overstated without realistically assessing long-term environmental consequences and its implications on the livelihoods of present and future generations. Second, the mechanisms of financing mega-infrastructure are often on the assumption of exaggerated revenue accruals from multiplier effects and flattened costs without any time and cost over-run. The fiscal burden of such financing modes would start surfacing in the medium term, and addressing it imposes additional costs. Two examples would clarify the above.

First, during the period June 24 to July 10, 2023, over 41 landslides, 29 flash floods, and one cloud burst occurred in Himachal Pradesh amid relentless rain. One could call these as events of 'climate crises'. But Himachal Pradesh is an active participant in the race to 'development' through the construction of several highway roads connecting various tourist locations, thereby making the mountain regions fragile and unleashing unplanned urbanisation. Uttarakhand faced a big disaster in 2013. Rather than learning from it, the government went on to

'rebuild' the State, which was a rebranding of the State with many highway projects. The 'Char Dham Yatra' is hyped as road connectivity that brings millions of people as religious tourists despite the fact that most places have infrastructure for only a few thousand people.

The total debt of the National Highways Authority of India (NHAI), the apex body for the construction and management of national highways in the country stood at ₹ 3,42,801 crore as on March, 2023, up from ₹23,797 crore in 2014. The bulk of the debt, i.e., ₹ 3.27 trillion, was contracted between 2017-18 and 2021-22. The NHAI's debt servicing cost will cross ₹ 50,000 crore in FY28 as the money was raised through bonds in 112 tranches; the last of those will mature in 2050. Apart from debt, the NHAI also has contingent liabilities, most of which are from disputed claims that have been filed by contractors and developers. The fiscal implications of financing development lingers in the system, imposing long-term constraints.

Conventional models of economic growth did not attach much importance to distribution as it was expected to be an inbuilt consequence of growth. These models assumed that the benefits of growth would percolate through the 'trickle-down effect', that is, growth is characterised as a 'high tide that lifts all boats'. In this scheme of things, populist re-distributive policies do not find a place. However, cross-country growth experience shows that the benefits of growth do not trickle down that easily and some sections of the population become 'outliers' in the growth process. Government-led redistribution is needed to reduce the size of such outliers and spread the benefits of growth more evenly. The rationale for economic populism arises in this context.

While economic populism imposes fiscal costs, inappropriate physical infrastructure-led development imposes additional costs, especially environmental costs. These costs might work as a binding constraint on subsequent governments. Poor resilience coupled with an injection of fragility to the environment results in a situation of costs of such 'infrastructure led development' remaining in the system for long. In contrast to narrowly defined and prominently visible megaprojects-led development, not all economic populism hurts. At times it might be the only way to forestall the dangerous obsession with physical infrastructure-led development.

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## INTERNATIONAL RELATIONS

## CREATING THE BRICS FUTURE TOGETHER NOW

**CONTEXT:** BRICS welcomed new members in August; assess its evolution rather than one unproductive meeting's results.

**BACKGROUND:** Six new members joined the BRICS group during a meeting in South Africa. Despite concerns about the meeting's productivity, it's essential to assess BRICS' evolution over time, rather than judging it solely by one gathering's outcomes.



## Economic Compulsion

- **BRICS Economic Focus:** BRICS primarily emerged as an economic alliance without military or security roles, in contrast to NATO.
- **Global Influence:** With 36% of global GDP and 47% of the world's population by 2050, BRICS could challenge the G7's dominance.
- **China and India's Role:** China and India, as BRICS members, hold significant economic power and continue to foster trade growth.
- **Bilateral Challenges:** Despite political differences, economic cooperation between China and India remains robust and prioritizes business over politics.

- **Long-Term Opportunities:** BRICS offers long-term potential for economic collaboration and growth, driven by the economic strength of its member countries.

## Search for an Alternative

- **BRICS as a Counterbalance:** BRICS provides a platform for countries seeking an alternative to the U.S.'s stance on China and its global influence.
- **Global Issues:** Refugee treatment and trade disputes have led countries to seek alternatives to traditional alliances like the Non-Aligned Movement.
- **Economic Alliances:** BRICS' growth may lead to the creation of trade, business, and investment protocols, similar to other economic blocs.
- **Digital Currency:** India and China's advancements in digital currency technology position them to promote their currencies as alternatives to the U.S. dollar.
- **Convergence of Interests:** Despite short-term challenges and differences, India and China share an interest in reducing reliance on the U.S. dollar, driving convergence in the long run.
- **Africa's Economic Promise:** Africa is seen as a key region for economic growth in the 21st century.
- **Negative Image of Europe:** European interventions and migrant treatment have created a negative perception among Africans.
- **Changing Partnerships:** Visa restrictions have led Africans to explore opportunities in China, while India seeks closer ties with African nations.

BRICS may fade from headlines between summits, but each meeting lays the foundation for future networks. This enduring group, as recognized by Goldman Sachs in 2003, holds the potential to rival the G6 economies in the long term.

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## SCIENCE AND TECHNOLOGY

# CHOLERA CASES DOUBLED IN 2022, REPORTS WHO

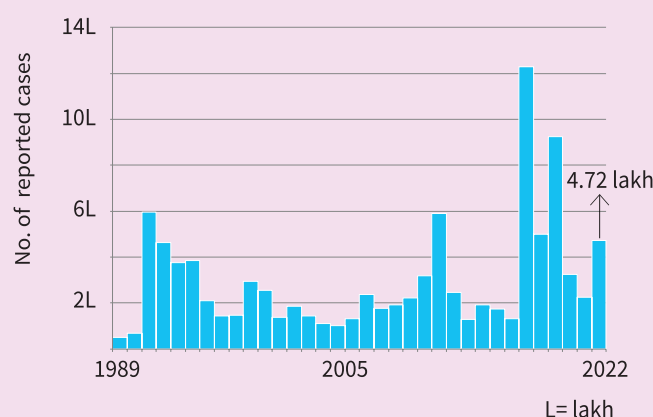
**CONTEXT:** World Health Organization: Cholera cases doubled in 2022 compared to 2021, with more countries reporting outbreaks.

**BACKGROUND:** Cholera, primarily caused by *Vibrio cholerae* strains O1 and rare O139, saw a significant increase in cases worldwide in 2022 compared to 2021, with more countries reporting substantial outbreaks.

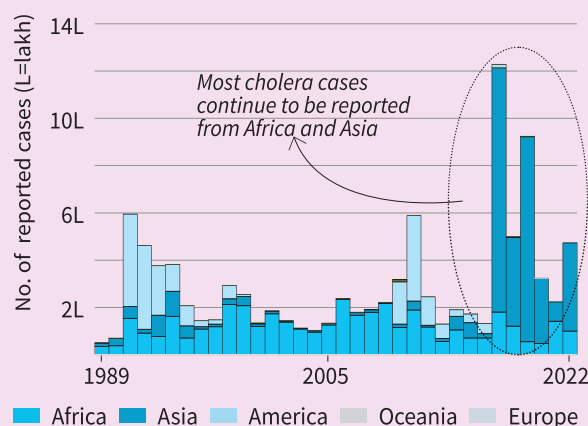
## Highlights of Report

- Cholera Resurgence: Cholera cases are on the rise, reversing a trend of decline since 2019, complicating WHO's 2030 target to reduce deaths by 90%.

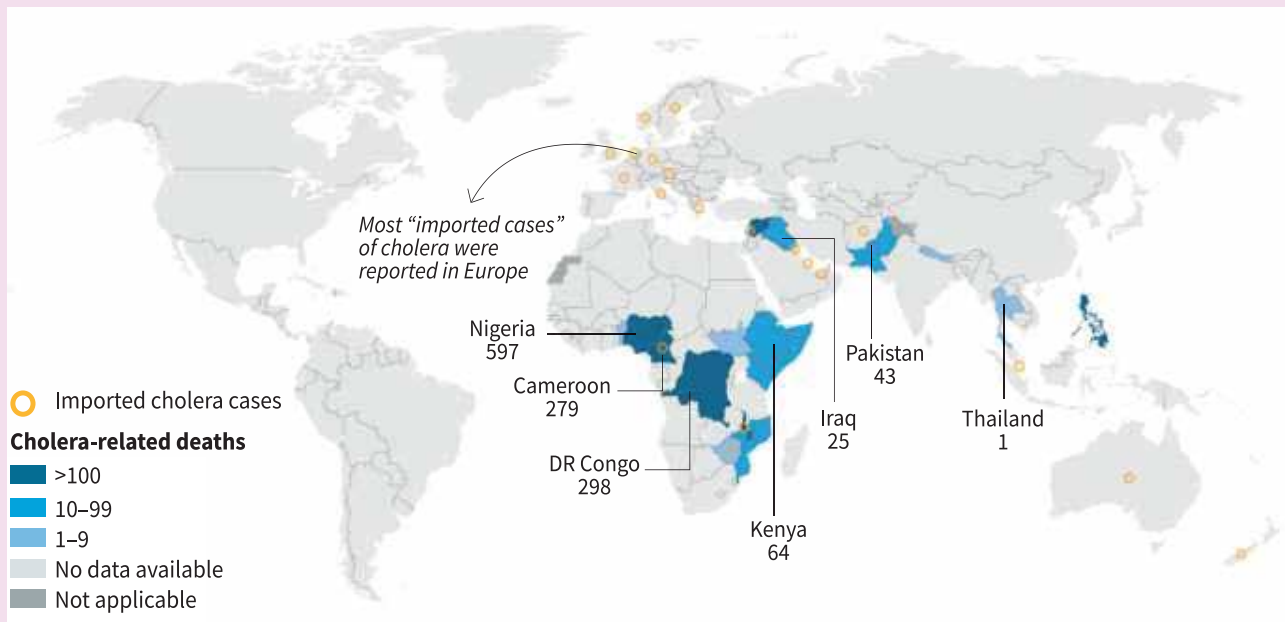
**Chart 1** The chart shows year-wise reported cholera cases between 1989 and 2022



**Chart 2** The chart shows year-wise cholera cases reported to WHO across continents



**Map 3** The map shows the country-wise reported cholera deaths and imported cases in 2022



- Climate Change Impact:** Cholera transmission is linked to climate-induced conditions like floods, heatwaves, and storms, favoring *Vibrio cholera* bacteria.
- COVID-19 Influence:** The decline in COVID-19 restrictions may have contributed to the cholera resurgence.
- Vaccine Response:** The emergency vaccine stockpile recommended a single-dose regimen in response to the growing cholera burden.
- Global Distribution:** Cholera cases are mainly reported in Africa and Asia, with some imported cases in Europe.
- African Challenges:** Africa reported fewer cases in 2022 but remains vulnerable, with no single country accounting for a significant share.
- Asian Developments:** Asian countries like Lebanon, Syria, and Afghanistan reported cases after years of absence.
- Diagnostic Testing:** More countries adopted rapid diagnostic tests in 2022 to enhance cholera detection.

## Cholera

- Basics:** Cholera is a bacterial infection caused by *Vibrio cholerae*, often transmitted through contaminated water or food.
- Symptoms:** Symptoms include severe diarrhea, vomiting, and dehydration, potentially leading to rapid health deterioration.
- Treatment:** Rehydration therapy and antibiotics are common treatments; rapid diagnosis and treatment are crucial to prevent severe complications and death.
- Most of those infected will have no or mild symptoms and can be successfully treated with oral rehydration solution.
- A global strategy on cholera control, Ending Cholera: a global roadmap to 2030, with a target to reduce cholera deaths by 90% was launched in 2017.

## POLITY AND GOVERNANCE

## COUNTING DEATHS IN INDIA'S PRISONS

**CONTEXT :** In August this year, the Supreme Court Committee on Prison Reforms found suicide to be the leading cause of 'unnatural' deaths — deaths other than ageing or illnesses — among Indian prisoners, with U.P. recording the highest number of suicides between 2017 and 2021.

The report stated that "...the number of custodial deaths has seen a steady rise since 2019, and 2021 has recorded the highest number of deaths so far." On the other hand, 'natural deaths' — 1,879 people in 2021 — were due to ageing and illnesses.

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### How are prison deaths classified

Every year, prison deaths are identified as 'natural' or 'unnatural' by the Prison Statistics India (PSI) report published by the National Crime Records Bureau (NCRB). In 2021, a total of 2,116 prisoners died in judicial custody, with almost 90% of cases recorded as natural deaths. Ageing and illness account for 'natural' deaths. Illness has been further categorised into diseases such as heart conditions, HIV, tuberculosis, and cancer. As the prison population swells, recorded natural deaths have increased from 1,424 in 2016 to 1,879 in 2021.

'Unnatural' deaths are more diverse in classification. They include suicide (due to hanging, poisoning, self-inflicted injury, drug overdose, electrocution, etc.) and death due to inmates, assault by outside elements, fire, negligence or excesses and accidental deaths such as natural calamities (earthquakes, snakebites, drowning, accidental fall, burn injury, drug/alcohol consumption, etc.).

In a landmark Supreme Court judgment, Justice M.B. Lokur said that the NCRB's distinction between natural and unnatural deaths is "unclear." During the pandemic, the PSI report classified deaths due to COVID-19 as 'natural' deaths. At the time, the occupancy rate of prisons was 118% of their capacity, and almost 40,000 more undertrials were held in prisons, in comparison with the previous year. The same year, the sanctioned strength of medical staff was around 1:125, but in reality, there was just one staff member to look after 219 inmates.

The issue of custodial deaths — why they occur and how they are investigated — is intertwined with how congested prisons are, if inmates have access to medical help, whether there is adequate staff and whether the available staff is properly trained to aid inmates. Only 5% of expenditure is spent on medical facilities, as per the PSI 2021 report. Moreover, between 2016 and 2021, money earmarked for spending on inmates was underutilised — ₹6,727.30 crore was the average national expenditure against a sanctioned ₹7,619.2 crore in 2021.

### How are deaths investigated?

Since 1993, the NCRB is required to intimate a custodial

death within 24 hours, followed by post-mortem reports, magisterial inquest reports or videography reports of the post-mortem. Further, if "an enquiry by the Commission into custodial death discloses negligence by a public servant, the Commission recommends to authorities of Central/State Governments for paying compensation to the Next of Kin (NoK) and also for initiation of disciplinary proceedings/prosecution against the erring public servant," the Home Ministry said in response to a Lok Sabha question in 2022. The same response noted that only one 'disciplinary action' was taken between 2021-22 against an "erring official."

In cases of custodial rape and death, the Code of Criminal Procedure also requires compulsory judicial magisterial inquiry in place of an executive magistrate inquiry. The National Human Rights Commission (NHRC) in 2010, however, weakened the legal requirement to say inquiry by a judicial magistrate is "not mandatory" when "there is no suspicion or foul play or where there is no evidence or allegation of an offence."

### What has government done so far?

The Supreme Court in a 1996 judgment articulated the social obligation towards prisoners' health, noting that they suffer from a "double handicap". "First, the prisoners do not enjoy the access to medical expertise that free citizens have. Their incarceration places limitations on such access; no physician of choice, no second opinions, and few if any specialists. Secondly, because of the conditions of their incarceration, inmates are exposed to more health hazards than free citizens."

The Model Prison Manual of 2016 and the Mental Healthcare Act of 2017, outline inmates' right to healthcare, which includes adequate investment in healthcare facilities, setting up mental health units, training officers to provide basic and emergency care, and formulating suicide prevention programmes to thwart such instances. In light of rising suicide cases, the NHRC in June this year issued an exhaustive 21-page advisory to States, highlighting that suicides arise out of both medical and mental health issues. The Supreme Court Committee on Prison Reforms made similar recommendations.

An infrastructural issue common to all is the need to scale both quantity and quality of staff, as several reports flag 'overflowing prisons' with inmate count exceeding capacity in at least 26 States. The NHRC recommended filling positions of "Prison Welfare Officers, Probation Officers, Psychologists, and Medical Staff," further noting that "the strength should be suitably augmented to include Mental Health professionals." There is an acute shortage of staff: a sanctioned staff of 3,497 people (out of which only 2,000 roles were filled), was responsible for looking after 2,25,609 prisoners in 2021 (this number has shot up to 5,75,347 as of September 2023, according to the National Prisons Information Portal). Vacancies too are unevenly distributed— States like Bihar and Uttarakhand had over 60% of positions lying vacant. Moreover, the total



strength of staff includes personnel charged with medical, executive, correctional, ministerial and other duties; not everyone is trained to provide medical aid.

Another recommendation is to allow inmates an “adequate number of telephones” with friends and family; judgments also note that prisoners should be allowed access to newspapers or periodicals to “reduce the feeling of isolation” and “possibility of harmful activity.” Authorities have denied such literature — including a P.G. Wodehouse book to Gautam Navlakha — citing “security risks”.

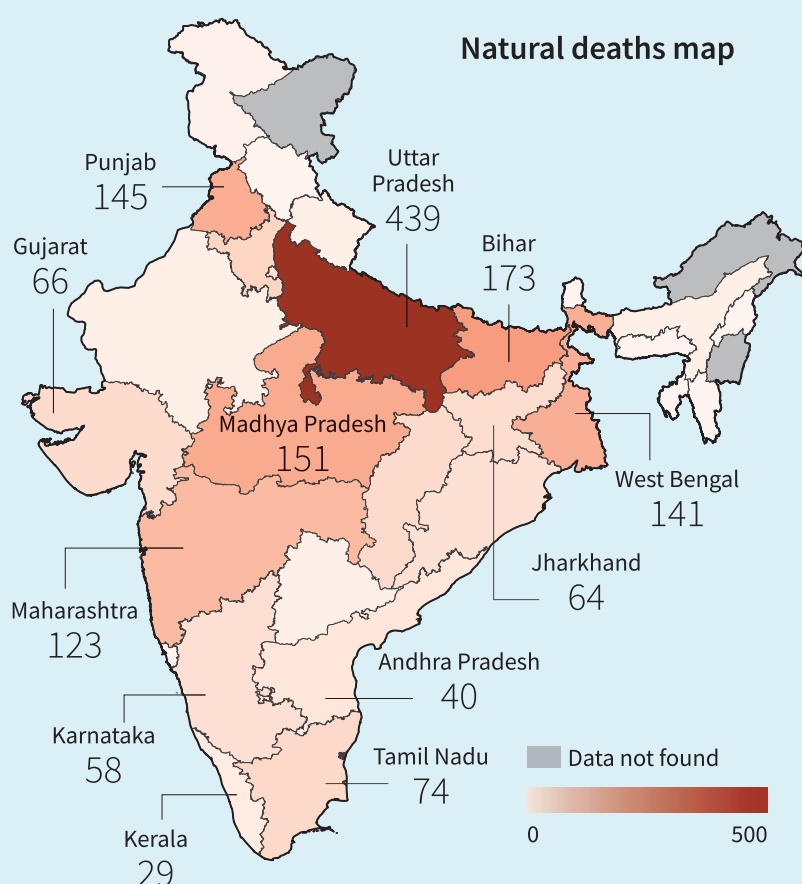
To prevent suicides specifically, guidelines recommend a

strict check on tools such as ropes, glasses, wooden ladders, pipes; initial mental health screening at the time of entry into jail; and installing CCTV cameras to monitor high-risk inmates. Human rights activists have cautioned against the latter measure, as heightened surveillance would violate the rights of prisoners. Almost 1.5% of the prison population suffers from mental illnesses, per the CHRI report. It also flagged a dearth of correctional staff including psychologists, “limited access to mental healthcare resources”, inadequate identification of mental illnesses in inmates along with heightened vulnerability and stigma.

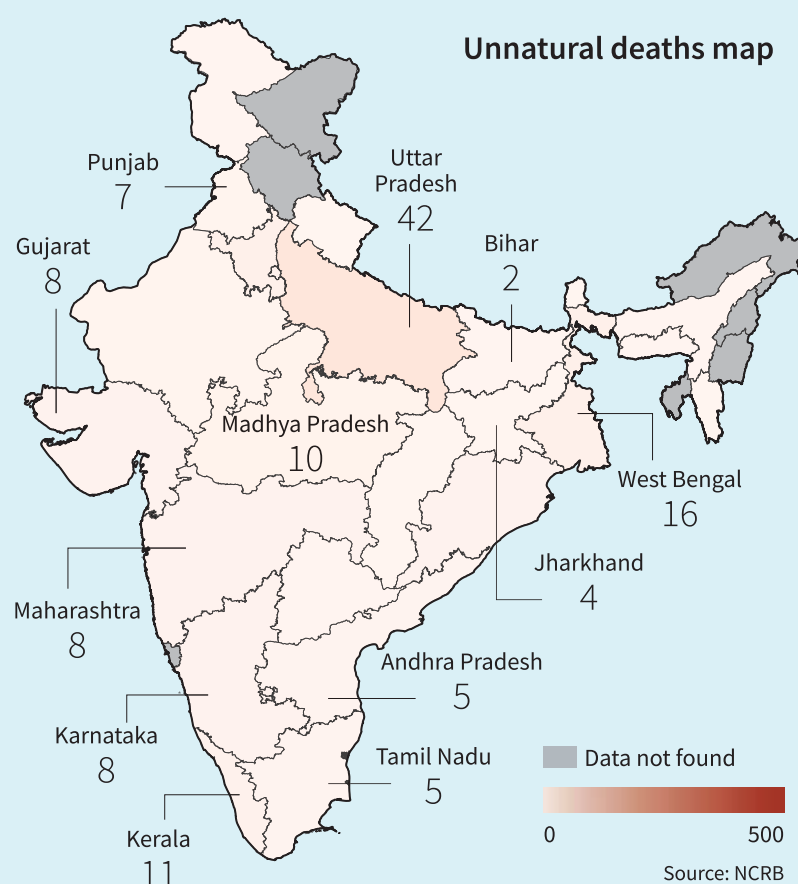
## The deaths of inmates in prisons in 2021

The two maps below show the number of ‘natural’ and ‘unnatural’ deaths of inmates in prison in some of the major States in the country. U.P. recorded the highest number of overall deaths, with 481 inmates dying in 2021

Natural deaths map



Unnatural deaths map



Source: NCRB

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## SCIENCE AND TECHNOLOGY

## ASTRA BVR MISSILE TO JOIN IAF SOON

**CONTEXT:** IAF contracts Bharat Dynamics for Astra BVR missiles; first batch to be inducted by year-end.

**HIGHLIGHTS:** The Indian Air Force (IAF) is progressing in the development of the advanced Astra-MK2 missile, following successful static firing. The Astra-MK1 has received bulk production clearance, with plans for proof firing and induction this fiscal year. It aims to equip frontline fighters with Astra-MK1 and MK2, reducing import reliance. A contract worth ₹2,971 crore was signed for Astra MK-I missiles, with the IAF expressing satisfaction with their performance.



ASTRA BVR MISSILES



## POLITY AND GOVERNANCE

## HC RULES AGAINST QUOTA IN MINORITY INSTITUTIONS

**CONTEXT:** The Madras High Court has ruled that educational institutions run by religious and linguistic minorities need not follow the rule of reservation with respect to the Scheduled Caste, Scheduled Tribe, and Other Backward Class students.

**Event:** The petitioner college had approached the court assailing a Government Order (GO) issued on November 20, 2021 rejecting the plea for extension of religious minority status to it since it had admitted 52% minority students in the academic years 2018-19 and 2019-20. Advocate-General R. Shunmugasundaram contended such admission had been made in violation of a 1998 GO which restricts admission of minorities to 50%. On the other hand, senior counsel Vijay Narayan, representing the college, claimed minority educational institutions should be granted a permanent status without being forced to get it extended from time to time. He also argued the Tamil Nadu Backward Classes, Scheduled Castes and Scheduled Tribes (Reservation of Seats in Private Educational Institutions) Act, 2006 would not be applicable to minority institutions.

### Observations of the High Court:

The court has also held that the government cannot compel such institutions to provide reservation to such candidates. The Court held that the status, once granted, would continue until the National Commission for Minority Educational Institutions cancels it on valid grounds and State government would not have any right to restrict the minority status of an institution to a particular period. The Division Bench upheld the right of the State government to insist that the minority institutions could admit students from the religious and linguistic minorities concerned only up to 50% of the sanctioned intake and that the rest must be filled on the basis of merit. The Bench clarified that the minorities who gain admission on merit should be excluded while calculating the first 50% of students.

Article 15(5) of the Constitution, introduced through the 93rd amendment in 2005, specifically excludes minority institutions while enabling the State government to make special provisions by law for the advancement of any socially or educationally backward classes of citizens or for the Scheduled Castes or Scheduled Tribes relating to their admission to educational institutions.

Further, the definition of 'private educational institution' under Section 2(d) of the 2006 Act also excludes minority institutions established under Article 30(1) of the Constitution.



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## ECONOMICS AND DEVELOPMENT

## REVISION TO JULY FUEL SHIPMENTS VALUE LIFTS OVERALL EXPORTS FIGURE

**CONTEXT:** India's goods exports by value for July has been sharply revised upwards by about \$ 2.3 billion to \$ 34.52 billion, driven by a 51 % jump in the petroleum exports tally from the month's initial estimates.

This is the sharpest revision in export figures implies that July's revised year-on-year decline in goods exports of 9.95 % was the least since April, breaking a three-month streak of double-digit contractions. Quick estimates had pegged July's exports at a nine-month low of \$ 32.25 billion, translating a 15.9 % YoY slump.

The revised July tally also puts August's initial exports tally of \$34.5 billion, which were reckoned to be a three-month high, in the shade. Moreover, with no substantive changes in the \$52.9 billion merchandise import bill for July, the trade deficit has also narrowed to a three-month low of \$18.4 billion, from the \$20.7 billion estimate.

Earlier, June's exports had been revised higher by \$1.4 billion, reviving a spate of such data revisions that began in late 2021 and peaked in the last six months of 2022-23, when the final tallies for exports were raised by almost \$3 billion a month. Import numbers were also revised last year, with October to March seeing an average change of \$1.8 billion, albeit with upward as well as downward revisions.

### Deficit implications

As per the revised data, petroleum products exports, which were earlier reckoned to have dropped 43.7% in July to just \$4.6 billion, ended up close to \$7 billion, reflecting only an 18.8% drop from July 2022. Officials had earlier attributed the unusually high revisions to delays in the reporting of some petroleum exports, particularly from units located in special economic zones. As per the quick estimates for August, overall merchandise exports declined 6.9%, while petroleum exports were reckoned to have slumped 30.6% to \$5.88 billion.

### Rosier picture

The sharpest revision in exports since March, implies that July's revised YoY drop in exports of 9.95% was the least since April



■ Petro products exports, earlier reckoned to have slid 43.7% in July to just \$4.6 bn, ended up close to \$7 bn

■ July's revised figure also puts August's initial export tally of \$34.5 bn in the shade

■ Negligible revision in import tally narrows trade deficit to three-month low of \$18.4 bn, from the \$20.7 bn estimate



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