7 PM COMPILATION

1st and 2nd Week May, 2025

Features of 7 PM compilation

- Comprehensive coverage of a given current topic
- Provide you all the information you need to frame a good answer
- Critical analysis, comparative analysis, legal/constitutional provisions, current issues and challenges and best practices around the world
- Written in lucid language and point format
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Caste Census – Significance and Challenges- Explained Pointwise

The Cabinet Committee on Political Affairs headed by PM has decided to include caste enumeration as part of next Census exercise. The last time when India's entire population was counted by caste was in pre-independent India – in 1931. Since then, only Scheduled Castes & Scheduled Tribes have been counted in the Census exercise.

What is Caste Census and Caste Survey?

- **Census:** Census is the total process of collecting, compiling, analyzing and disseminating demographic, economic and social data of all persons in a country at a specific period of time. Census in India is conducted at regular intervals of 10 years. Under Article 246 of the Constitution, the Census is a Union subject.
- **Caste Census:** A caste census involves the systematic recording of individuals' caste identities during a national census. It aims to gather data on the distribution, socio-economic status, education levels, and other demographic details of various caste groups within the population.
- Every Census in independent India from **1951 to 2011** has published data on Scheduled Castes and Scheduled Tribes, but not on other castes. Before that, every Census until 1931 had data on caste. Thus, the most recent caste data available is from **1931 Census**.
- **Socio-Economic Caste Census (SECC):** SECC was conducted in based on the recommendations of Group of Ministers headed by then Finance Minister Pranab Mukherjee in 2010. It was done outside of the purview of Census exercise. However the **findings were never made public due to concerns about data accuracy & consistency**.
- **Caste Survey:** Since only the Union govt has the power to conduct census, several state governments like **Bihar, Karnataka, Telangana have already conducted caste surveys** to ascertain the social and economic status of different castes for better policymaking.

Difference between Census, Caste Census(Socio Economic Caste Census) and Caste Survey:

Parameters	Census	Caste Census (SECC)	Caste Survey
Legal Backing	Census is backed by the **Census Act 1948**	Caste Census is **not backed by any particular specific statute.** Central govt by notification may provide for collection of caste data	**No statutory backing.** Caste surveys are used by the State governments since they do not have powers to conduct census.
Caste Data	Socio economic data of only **SCs and STs** were collected and released.	Socio economic data of OBCs were collected for the **first time in 2011 census** after independence. However the data was not released.	State Governments conducts **caste surveys** to ascertain the socio economic data of castes.

Confidentiality	All census data are kept confidential	All the personal information given in the SECC is open for use by Government departments to grant and/or restrict benefits to households.	State governments use the Caste survey data for informed policy making of state policies.

Read More- **Forum IAS**

What are the advantages of Caste Census?

1. Evidence-based Policymaking: A caste census can provide precise and comprehensive data on the socio-economic status, educational attainment, health indicators, and representation of various caste groups at the national and regional levels. This granular data is crucial for formulating targeted and effective policies to address specific disparities faced by different communities. It can help in identifying castes and sub-castes that are particularly marginalized or lagging behind in development indicators, allowing for focused interventions.

2. Rationalization of reservation: The current policies are based on the last caste census which was conducted in 1931. The data can provide a factual basis for reviewing and rationalizing existing reservation policies in education and employment, ensuring they are aligned with the current socio-economic realities of different caste groups. For e.g. New caste census can help the government in **identifying the most benefited section and reduce their share** in the overall reservation to provide an opportunity to other castes. It can help in identifying the communities that may currently be excluded from affirmative action but are demonstrably backward and in need of such support for e.g. **Denotified, Nomadic & Semi-Nomadic Tribes**. Regular caste-based data collection can also help in monitoring the impact of reservation policies over time and make necessary adjustments.

3. Better targeting of Government welfare schemes: Caste census would lead to the identification of both the dominant & the dominated, which will have a positive effect in terms of targeting the welfare. Reliable caste-based data can inform the allocation of public resources, ensuring that funds are directed towards the communities that need them most and implementing the development programs that are tailored to the specific needs of different caste groups, leading to more efficient use of resources.

Case Study = BIHAR:

Under the **National Food Security Act**, 83.92% of the population of Bihar is entitled to subsidized food grain. The Bihar caste survey reported that the population of the state has increased from 103.8 million in 2011 to 130.7 million in 2023. Thus by current population estimates,109.7 million persons are eligible for the subsidy. However the current beneficiary count is just 87.1 million. That is, in Bihar alone, 22.6 million persons have been excluded from this benefit at a time when food inflation is high.

4. Caste has an important position in Indian society: While census data has been captured for Scheduled Castes, Scheduled Tribes, religions and linguistic profiles, there has been **no profiling of all castes in India since 1931.** Caste has an important position in the Indian society and the data on caste can be helpful in ascertaining the socio-economic positions of different castes in India.

5. Addressing the prevalent inequalities: Unequal distribution of wealth, resources and education has meant an acute shortage of purchasing power among the majority of Indians. The census will help to address these issues in a democratic, scientific and objective manner. This will lead to **social justice** in the country.

6. Fulfilment of constitutional mandate: Our Constitution favours conducting a caste census. **Article 340** of the Constitution empowers the government to investigate the conditions of socially and educationally backward classes and make recommendations for their advancement. The constitutional body NCBC also urged the government to collect data on the population of OBCs as part of Census of India 2021 exercise.

7. Helpful in fulfilling the objectives of various commissions: **Sachar committee** which was formed to examine the socio-economic and educational status of the Muslim community in India, mentioned that the availability of data on religion was useful in highlighting the relative deprivation of minorities. So, similar data on caste is also desirable to identify vulnerable sections within castes. This data will be useful for **Justice Rohini Commission** which has been formed for the sub-categorization of OBCs.

8. Addressing inter-sectionality: Caste intersects with other factors such as gender, religion, and region, leading to **compounded disadvantages.** The census can reveal these intersections which will lead to more nuanced policy approaches that target multiple dimensions of marginalization.

9. Break the myths associated with castes: The caste census will reveal the actual data on castes and remove ambiguities associated with the caste. For instance, In Karnataka, there were claims that among the castes, the **Lingayats** are the most numerous. So the census can reveal the true information on that.

10. Empowering marginalized communities: Enumeration of castes within the Census exercise would likely lead to the emergence of new identities & aspirations. This would lead to opening of avenues for new political negotiations, coalitions, and party politics which will result in deepening of democracy.

What can be the challenges of Caste Census?

1. Caste based political mobilisation: The data can be used by the political parties for their narrow political gains. This will encourage **caste based mobilizations** in the country. As India seek to eliminate and weaken the notion of caste, a caste census would only strengthen it. There will be from every caste group for share in the power at the cost of administrative efficiency.

2. Hardening of caste identities may hamper growth of national integration: There have been concerns that counting caste may help **solidify or harden identities.** It might lead to a renewed emphasis on caste as a primary marker of identity. The process of enumeration and the subsequent use of the data could potentially exacerbate existing social tensions and create new fault lines between different caste groups, especially if perceived as leading to unequal benefits or discrimination. Due to these repercussions, nearly a decade after the SECC, a sizable amount of its data remains unreleased or released only in parts.

3. Strengthen demands for further reservations: Caste census may increase demand for larger or separate quotas. For instance, **Patels, Gujjars, Jats and other castes are demanding reservations**. The caste census might induce more such demands in future. The census would put pressure on the SC to lift the 50% ceiling.

4. Administrative and Logistical Complexities: India has thousands of castes and sub-castes, with significant regional variations in nomenclature and classification. Accurately identifying and categorizing each individual's caste can be a monumental task for enumerators, increasing the risk of errors and inconsistencies. The Registrar General of India rejected the request forwarded from PMO to conduct the caste census in 2010 due to logistical & practical difficulties.

5. Lack of a Uniform Definition: There isn't a universally agreed-upon definition of "caste" in the Indian context, making it challenging to establish clear and consistent criteria for enumeration. Enumerating the caste numbers in India is a complex task as the **same caste is spelt in different ways in different states.** Also one caste maybe extremely backward in one state and can be backward in the other state.

6. Potential stigmatization: Disclosure of caste identities could lead to individuals being **stigmatized or discriminated** against based on preconceived notions associated with certain castes. This can deter honest responses and undermine the survey's accuracy.

What should be the way forward?

1. Standardized Classification: Develop a clear and standardized list of castes and sub-castes, potentially drawing upon existing government classifications and involving anthropological and sociological expertise. Address the issue of synonymous caste names across regions.

2. Comprehensive Training: Provide extensive and sensitive training to enumerators on the importance of accuracy, respectful engagement, and handling potential sensitivities around caste identity. Emphasize the voluntary nature of participation and data confidentiality.

3. Ensuring Data Accuracy and Reliability:

- **Community Involvement:** Involve local community leaders and caste organizations in the process to build trust and ensure accurate identification.
- **Verification Mechanisms:** Implement mechanisms for data verification at multiple levels to minimize errors and inconsistencies.
- **Public Awareness Campaigns:** Conduct extensive public awareness campaigns to educate people about the purpose and benefits of the census, address privacy concerns, and encourage accurate participation.

4. Data Sensitivity: Information about an individual's caste is highly sensitive, and concerns about data privacy and potential misuse need to be addressed. Ensure that strong data protection laws and protocols are in place to safeguard the collected information and prevent its misuse.

5. Avoid Political Misuse: Establish clear protocols and legal safeguards to prevent the data from being used for divisive or partisan purposes. Frame the census as a tool for inclusive development, not as a means to deepen social divisions.

Conclusion:

Though there have been several apprehensions about the consequences of the caste census, however, it is up to the government & the civil society together to ensure that the caste census is not done for the fragmentation but for harmony in society. It would be a golden opportunity for better power sharing & for deepening of democracy.

Read More- The Indian Express
UPSC Syllabus GS-2: Government policies & interventions in various sectors

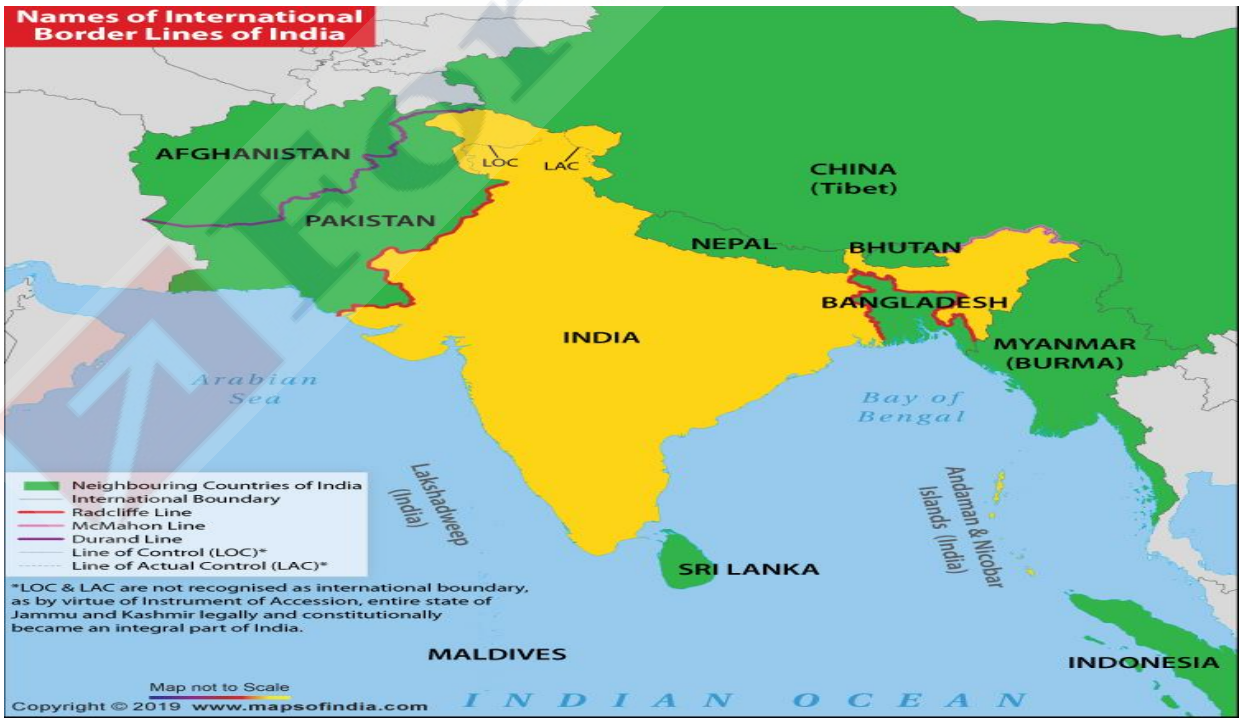
The Challenge of Cross-border Terrorism in India- Explained Pointwise

The India-Pakistan border is a prominent hotspot for cross-border terrorism. Recent events, such as the deadly **Pahalgam attack** in Jammu and Kashmir that killed 26 tourists, have intensified accusations and diplomatic fallout between the two countries. Even though India and Pakistan have tried many times to bring peace through talks and agreements still the situation has not improved to the desired level. This is mainly because Pakistan continues to support terrorist groups like Lashkar-e-Taiba (LeT), Jaish-e-Mohammed (JeM) etc, which carryout cross-border terrorist attacks to disturb the peace in the region. Thus, in this article we will analyze the causes & consequences of cross-border terrorism and various government initiatives as well as what could be the way forward.

What is cross-border Terrorism & what are its sources in India?

- **Cross Border Terrorism:** Cross-border terrorism refers to terrorist activities where the territory of one country is used to plan, support, or launch attacks against another country. This form of terrorism often involves non-state actors receiving support-tacit or explicit-from states or entities across international borders. It is considered a form of "grey zone" conflict, amounting to an undeclared war aimed at destabilizing a nation through sustained, low-intensity violence.
- **Key Features:**
    - Terrorist groups operate from one country and infiltrate into neighboring states to carry out attacks.
    - Methods include armed incursions, bombings, cyberattacks, smuggling of arms and narcotics, and sponsoring proxy fighters.
    - The intent is often to intimidate populations, disrupt governance, or further ideological, political, or religious objectives.

Sources of Cross Border Terrorism



Source- India Map

Indo-Pakistan Border	The Indo-Pakistan Border (3,323 Km) runs along the states of Gujarat, Rajasthan, Punjab and J&K. India consistently accuses Pakistan of providing material, logistical, and financial support to terrorist groups operating across the border, especially in Jammu and Kashmir. Groups such as Lashkar-e-Taiba (LeT) and Jaish-e-Mohammad (JeM), which have claimed responsibility for major attacks, are believed by Indian authorities and many international analysts to operate from Pakistani territory. Several militant organizations, including LeT, JeM, and The Resistance Front, act as proxies for larger terrorist networks and are used to launch attacks from across the border. Inadequate cooperation from Pakistan has made the management of border further difficult for India.
Indo-Bangladesh Border	The Indo-Bangladesh Border (4,096 Km) passes through West Bengal, Assam, Meghalaya, Tripura and Mizoram. Illegal migration across this border poses serious security threats and acts as a fertile ground for organisations like the Inter-Services Intelligence of Pakistan to penetrate and expand their activities. Poor law and order situation at the border, has led to smuggling of arms and drugs. The supply of arms helps in sustaining any conflict.
Indo-Nepal Border	India-Nepal Border (1,751 Km) is an open border to facilitate the free movement of people across the border. Anti-India organizations use this border to plant their people in the territory of India. Smuggling of gold, small arms, drugs and fake currency helps terrorists in executing an attack.
Indo-Myanmar Border	The Indo-Myanmar Border (1,643) passes through the north-east states of Arunachal Pradesh, Nagaland, Manipur and Mizoram. The insurgents and terrorist groups like the National Socialist Council of Nagaland (NSCN) and United Liberation Front of Asom (ULFA) operate from Myanmar, which threaten the security of India as well as Myanmar.
India-Bhutan	The Indo-Bhutan border (699 km) passes through the states of Assam, Arunachal Pradesh, West Bengal and Sikkim. Illicit establishment of camps by militant outfits in the dense jungles of south-east Bhutan helps insurgents from India in executing anti-India activities.

Maritime Borders	India's long coastline remains comparatively unguarded with minimal presence of coast guards. The 26/11 cross-border terrorist attack took place through maritime borders.

What are the reasons behind cross-border terrorism in India?

1. State-sponsored Policy by Pakistan:

- Pakistan's military-intelligence establishment, particularly the Inter-Services Intelligence (ISI), has deliberately used terrorism as a tool of state policy to destabilize India, especially in Jammu and Kashmir. It is a part of Pakistan's policy of ***'bleeding India through thousand cuts'***.
- Pakistan has sought to challenge Indian control over Kashmir and keep the issue active on the international stage by supporting militant groups that operate across the border.
- Pakistan has cultivated and deployed non-state actors such as Lashkar-e-Taiba and Jaish-e-Mohammad as proxies to conduct attacks in India, providing them with funding, training, and safe havens. This proxy strategy allows Pakistan to wage asymmetric warfare while maintaining plausible deniability.
- Pakistan has also supported insurgency in other Indian regions, such as Punjab, to destabilize India further *e.g. Terrorist attack on Pathankot Airbase in 2016*.

2. Porous and difficult-to-secure borders: India's borders with Pakistan, Bangladesh, Nepal, Bhutan, Myanmar, and even along the coastline are often porous and challenging to monitor due to difficult terrain (mountains, jungles, rivers, deserts). These geographical complexities make infiltration, smuggling of arms, and movement of militants easier. Smuggling of arms, drugs, and fake currency across these borders helps sustain terrorist operations.

3. Over Ground Workers: The local population is recruited as over-ground workers by the terrorist outfits in border areas. These over-ground workers support and facilitate the cross-border movement of terrorists by providing them transportation, shelter, and other assistance.

4. Corruption among officials: Corrupt officials allow illegal cross-border movement in exchange for bribes. This provides avenues for criminal elements and terrorists to enter India.

5. Inadequate border management & security gaps: Inconsistent or inadequate border security infrastructure and lack of strategic coordination among security agencies can create vulnerabilities that are exploited by terrorists.

What are the consequences of cross-border terrorism in India?

Cross-border terrorism has had severe consequences for India. These are mentioned below-

1. Loss of civilian and defence personnel lives: There has been loss of lives of thousands of civilians in acts of cross-border terrorism over the years. Thousands of defense, paramilitary and police personnel have sacrificed their lives in the line of duty fighting cross-border terrorism *e.g. Attack on CRPF convoy in Pulwama in 2019*.

2. Disruption of peace and security: Cross-border terrorism has disrupted peace and security along India's borders, particularly with Pakistan. It has led to a deterioration of bilateral relations between India and Pakistan, leading to suspension of treaties (like the Indus Waters Treaty), closure of trade routes, and reduced

cooperation. It consolidates nationalism and deepens divisions between India and Pakistan, making conflict resolution more difficult.

3. Economic disruption: Cross-border terrorism causes significant economic loss by disrupting trade, commerce, tourism, agriculture, and other vital activities, especially in conflict-prone regions like Jammu & Kashmir. Major attacks, such as the Pahalgam massacre, have led to mass cancellations in the tourism sector, loan defaults, stalled infrastructure projects, and rising unemployment. The perception of risk deters both domestic and foreign investment, reduces FDI inflows, and increases the cost of doing business. Ancillary sectors such as transport, horticulture, banking, and retail also suffer ripple effects from these disruptions.

4. Social & Psychological impact: Frequent terror attacks inflict heavy psychological trauma on victims and their families, leading to long-term mental health issues and increased medical costs. The constant threat of cross-border terrorism has also created an atmosphere of fear and insecurity among the civilian population living along the borders. The radicalization of local populations, especially youth, is exacerbated by persistent violence and extremist propaganda. It also leads to attack on Kashmiri people in other parts of the country.

5. Long-term developmental setbacks: Persistent terrorism erodes investor confidence, leading to capital flight and stunted industrial growth. Educational opportunities are lost as institutions close or are disrupted, impacting future income and social mobility.

6. Illegal infiltration and smuggling: Cross-border terrorism has facilitated illegal infiltration and smuggling of narcotics, arms and weapons across India's borders, especially with Pakistan and Bangladesh.

What are the steps taken by India to counter cross border terrorism in India?

1. Strengthening Security and Intelligence Infrastructure

- **National Investigation Agency (NIA):** The NIA is India's primary agency for investigating and prosecuting terrorism-related cases, especially those involving cross-border elements. It coordinates with other agencies to ensure a unified response to terror threats.
- **Research and Analysis Wing (R&AW):** This external intelligence agency focuses on countering cross-border terrorism, particularly from Pakistan-based groups.
- **National Intelligence Grid (NatGrid):** Integrates data from multiple agencies to provide real-time threat analysis and improve intelligence sharing.

2. Legislative and Policy Measures:

- **Unlawful Activities (Prevention) Act (UAPA):** Provides a robust legal framework to prosecute terrorism-related offenses, designate terrorist organizations, and freeze assets.
- **National Security Act (NSA):** Allows preventive detention of individuals suspected of involvement in terrorism.
- **Amendments to Laws:** The UAPA and Prevention of Money Laundering Act have been strengthened to address new forms of terrorism and its financing.

3. Enhanced Border Management:

- **Central Armed Police Forces (CAPFs):** Agencies like BSF, CRPF, ITBP, and SSB are deployed in sensitive border areas to prevent infiltration and support anti-terror operations.
- **Smart Fencing and Surveillance:** India is investing in smart fencing, drones, sensors, and surveillance cameras along borders to detect and prevent cross-border infiltration.
- **Coastal Security:** Upgradation of coastal security infrastructure to prevent maritime infiltration.

4. Specialized Counter-Terrorism Units:

- **National Security Guard (NSG):** An elite force specializing in counter-terrorism operations, including hostage rescues and response to large-scale attacks.
- **NSG Hubs:** Established in major cities for rapid deployment during emergencies.

5. Diplomatic and Strategic Actions:

- **Suspension of Bilateral Agreements:** In response to major attacks, India has suspended the Indus Waters Treaty, closed border check posts, and reduced diplomatic staff with Pakistan to signal zero tolerance for cross-border terrorism.
- **International Advocacy:** India raises the issue of cross-border terrorism in multilateral forums, presses for global action on terror financing, and seeks extradition of perpetrators.

6. International Cooperation:

- **Intelligence Sharing:** Collaboration with international intelligence agencies to improve the accuracy and timeliness of counter-terrorism operations.
- **Action Against Terror Financing:** Efforts to choke the flow of funds to terrorists by monitoring financial transactions and working with global partners.

What should be the way forward?

1. Strengthening border security: There is a need to reassess policies related to management of India's international borders such as intelligence apparatus, internal security and border management. The smart fencing of all Indian borders must be expedited.

2. Kinetic Strikes: The surgical strikes like the Uri Surgical Strike and the airstrike like the Balakot airstrikes must be carried out to deter the terrorists. The military should also look at alternative means to strike at the terror camps across the LoC (Line of Control) and LAC (Line of Actual Control) through mechanisms like Precision Engagement Capability.

3. Specialized force and training- India should move in the direction of specialisation of military to fight cross-border terrorism. A judicious mix of properly trained manpower and affordable and tested technology is likely to yield better results.

4. Beefing up cyber defence Mechanism: A holistic cyber defense mechanism must be developed to effectively counter cyber-linked terrorism, including conducting cyber operations and implementing strong counter-measures against cyber attacks from foreign soil.

5. Speeding up judicial process: India's national criminal justice system must be enhanced and legal protocols must be streamlined to enable speedy trials of cross border terrorism cases.

6. Counter-radicalization programmes: The counter-radicalization programs focusing on promoting non-violence and tolerance must be implemented, especially in educational institutions. This will reduce youth's exposure to cross border terrorism and radical ideology. This will reduce the number of over-ground workers in India.

Conclusion:

Cross-border terrorism thus imposes a heavy and multidimensional cost on India, affecting its economy, society, politics, security, and prospects for peace and development. A multi-pronged approach-combining

financial, diplomatic, security, intelligence, and socio-political strategies, supported by international cooperation and dialogue with local population-is essential to effectively counter and ultimately resolve cross-border terrorism.

Read More- The Hindu
UPSC Syllabus- GS 3 – Internal Security

Food vs Fuel (Food Security vs Energy Security) – Explained Pointwise

India's growing use of maize for ethanol production has triggered a major shift in its agricultural economy. Once a surplus producer and exporter, India is now importing maize to meet rising demand, putting pressure on domestic feed and food supplies. The diversion of maize for biofuel has disrupted supply chains, raised prices, and even impacted soybean growers through a ripple effect. As policymakers consider GM maize imports, the debate intensifies between ensuring energy security and safeguarding food and feed priorities.

What are Biofuels?

According to the **FAO**, biofuels are energy carriers that store the energy derived from biomass. A wide range of biomass sources can be used to produce bioenergy. These include – fibre and wood residues from the industrial sector, food and non-food crops, agricultural wastes, algae, etc.

Ethanol:

Ethanol-based biofuels are often considered a preferable alternative to fossil fuels due to their lower emissions due to less carbon dioxide emissions than conventional fuels.

It is produced from grains, their stalks, rotten potatoes, sugarcane juice, sugarcane molasses, and agricultural and industrial waste. When ethanol is produced directly from crops such as rice, maize, and sugarcane, the technology is referred to as **1G (1st Generation)**. When crop waste, non-food crops, industrial waste, and lignocellulosic (plant dry matter) feedstocks are used, the technology is **2G (2nd Generation)**.

What are some of the biofuel initiatives being undertaken by India?

National Biofuel Policy 2018:
Read about it **here**.

Ethanol Blending Programme: It involves producing bioethanol that would be blended with petrol. As per the policy, India was to achieve 10% blending rate (E10) by 2021-22 and 20% (E20) by 2025-26. It has led to the average ethanol blending in petrol rising from 1.6 to 11.8% between 2013-14 and 2022-23. Read a detailed article on **Ethanol Blending here**.

Pradhan Mantri JI-VAN Yojana, 2019: To create an ecosystem for setting up commercial projects and to boost Research and Development in 2G Ethanol sector.

GOBAR (Galvanizing Organic Bio-Agro Resources) DHAN scheme: It focuses on managing and converting cattle dung and solid waste in farms to useful compost, biogas and bio-CNG, thus keeping villages clean and increasing the income of rural households.

Why is India promoting Biofuel production?

Read about the **Significance of Biofuels** **here**.

1) **Enhancing India's energy security:** By diversifying its energy sources, India can build a more resilient energy infrastructure, lessening its reliance on a single energy type and promoting a mix of renewable resources.

2) **Import Substitution:** India heavily relies on imports to meet its energy requirements (around 80% of its oil requirement is imported). Biofuels can help strategically reduce the dependence on imported fossil fuels and conserve foreign exchange reserves.
For instance, India's crude oil import bill will fall annually by about **$4 billion** under E20 (**NITI Aayog**).

3) **Negate Crude Oil Price Hikes:** Can significantly offset negative economic impacts of moderate oil price hikes.

4) **Addressing Environmental concerns:** As per **NITI Aayog**, petrol blended with 20% ethanol would **reduce carbon monoxide emissions by 50%** in two-wheelers and **30%** in four-wheelers.

5) **Boosting the domestic agricultural industry:** Biofuel production can lead to investment and innovation in agricultural practices. This can help achieve the target of **'Doubling farmer's income'**.

6) **Job Creation:** It can generate about 18 million rural jobs (as per the **Asian Development Bank**).

However, the push for ethanol as a fuel in India is not without its challenges, particularly in the area of food security.

How can India's biofuel policies harm food security of India?

According to the **FAO**, **crop diversion to biofuels** and climate change are the most significant threats to long-term food security.

India's biofuel policies can impact food security in several ways:

1) **Diversion of Food Crops:** Most ethanol (for blending) in the country is produced using 1G as 2G remains commercially unviable in India. The diversion of food crops such as rice – to ethanol – will hamper India's nutritional security ambitions.
For instance, in 2022, close to 1 million metric tonnes of rice fit for human consumption from FCI's stocks was sold at subsidised prices to produce ethanol.

2) **Diversion of Agricultural Land:** It can lead to the conversion of agricultural land used for growing food crops to cultivating biofuel feedstocks like sugarcane, corn, or oilseeds. This reduces the land available for growing essential food crops, potentially decreasing overall food production.

3) **Adverse impact on small and marginal farmers:** Increased demand for biofuel crops might compete with food crops for resources such as water, fertilizers, and agricultural infrastructure. This competition can lead to price hikes for these resources, affecting small-scale farmers.

4) **Rise in Food Prices:** A decrease in land availability for growing food crops can lead to an increase in food prices (due to lesser production).
For instance, the Centre has capped the use of 'sugacane juice and sugar syrup' for ethanol production in the 2023-24 supply year due to concerns over sugar price rising.

5) **Disincentivises Crop Diversification:** Farmers may prefer to grow more sugarcane and rice due to price support schemes. This would push farmers away from crop diversification strategy of growing more pulses and oilseeds.

6) **Impact on Soil Health:** The practices of **monocropping** for biofuel feedstock crops (such as rice, sugarcane) will deplete the nutrients in the soil and make it infertile.

7) **Impact on Water Availability:** Incentives for ethanol blending might encourage increased sugarcane and rice cultivation — **water-gruzzling crops**.
Producing a kilogram of sugar requires 1,500-2,000 litres of water — making it an unsustainable option.

8) **Climate Change Induced Vulnerability:** Biofuel production might contribute to **monoculture farming**. This can increase vulnerability to climate change-related risks such as pests, diseases, and extreme weather events.

However, biofuel production may also have a positive impact on India's food security.

How can India's fuel policy enhance food security in the longer term?

1) **Raise Agricultural Income:** For instance, biodiesel could help raise farm income by providing an additional market for oilseed crops. Farmers can grow oilseed crops in rotation with food crops such as wheat.

2) **Nutritional Security:** Biofuel production can create new income streams, generate jobs and lead to infrastructural development in rural areas. The resultant improvement in socio-economic indicators can enhance nutrient absorption by individuals, promoting nutritional security.

3) **Increased Farm Productivity:** Investment in biofuel technology can stimulate R&D in the agricultural sector. This can lead to technological advancements and increased farm productivity.

4) **Raise Private Investment in Agriculture:** Assistance to farmers for growing biofuel feedstocks can also encourage private investment in the agriculture sector.

What should be the Way Forward?

1) **Investment in R&D:** Investment in R&D on **2G (Non-food sources)**, **3G (Non-food, non-plant sources such as algae) as well as 4G (Genetically engineered) Biofuels** could significantly enhance the future role of biofuels without compromising food security.

2) **Safety Nets:** Social security nets such as the National Food Security Act are needed to protect vulnerable people from high food prices and ensure access to adequate food.

3) **Focus on 2G sources such as molasses-based ethanol:** If cultivated on wastelands with judicious water usage, it would not have major adverse impacts on food security.

4) **Proper Land Use Management:** Land use mapping and allocation studies as well as provisions to make wasteland available for biodiesel production should be undertaken.

5) **Optimising Incentives:** It is necessary to design a combination of tax, subsidy, and regulatory measures to ensure that the incentives given to the biodiesel sector do not lead to expansion of biodiesel cultivation into arable lands.

6) **Exploring Alternatives:** To achieve the goal of energy security as well as emissions reduction, alternative mechanisms – EVs, other renewable sources (such as solar, wind), etc. – need to be explored.

India, like many countries, faces the challenge of balancing its energy needs with other priorities such as agriculture and food security. Policies aimed at sustainable energy advancement, optimizing resource use, and coordinated planning can reduce the conflict between clean energy objectives and food security priorities.

Read more– The Indian Express
UPSC Syllabus- GS 3-Food Security

Sustainable AI and India's Energy Future: The Role of Small Modular Nuclear Reactors (SMRs)

The global Artificial Intelligence (AI) revolution is not just a technological transformation — it is a **massive energy transition**. According to the **International Energy Agency (IEA)**, data centres already consume about **1.5% of global electricity (2024)**, are growing at 12% annually and this figure is expected to **double by 2030**, driven by the proliferation of **generative AI tools** like ChatGPT and Midjourney. While AI promises to increase productivity and economic growth, it also risks becoming an energy-intensive burden on national grids, raising serious sustainability concerns.
As the world grapples with the **climate crisis and net-zero commitments**, the integration of **nuclear energy**, particularly **Small Modular Reactors (SMRs)**, offers a cleaner, scalable, and reliable alternative to power the next generation of digital infrastructure.

Why AI Needs So Much Energy?

1. **High Computational Requirements**: AI models like **GPT-4** require massive computing during training and inference stages. Each training cycle can emit as much CO_2 as five cars running across their lifecycle. **Example:** MIT Technology Review estimates AI model lifecycle emissions rival some small nations' per capita CO_2.
2. **Continuous Power Use Post-Deployment**: Once deployed, AI models operate across global servers 24/7. Tools like ChatGPT or Midjourney continuously consume energy to serve millions of users daily**. Example:** Midjourney and DALL·E require high-resolution image synthesis, stressing data centres 24×7.
3. **Data Storage and Management**: AI relies on gigantic datasets stored in high-performance storage systems. These systems demand constant cooling and uninterrupted energy supply. Data centres need continuous cooling, consuming **additional 40-50%** of the total energy.
4. **Energy-Intensive GPUs**: AI depends on **power-hungry GPUs (Graphic Processing Units)**. **Example:** OpenAI's CEO tweeted **"our GPUs are melting,"** illustrating thermal and energy inefficiencies.
5. **Edge AI and Real-time Analytics**: As AI integrates with IoT and real-time applications, more decentralized processing (Edge AI) will further increase total power requirements. AI services demand **always-on global infrastructure**. **Example:** Amazon, Microsoft, and Google run **redundant global data hubs** powered by fossil-heavy grids.

What is an SMR and How It Can Support AI's Energy Needs?

Small Modular Reactors (SMRs) are compact, factory-fabricated nuclear reactors that generate **50-300 MW** of electricity. Their design enables scalability, faster deployment, and co-location with energy-intensive infrastructure like AI data centres.

1. **Economic Competitiveness:** As per NITI Aayog, SMR projected to lower electricity costs from ₹10.3 to ₹5/kWh in India post-deployment.
2. **24×7 Baseload Energy**: Unlike solar or wind, SMRs provide **continuous power**, ideal for AI uptime needs. **Example:** Google signed an agreement to power AI systems using nuclear energy (2023).
3. **Low Carbon Footprint**: SMRs offer **zero direct CO_2 emissions** during operation, supporting net-zero goals.

4. **Scalable and Modular**: Easy to expand as AI data demand grows. **Example:** U.S.-based NuScale Power's SMR design approved by NRC for modular construction.
5. **Space Efficient**: Require smaller land footprint compared to solar or wind farms per MW.
6. **Faster Deployment**: SMRs can be operational in **3–5 years**, compared to 10+ years for large nuclear plants.
7. **Enhanced Safety**: Passive safety systems reduce meltdown risks. **Example: Rolls Royce SMRs use natural convection for cooling.**
8. **On-site Integration**: Co-location with AI clusters reduces **transmission losses**. **Example: Microsoft to use SMR power at former Three Mile Island site.**
9. **Hydrogen and Heat Co-production**: SMRs can generate **industrial heat and hydrogen**, powering AI + green industries.
10. **Water Neutral Design:** Newer SMRs require **less or recycled water** for cooling—key in arid zones.
11. **Economic Viability**: Projected costs in India to fall to ₹5/kWh post-**operationalization (as per NITI Aayog projections).**

What is the Significance of SMRs Across Different Sectors?

1. **Climate Change Mitigation**: SMRs offer zero-carbon power, aligning with the IPCC and Paris Climate goals.
2. **Industrial Decarbonization**: SMRs can power steel, cement, and chemicals, where renewables struggle to provide steady baseload.
3. **Water Desalination**: Countries like UAE plan to use SMRs for producing clean drinking water.
4. **Space Exploration**: NASA is exploring SMRs for space colonies (**Project Kilopower**).
5. **Remote Power Supply**: Arctic and island communities' benefit from off-grid nuclear microreactors (e.g., Alaska).
6. **Hydrogen Production**: High-temperature SMRs are capable of producing clean hydrogen for fuel and industry.
7. **Disaster Resilience**: SMRs can supply power to critical infrastructure during emergencies (e.g., hospitals, telecom).
8. **Defense Sector**: Military bases could use SMRs for secure, self-sufficient power (used in U.S. naval submarines).
9. **Educational and Research Use**: Countries like Canada and the UK are investing in university-based SMRs for nuclear R&D.

What are the Various Indian & International Initiatives?

1. **IndiaAI Mission**: ₹10,300 crore mission to develop public compute for AI — needs sustainable power.
2. **NITI Aayog – SMR Roadmap (2022):** Identified SMRs as central to India's low-carbon strategy.
3. **BARC & NPCIL Research:** India's Bhabha Atomic Research Centre is working on 100 MW Indian-designed SMRs.
4. **International Atomic Energy Agency (IAEA) Collaboration**: India participates in SMR Safety Working Group for harmonized SMR regulations.
5. **India-U.S. Civil Nuclear Pact:** SMRs are being explored under technology cooperation mechanisms of the 2008 pact.
6. **Paris AI Action Summit**: India pledged to make AI development energy efficient and sustainable.
7. **Quad Clean Energy Program**: India, U.S., Japan, and Australia collaborate on SMR research and deployment.

8. **Act East & Arctic Engagement**: SMR as part of Arctic infrastructure diplomacy (Norway, Russia partnerships).
9. **India-France Nuclear Cooperation**: Potential synergy in deploying SMRs with AI-aligned renewable hubs.
10. **Public-Private Pilot Projects**: Talks are ongoing between Indian tech firms and nuclear energy startups. **E.g., NuScale Power, TerraPower.**

What are the Challenges?

1. **Policy and Regulatory Hurdles**: India lacks a comprehensive SMR-specific framework. Current laws like the Atomic Energy Act, 1962 need updating.
2. **Public Perception and Nuclear Anxiety**: Memories of Chernobyl and Fukushima remain strong. Even Microsoft's project at Three Mile Island faced scrutiny.
3. **High Upfront Investment**: Estimated costs for SMR units are ₹3,000-5,000 crore, which deters private sector investment.
4. **Long Approval Timelines**: Nuclear projects in India face delays from environmental and land acquisition bottlenecks.
5. **Skilled Workforce Gap**: India needs more nuclear engineers and AI-power integration specialists.
6. **Waste Management**: SMR waste, though smaller in volume, still lacks a tested, long-term solution in India.
7. **Security Concerns**: Smaller nuclear units are at higher risk of sabotage or theft if not well-guarded.
8. **Renewable Coordination**: Balancing SMRs with solar/wind in a hybrid grid requires smart policy integration.
9. **Land and Water Use**: Data centres consume massive land and water for cooling and operation. **Example:** Meta's new facility in Mesa, Arizona, will consume **1.5 billion liters of water annually**.
10. **Effluents and Electronic Waste**: AI hardware leads to toxic waste during chip and circuit board manufacturing.

What can be the Way Forward?

1. **Robust Nuclear Policy Update**: Amend Atomic Energy Act to allow private investment in SMRs with safeguards **(NITI Aayog 2021 draft suggested this).**
2. **Green Energy Mandates for AI**: Like privacy disclosures, energy audits should be mandated for AI firms (model: EU's Digital Services Act).
3. **Public Awareness Campaigns**: Use platforms like Vigyan Samagam (India's science expo) to demystify nuclear tech.
4. **Fast-track Pilot SMRs**: Launch pilot in Chennai AI cluster under PPP mode (model: Tamil Nadu's nuclear corridor).
5. **SMR-Renewable Hybrid Projects**: Pair SMRs with solar farms in regions like Rajasthan and Ladakh (high solar irradiance + remote locations).
6. **Global R&D Collaborations**: Partner with U.S. DoE, Canadian Nuclear Labs for tech transfer and safety training.
7. **Green Data Centre Policy**: Align with Energy Conservation (Amendment) Act, 2022 to certify green digital infrastructure.
8. **AI for SMR Grid Optimization**: Use AI itself to manage energy efficiency in SMRs and hybrid microgrids (as piloted in Finland and Japan).

Conclusion:

As Sam Altman aptly tweeted, "Our GPUs are melting." But what's also at stake is our climate future. Artificial

Intelligence promises to redefine productivity and knowledge, but it risks becoming a **carbon juggernaut** if powered by fossil fuels. SMRs offer a viable pathway to support AI's explosive growth without compromising climate commitments. For India, the convergence of **clean tech**, **AI leadership**, and **nuclear innovation** under Atmanirbhar Bharat could define a new global standard for **sustainable digital power** by 2047.

Question for Practice

Q. Examine the potential role of Small Modular Nuclear Reactors (SMNRs) in addressing the energy demands of Arctic development and the expansion of AI and data infrastructure. Discuss the benefits and challenges of deploying SMNRs, and evaluate their overall viability as a sustainable and environmentally sound energy solution in the Indian context.

Read More: The Hindu
UPSC Syllabus GS3: S&T – Developments & their applications & effects in everyday life

India-UK Free Trade Agreement 2025: A Strategic Leap in Bilateral and Global Trade Architecture

India and the United Kingdom, the **world's fifth and sixth largest economies** respectively, signed the **long-awaited Free Trade Agreement (FTA) on May 6, 2025,** after nearly three years of negotiation. This deal, hailed by Prime Minister Narendra Modi as an **"ambitious and mutually beneficial" agreement**, marks a historic milestone in India's trade diplomacy post-Brexit.

The FTA was initiated during former UK PM Boris Johnson's visit in April 2022, aiming for a "Diwali" deadline that year. Although delayed, the deal now signifies a bipartisan consensus in the UK and a continuity of economic vision across political transitions. **The agreement is expected to deepen bilateral trade, which stood at £42.6 billion in 2024, and unlock new opportunities for job creation, investment, and innovation.**

How the Evolution of the India–UK FTA takes place over the years?

- **Initial Political Will:** The idea gained traction during British PM Boris Johnson's visit to India in April 2022, where the "Diwali 2022" deadline was set.
- **Post-Brexit Dynamics:** UK's exit from the EU in January 2020 necessitated new trade partners; India offered a dynamic, growing market.
- **Multi-Governmental Support:** The FTA saw consistent support across UK administrations — from Boris Johnson to Rishi Sunak to Keir Starmer — indicating rare bipartisan continuity.
- **India's Global Engagement:** This deal follows India's FTAs with UAE, Australia, and Mauritius, reflecting a broader effort to become a "vibrant trade and commerce hub."
- **China-Plus-One Strategy:** Global firms and economies have increasingly diversified away from China, boosting India's strategic attractiveness.

What Has Been Agreed? – 7 Key Dimensions

1. **Tariff Reductions on Key Goods**: India agreed to halve tariffs on Scotch whisky and gin from 150% to 75%, and reduce them to 40% by the tenth year. Tariffs on British automobiles reduced from over 100% to 10% under a quota system.
2. **Broader Goods Access**: Lower tariffs for cosmetics, aerospace parts, medical devices, lamb, salmon, chocolate, soft drinks, and electrical machinery.
3. **Liberalisation of Services**: Increased mobility quotas: Around 100 new annual visas for Indian professionals in sectors like IT, healthcare, and engineering. Provision for mutual recognition of professional qualifications.
4. **Customs Cooperation and Regulatory Alignment**: Enhanced procedures to streamline customs and reduce non-tariff barriers, fostering smoother market access.
5. **Carbon Border Adjustments**: Delicate negotiations on the UK's carbon tax policies affecting Indian metal exports, with provisions to consider developing countries' concerns. An understanding on carbon taxation was reached to avoid penalizing Indian metal exports under the UK's carbon levy plan.
6. **Investment Facilitation and MSME Support**: Special provisions for promoting MSME engagement through reduced compliance costs and enhanced market access. Encouragement for cross-border investment, particularly in green and digital sectors.
7. **IPR and Digital Trade**: Provisions to safeguard intellectual property and enable data flows, essential for India's IT and pharmaceutical sectors.

What It Means for Both Nations?

1. **Post-Brexit Pivot**: The UK's largest and most economically significant deal since Brexit (2020), reflecting its shift towards Indo-Pacific markets.
2. **Geopolitical Signaling**: A subtle response to **"America First" tariff policies** and trade stagnation with China, enhancing India's role in global trade diversification.
3. **Boost to Domestic Industries**: Indian sectors such as pharmaceuticals, textiles, IT services, and auto components stand to gain from improved UK access.
4. **UK Economic Relief**: Amid its ongoing cost-of-living crisis, the UK benefits from more affordable imports and enhanced market competitiveness.
5. **Soft Power and Diaspora Diplomacy**: Enhanced mobility and recognition for Indian professionals improves soft power and diaspora engagement.
6. **Model for Future FTAs**: This FTA may serve as a template in India's negotiations with the US and the EU, especially in terms of services and regulatory standards.
7. **Global Trade Stability**: Reassures global investors and partners amid rising protectionism and volatile multilateralism.

What are the other Indian Initiatives, Collaborations & Global Trade Programmes?

1. **India-UK Joint Economic and Trade Committee (JETCO)**: Mechanism for periodic FTA review and coordination.
2. **Production Linked Incentive (PLI) Schemes** – To boost domestic manufacturing and exports.
3. **One District One Product (ODOP)** – Facilitating local products' access to global markets.
4. **India-UAE CEPA (2022)** – India's first major trade deal post-2010, providing duty-free access to 90% of Indian exports.
5. **India-Australia ECTA (2022)** – Focus on education, pharma, and agriculture exports.
6. **Digital India and Startup India Missions** – Empowering sectors that gain from FTAs.
7. **Supply Chain Resilience Initiative (SCRI)** – Collaboration with Japan and Australia to reduce dependence on China.

8. **India's G20 Presidency 2023** – Advocated "reformed multilateralism" and "inclusive globalization".

What are the Challenges in the India-UK FTA?

1. **Asymmetric Gains**: GTRI Report: Many Indian exports already enjoy zero/low tariffs in the UK; actual trade boost may be modest.
2. **Carbon Taxation Conflicts**: UK's carbon border tax may hit Indian metals, similar concerns exist in India-EU FTA.
3. **Immigration Politics in UK**: Brexit legacy restricts liberal migration policies; UK conceded only ~100 new visas/year. Visa quotas for Indian professionals were far fewer than originally demanded.
4. **Regulatory Compliance Costs**: Indian MSMEs may struggle to meet the UK's high technical and environmental standards. Compliance costs on Indian exporters increase due to lack of **mutual recognition agreements (MRAs).**
5. **Domestic Industry Resistance**: Concerns from India's auto and dairy sectors on tariff relaxations.
6. **Non-Tariff Barriers**: Stringent UK and EU regulations on food safety, environment, and IP can restrict Indian exports. Persistent issues like labelling requirements, phytosanitary measures, and intellectual property norms.
7. **Limited Stakeholder Consultations**: Criticism over lack of transparency and public scrutiny in FTA negotiations.
8. **Data Localization and Privacy Concerns**: UK and EU emphasize strong data protection frameworks; conflicts with India's draft Digital Personal Data Protection Act.

What can be the Way Forward?

1. **FTA as a Floor, Not Ceiling**: Use the India-UK FTA as a springboard for deeper integration in defence, education, climate cooperation. **NITI Aayog or an empowered committee** must monitor FTA implementation and sectoral impact.
2. **Diversify Trade Portfolio**: Focus on India-EU and India-US FTAs with renewed vigour. **MRA and SPS dialogue** must be expanded for mutual recognition in pharma, electronics, and agro-products.
3. **Sectoral Skill Development**: Equip Indian professionals with global competencies via initiatives like Skill India. Negotiate sector-specific visa quotas (e.g., digital nurses, fintech workers) in future updates.
4. **Streamline Compliance Support**: Provide technical and legal aid to MSMEs for meeting UK/EU standards.
5. **Green Trade Diplomacy**: Develop a strategy to navigate EU/UK climate-linked trade norms like CBAM (Carbon Border Adjustment Mechanism).
6. **Data and Digital Readiness**: Strengthen frameworks like the Digital Personal Data Protection Act 2023 to align with global standards.
7. **Public Engagement & Transparency**: Institutionalize stakeholder consultations for future trade negotiations. Improve India's certification and quality systems (BIS, FSSAI) to meet global benchmarks.
8. **Strengthen Dispute Resolution Mechanisms**: Build capacity in international trade arbitration and legal recourse. Include **anti-dumping, dispute resolution,** and review clauses to protect sensitive domestic sectors.

Conclusion:

The India-UK FTA 2025 is not just a bilateral trade pact — it is a strategic leap in India's vision of "Atmanirbhar Bharat" intertwined with globalization. It exemplifies India's shift from protectionism to proactive engagement, with the FTA serving as "the floor, not the ceiling." As India eyes deals with the EU and the US, the learnings from this pact will be instrumental in crafting a globally competitive, inclusive, and resilient trade regime.

Question for Practice

Q. Assess the potential benefits and key features of the UK-India Free Trade Agreement (FTA) in light of the claim that it prioritizes tariff elimination on many goods and service sector liberalization for mutual economic gain. Briefly mention important goods likely impacted by tariff changes and discuss the FTA's broader significance for UK-India economic and strategic ties.

Read More: The Indian Express
UPSC Syllabus GS-2: Bilateral relations

Human Development Report 2025 & India's Progress

Amid a disturbing rate of deceleration in global development and a growing divide between the rich and the poor, India has inched up on the Human Development Index.
In the backdrop of global developmental slowdown, India has marked a notable progress in the **2025 Human Development Report (HDR)** titled **"A Matter of Choice: People and Possibilities in the Age of AI",** published by the **United Nations Development Programme (UNDP)**. India climbed four ranks to **130 out of 193 countries**, with its **Human Development Index (HDI) value rising from 0.676 (2022) to 0.685 (2023)**, reflecting resilience in the aftermath of the pandemic. However, the progress is tempered by significant challenges such as **rising inequality**, **gender disparities**, and the **risk of technological divides in the AI era**.

What is the Human Development Index (HDI) and Human Development Report (HDR)?

The **HDI**, introduced in the **UNDP's 1990 Human Development Report**, is a composite index measuring average achievement in three key dimensions:

1. **Health** – measured by life expectancy at birth.
2. **Education** – measured by mean years of schooling and expected years of schooling.
3. **Standard of Living** – measured by Gross National Income (GNI) per capita (PPP $).

The HDI serves as a **multi-dimensional alternative to GDP**, emphasizing "human well-being" over mere economic output. The **HDR** is an annual flagship publication by **UNDP** that evaluates progress on HDI and related indices like the **Gender Inequality Index (GII) and Multidimensional Poverty Index (MPI).** It offers an analytical snapshot of development progress and inequality, and in 2025, focuses on the transformative power and risks of Artificial Intelligence (AI) in shaping human progress.

Changes in HDI values & indicators between 2022-23:

Key Data (Human Development Index)	2022	2023
Rank	133	130
HDI value	0.676	0.685
Life Expectancy (years)	71.70	72.00
Expected Years of Schooling (years)	12.96	12.95
Mean Years of Schooling (years)	6.57	6.88
Gross National Income Per Capita (S 2021 PPP)	8475.68	9046.76

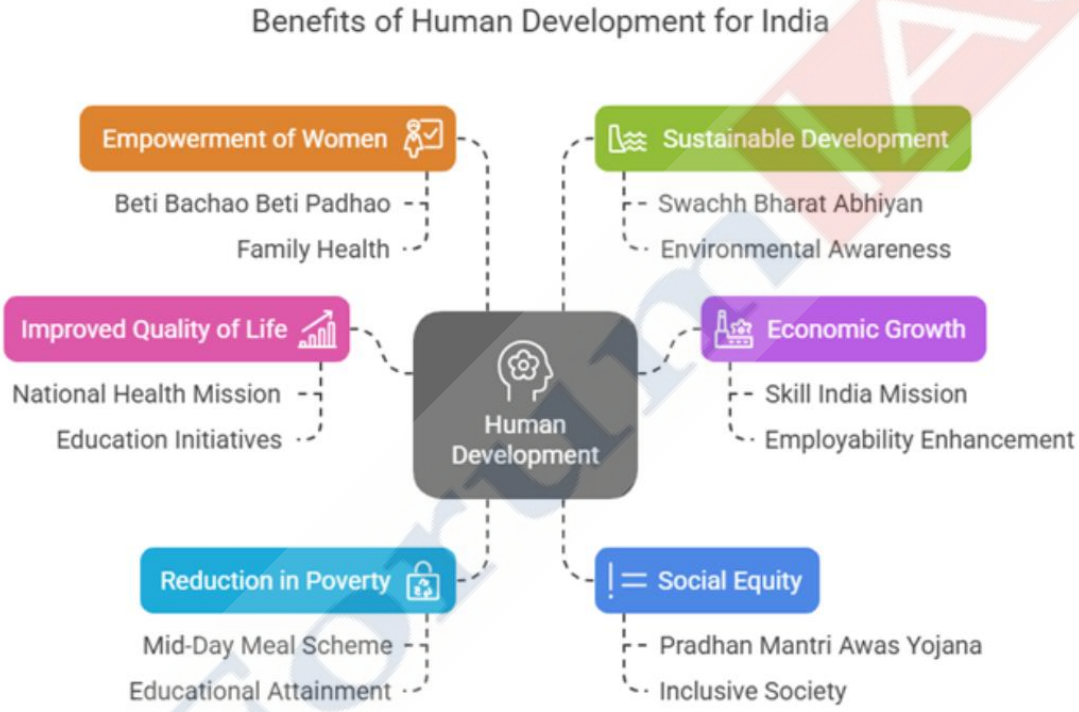
What are the Key Findings of the 2025 HDR?

1. **India's Rank and HDI Value Improves:** India's HDI rank improved from **133 (2022)** to **130 (2023)** out of 193 countries. HDI value increased from **0.676 to 0.685**, nearing the **High Human Development threshold (0.700)**.
2. **Life Expectancy at Record High:** Life expectancy rose to **72 years** in 2023, up from **67.7 years in 2022**. This is India's highest life expectancy since HDI began in 1990 (then: 58.6 years).
3. **Education Progress: Expected years of schooling**: increased to **13 years** (from 12.6). **Mean years of schooling**: rose to **6.9 years** (from 6.57). Reflects impact of **RTE Act**, **NEP 2020**, and **Samagra Shiksha Abhiyan**.
4. **Income Growth: GNI per capita** rose to **$9,046 (PPP, 2021)** from $6,951. Since 1990, income has increased more than fourfold ($2,167 → $9,046).
5. **Multidimensional Poverty Reduction: 135 million Indians escaped multidimensional poverty** between **2015-16 and 2019-21** (NITI Aayog MPI data).
6. **Gender Inequality:** Gender Development Index (GDI): **0.874** (female HDI = 0.631, male = 0.722). India ranks **102nd on Gender Inequality Index (GII)** with a score of **0.403**.
7. **AI and Development:** India retains **20% of AI researchers** (up from nearly 0% in 2019). Highest **self-reported AI skill prevalence** globally.
8. **Inequality-Adjusted HDI (IHDI):** India's HDI falls to **0.475** when adjusted for inequality – a **30.7% drop**, one of the **highest regional losses**.

What Does the 2025 HDR Highlighting About India's Growth and Development?

1. **Health Improvements:** Initiatives like **Ayushman Bharat**, **NRHM**, **JSY**, and **POSHAN Abhiyaan** have expanded access and outcomes.
2. **Social Sector Investments:** Health missions like **Ayushman Bharat**, **Poshan Abhiyaan**, and **Janani Suraksha Yojana** improved health outcomes.
3. **Educational Access**: RTE Act and NEP 2020 have improved school access; average expected schooling up to 13 years.
4. **Economic Resilience**: GNI per capita quadrupled since 1990; economic recovery post-COVID aided by schemes like Jan Dhan Yojana and MGNREGA.
5. **Poverty Reduction**: "135 million exited multidimensional poverty" — UNDP.

6. **AI as a Growth Multiplier:** AI tools being used for **crop advisories**, **insurance access**, and **local-language governance services**.
7. **Digital Inclusion**: India leads in self-reported AI skills; "AI used in farmer insurance and advisory services in regional languages."
8. **Youth-Centric Development:** With the **average age of India at 28**, harnessing AI and education can unlock a demographic dividend.
9. **Digital Infrastructure and Inclusion:** National plans for **AI compute facilities** and **digital public goods** are enabling digital equity.
10. **Human Capital Upgradation:** Skill development in emerging technologies is being prioritized across states like **Tamil Nadu and Telangana** (in collaboration with UNDP).



What is the Significance of HDI for India?

1. **Benchmarking Progress:** HDI provides a multidimensional lens beyond GDP – essential for India's **$5 trillion economy** vision.
2. **Tracking Progress Towards SDGs**: HDI aligns with Sustainable Development Goals. HDI overlaps with **SDGs (Goal 1, 3, 4, 5, 10)** – pivotal for achieving **Agenda 2030**.
3. **Policy Targeting:** Use of Multidimensional Poverty Index (MPI) aligns with HDI insights for focused anti-poverty interventions. It identifies **sectoral inequalities** (e.g., education vs. income) to design **evidence-based policies**.
4. **Poverty Reduction Monitoring:** Tracks India's **multidimensional poverty** dynamics, aiding **MPI-linked schemes**.
5. **Gender Equity Agenda:** Supports tracking gendered development outcomes under **Women-Led Development**, a **G20 India Presidency theme**.

6. **Human Capital Strategy:** Facilitates tracking of **labour force quality**, education, health – key to **productivity and innovation**.
7. **Federal-State Development Competition:** Promotes **state-wise HDI ranking** (NITI Aayog's Human Development Dashboard), encouraging cooperative federalism.
8. **International Image Building:** HDI performance impacts India's **global investment climate**, **creditworthiness**, and **soft power**.
9. **AI as a Development Lever:** Highlights the critical role of **AI in achieving inclusive growth**, a new frontier for HDI discourse. As AI reshapes sectors, HDI-adjusted indicators ensure technology is harnessed inclusively.
10. **Inequality Correction Framework:** Aids in policy discussions around **wealth redistribution, taxation reforms**, and **social safety nets**.

What are the Major Indian Initiatives to Achieve the Human Development?

1. **Ayushman Bharat & Poshan Abhiyaan:** Key in improving life expectancy and health outcomes.
2. **NEP 2020 & RTE Act:** Focused on universal and inclusive education.
3. **MGNREGA & Jan Dhan Yojana:** Enabled livelihood security and financial access for the poor. Joint efforts on AI deployment for governance and development, e.g., AI for skill development in Tamil Nadu and Telangana.
4. **AI Collaborations:** UNDP is working with Indian states on **inclusive AI skill programmes**.
5. **India-AI Mission:** A forthcoming initiative to democratize AI via shared compute infrastructure.
6. **Digital Public Infrastructure (DPI):** Initiatives like **Aadhaar, UPI, DigiLocker** are being scaled globally.
7. **SDG India Index by NITI Aayog:** Tracks progress across HDI-linked SDGs, promoting **state-level accountability**.
8. **AI for Good Initiatives**: India's proposed National Compute Facility to democratize AI research; aligned with Global Partnership on Artificial Intelligence (GPAI).

What are the Challenges to Human Development in India?

1. **High Inequality Impact:** HDI loss of **30.7% due to inequality** is among the highest in South Asia.
2. **Gender Disparity Remains a Concern:** Despite rising **FLFPR to 41.7% (2023-24, Economic Survey),** women score lower on HDI components; no timeline for women's legislative reservation implementation. India ranks 102nd on GII; political reservation for women remains **unimplemented**.
3. **Education Quality Concerns: ASER reports** highlight poor learning outcomes despite high enrolments.
4. **Jobless Growth & Informality:** Rising GDP not translating into formal job creation – **90% workforce in informal sector** (PLFS).
5. **Urban-Rural Divide:** Basic services like health, education still lag in rural areas.
6. **Digital Divide:** Unequal access to digital tools may worsen AI-driven development inequality.
7. **Health Infrastructure Gaps:** Doctor-population ratio still below WHO norms; stark inter-state disparities.
8. **Stagnant HDI Progress Pace:** Global and Indian HDI progress **slowest since 1990**, risking SDG 2030 delays.
9. **Global Comparison**: India lags BRICS peers—Brazil (89), China (75), Russia (59)—suggesting the need for sustained human capital investment.

What can be the Way Forward?

1. **Implement Women's Reservation Act Promptly:** A game-changer for political inclusion.
2. **Universalize Quality Education:** Implement NEP 2020 goals with a focus on **learning outcomes**, not just enrolment.
3. **Expand Social Security Net:** Formalize informal jobs through **ESIC/EPFO access and gig worker welfare**.
4. **Invest in AI for Public Good:** Scale up AI for governance, agriculture, and health with open-source, multilingual tools.
5. **Bridge the Digital Divide:** Expand **PM-WANI**, **BharatNet** to enhance digital infrastructure in remote areas.
6. **State-Level HDI Targets:** Encourage state competitiveness on HDI parameters via **rankings, grants, and incentives**.
7. **Boost Fiscal Allocation for Social Sector:** Increase public spending on **health (currently ~2.1% of GDP)** and **education (~2.9%)**, below global averages.
8. **Strengthen Data Systems:** Robust district-level HDI tracking is needed using **real-time dashboards, AI-powered analytics**.

Conclusion:

India's performance in the 2025 HDR reflects both **commendable progress and enduring structural challenges**. As Achim Steiner of UNDP aptly noted, **"AI is no panacea, but the choices we make can reignite human development."** For India@2047, human development must be central to its growth story—leveraging technology, deepening inclusion, and investing in its people. As global HDI progress decelerates, India must stay the course with "purpose-driven policies," "inclusive governance," and "AI for good" strategies. It is not just about **moving up the HDI ranks**, but ensuring that development is **sustainable, equitable, and empowering for all**.

Read More: The Hindu
UPSC Syllabus GS 2: Issues related to development & management of social sectors

India's Air Defence Systems: Shielding the Skies and Enabling Strategic Superiority

In modern warfare, **air superiority** is critical for operational dominance. The recent **Indian-Pakistani aerial exchanges** along the western border underscore the importance of a robust **Air Defence (AD) system**. India's thwarting of Pakistani attacks and its neutralization of enemy AD systems—especially around **Lahore**—illustrate how advanced, multi-layered air defence capabilities are key to national security. These events spotlight the **strategic relevance** of air defence systems as **both defensive and offensive tools in securing airspace and asserting military superiority.** Modern air combat is no longer just about **fighter jets; it is an integrated ecosystem** where ***detection, tracking, and interception*** **work in unison.** Effective air defence systems are indispensable in contemporary warfare, offering a **credible deterrent against enemy aircraft, missiles, and drones, and forming the backbone of national security architecture.**

What are Air Defence Systems?

Air defence systems are **multi-layered and multi-domain military framework** designed to **detect, track, and intercept aerial threats**, such as enemy aircraft, UAV's/drones, and ballistic missiles. Their goal is to **deny adversaries access to friendly airspace** while enabling **safe operations for own forces**. They combine **radar, control centres, interceptor aircraft, surface-to-air missiles (SAMs), anti-aircraft artillery (AAA), and electronic warfare (EW)** systems. These systems rely on the "**C3 model**":

- **Command** – decision-making structures.
- **Control** – operations and resource allocation.
- **Communication** – coordination between subsystems.

How Air Defence Systems Work: The Three-Tier Operational Framework?

1. **Detection: The Radar systems** emit electromagnetic waves to identify objects. Capable of identifying **type, location, speed**, and **altitude** of threats. **Satellites** assist in detecting high-altitude threats like ICBMs. **Example: India's Rohini and Arudhra radars, DRDO-developed, are vital components.**
2. **Tracking:** Tracks multiple threats in real time using **radar, IR sensors, and laser rangefinders**. It can easily differentiate between hostile, friendly, and civilian aircraft. Tracking accuracy is crucial to avoid false positives and collateral damage. It enables prioritization of targets in **multi-threat scenarios**, while avoiding friendly fire.
3. **Interception:** Neutralizes the threat using **fighter aircraft, surface-to-air missiles (SAMs), anti-aircraft artillery (AAA), or electronic warfare (EW)**. Requires **split-second decision-making** and seamless C3 integration. Choice of interception method depends on, threat range, altitude, speed and trajectory. Requires seamless coordination across sensors and shooters through C3 systems.

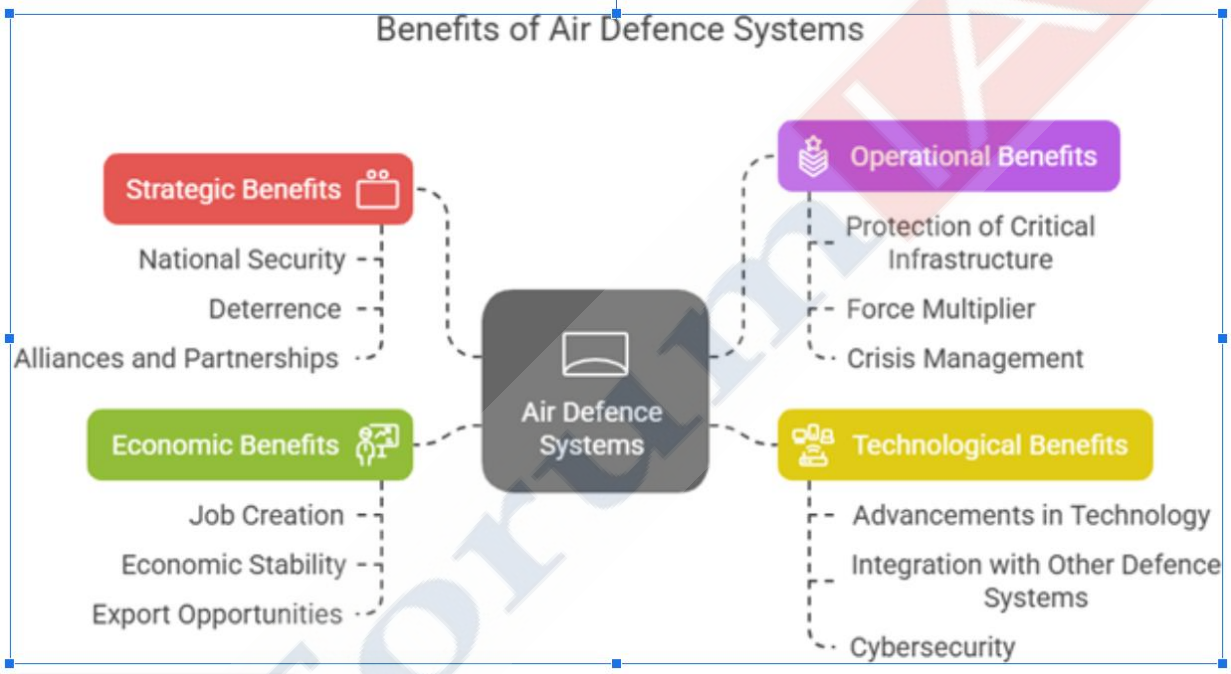
What are the Weapons Used in Air Defence Systems?

1. **Interceptor Fighter Aircraft:** Rapid-response jets equipped with **air-to-air missiles** and EW systems. India employs **MiG-21 Bison, Rafale, Su-30MKI, MiG-29**, and **Tejas Mk-1** in interception roles. Interceptors are ideal for engaging **high-speed or evasive targets**.
2. **Surface-to-Air Missiles (SAMs):** The **backbone of air defence** due to range, accuracy, and lower risk. India operates a mix of:
    - **Long-range SAMs** (e.g., S-400): Counter aircraft/missiles hundreds of km away.
    - **Medium-range** (e.g., Akash, Barak): Mobile, launch-on-move.
    - **Short-range MANPADS**: Hand-held, used against helicopters, drones.
3. **Anti-Aircraft Artillery (AAA):** Legacy systems, still used in **low-altitude or last-ditch defence**. Fire explosive shells at high rates (~1,000 rounds/min). Often integrated with **automated fire-control systems**. India uses **L-70 and ZU-23-2** systems. Effective against **slow or low-flying threats** like UAVs.
4. **Electronic Warfare (EW):** Non-kinetic means to **jam, deceive, or disrupt** enemy targeting. India employs EW from both **ground stations** and **airborne platforms** (e.g., **Netra AEW&CS**). Critical in blinding enemy radar and preventing missile guidance.

What is India's Multi-Layered Air Defence Structure?

Layer	Key Systems	Role
Long-range	**S-400 Triumf**	Neutralizes enemy aircraft/missiles up to 400 km
Medium-range	**Akash, Barak 8**	Protects strategic assets, mobile field units

Short-range	**MANPADS, SPYDER**	Protects forward bases, vulnerable areas
EW Systems	**DRDO's Samyukta, Himshakti**	Jamming and deception
Interceptors	**Rafale, Su-30MKI, MiG-29, Tejas**	Rapid threat response
C3I	**Integrated Air Command and Control System (IACCS)**	Networked radar, sensors, communication



What is the Significance for India's National Security and Strategic Posture?

1. **Suppression of Enemy Air Defenses (SEAD) and Enabling Air Superiority:** India's recent strike on Pakistani air defence systems near Lahore highlights the use of SEAD operations to proactively neutralize **enemy radars and surface-to-air missile (SAM) sites**. By employing **electronic warfare (EW), precision-guided missiles, and drone swarms, SEAD ensures** India can dominate contested airspace with minimal attrition. This **offensive capability enables safe execution** of deeper aerial operations, such as reconnaissance and **tactical air support, especially in high-threat environments.**
2. **Denial of Enemy Air Dominance:** India's air defence system acts as a protective barrier that deters and intercepts **enemy aircraft and missiles**, thereby denying adversaries any chance of achieving air superiority. During the latest **Indo-Pak tensions, India effectively prevented Pakistani fighter jets** from inflicting damage on critical infrastructure. By ensuring control over its airspace, India can protect its military operations and deter further escalations, reinforcing strategic stability.
3. **Surveillance, Deterrence, and Pre-emption:** Effective air defence enables India to control and monitor its airspace, **preventing hostile aerial reconnaissance, drone incursions, and missile**

attacks. In crisis situations like the **2020 LAC standoff with China, enhanced radar coverage and quick-deploy AD systems** helped enforce deterrence. Airspace control strengthens national security by ensuring readiness and responsiveness, and by complicating adversarial planning through constant surveillance.

4. **Strategic Autonomy and Deterrence Posture:** Air defence systems are essential to protecting strategic assets such as **nuclear facilities, command centres, and major cities**, thereby strengthening India's deterrence posture. The deployment of **S-400 systems to shield high-value targets,** such as Delhi and key military installations, raises the cost of any enemy attack. This protection underpins India's second-strike capability, enhances its **No First Use (NFU) doctrine, and upholds strategic autonomy** in decision-making during conflicts.
5. **War Preparedness Against a Two-Front Threat:** Given India's unique vulnerability to a two-front war involving China and Pakistan, a robust air defence infrastructure is vital to national preparedness. Systems like the **Integrated Air Command and Control System (IACCS), Akash, and QRSAM e**nsure India can simultaneously defend multiple theatres. The ability to quickly respond to aerial threats across frontlines **in Ladakh, the Northeast, and the Western border** supports integrated warfighting strategies and joint force operations.
6. **Civilian and Infrastructure Protection During Escalation:** Air defence systems play a crucial humanitarian and strategic role in protecting civilian populations, critical infrastructure, and urban centres during conflict. This is particularly significant **under India's NFU nuclear doctrine, where survival of cities and command centres is essential to second-strike credibility**. Deployments near **Mumbai, Delhi, and other metros—**using systems like **Akash, MANPADS, and EW suites—** ensure that population centres are shielded from enemy air raids and missile attacks.

What are the Challenges in India's Air Defence Framework?

1. **Obsolescence of Legacy Platforms:** India continues to rely on outdated systems such as **MiG-21 interceptors** and older radar technologies. Traditional radar systems also struggle to detect **UAV swarms** or low-observable threats, creating serious vulnerabilities in India's airspace defence. Example, MiG-21s, inducted in the 1960s, have had a high accident rate and are ill-equipped to respond to modern, high-speed threats like stealth drones or cruise missiles.
2. **High Resource and Logistical Requirements:** Establishing a **layered, all-weather, full-spectrum air defence** is capital-intensive and operationally complex. Balancing between high-end deterrents and cost-effective, mobile, indigenous systems is crucial but unresolved. **Example**: The procurement of **5 S-400 Triumf units from Russia cost approx. ₹35,000 crore**, highlighting the financial burden. The operational deployment and maintenance over vast borders further stretch logistical capacity.
3. **Coordination and Command Gaps:** India's three services operate independent air defence systems, resulting in **siloed operations and delayed response**. The push for **Integrated Theatre Commands** and a **Joint Air Defence Command** is ongoing but yet to be fully implemented. **Example**: The lack of real-time coordination between the **Army and Air Force** can lead to response delays in scenarios like drone intrusions.
4. **Vulnerability to Electronic and Cyber Warfare:** Increasing reliance on digital communication makes systems vulnerable to **cyberattacks, GPS jamming, and radar spoofing**. Hardened cyber-defence protocols and quantum-secure communication channels are required for future readiness. **Example**: **Modern stealth drones and cyber tools** can bypass conventional radar by using low-signature technologies or disabling systems via malware.
5. **Technological Lag in Emerging Threats:** India lags in countering **hypersonic missiles, loitering munitions, and ultra-short-range attacks**. India's indigenous R&D must accelerate in niche domains like directed-energy weapons and AI-based real-time threat analysis. **Example**: **China has tested**

hypersonic glide vehicles and AI-integrated radar, giving it a technological edge in early warning and interception.

6. **Inadequate Low-Altitude and UAV Coverage:** Many radar systems are not optimized for **low-flying objects**, particularly mini and micro drones. Incorporation of **counter-UAV systems, passive radars, and acoustic sensors** needs prioritization. **Example**: The **2021 drone attack on Jammu Air Force Station** went undetected, demonstrating major operational gaps in **low-altitude threat detection**.
7. **Delays in Indigenous Capability Development:** India's defence R&D ecosystem faces delays and reliability issues in key indigenous projects. This prolongs dependence on costly imports and hampers long-term self-reliance under **Atmanirbhar Bharat**. **Example**: Systems like **Akash-NG, XRSAM, and QRSAM** are still under testing and have not yet achieved full operational capability.
8. **Terrain and Border Deployment Challenges**: India's varied terrain — from high-altitude Ladakh to coastal zones — complicates **uniform air defence deployment**. Terrain-agnostic systems like **balloon-mounted radars** or **satellite-aided early warning** must be integrated. **Example**: In **mountainous terrain**, radar coverage is patchy due to line-of-sight limitations, and missile performance is affected by altitude and temperature.

What can be the Way Forward?

1. **Accelerate Indigenous Development:** Support DRDO and private firms to develop advanced radars and SAMs like Akash-NG, QRSAM, and XRSAM.
   Example: *India's **Akash missile system**, now being exported to Vietnam and the Philippines, shows potential for self-reliance. South Korea's **Cheongung-II** medium-range SAM is an indigenous success adapted from global tech.*
2. **Integrate AI and Machine Learning:** Adopt AI/ML for radar recognition, threat prioritization, and electronic warfare automation.
   Example: DRDO's **Air Defence Fire Control Radar (ADFCR)** already integrates basic AI features. The **US NORAD** and **NATO's Integrated Air & Missile Defence (IAMD)** increasingly use AI for target classification and coordination.
3. **Develop Directed Energy Weapons (DEWs):** Invest in laser and microwave-based weapons to counter drones and low-flying projectiles.
   Example: *DRDO's **ADITYA laser system** is under development for UAV defence. The **US Army's HEL-MD** and Israel's **Iron Beam** use laser tech for neutralizing aerial threats.*
4. **Strengthen SEAD Capabilities:** Enhance Suppression of Enemy Air Defenses via stealth UAVs, anti-radiation missiles, and cruise strikes.
   Example: *India's **Rudram-1** anti-radiation missile is tailored for SEAD roles. The **US AGM-88 HARM** missile was widely used in Iraq and Yugoslavia to suppress hostile radars.*
5. **Enhance IACCS (Integrated Air Command & Control System):** Ensure real-time tri-service integration for dynamic and rapid air threat responses.
   Example: *India's **IACCS** network is operational and should be expanded to cover civilian radar inputs. **NATO's ACCS** enables member nations to operate air defenses cohesively across borders.*
6. **Deploy Layered Urban Shields:** Create multi-tier defence grids over strategic cities using S-400, Akash-NG, and VSHORADS.
   ***Example: Delhi and Mumbai** are to be protected under the S-400 coverage deployed in the western sector. Israel's **Iron Dome (short-range) + David's Sling (mid-range) + Arrow (long-range)** model offers a benchmark in layered protection.*
7. **Foster International Defence Cooperation:** Deepen collaborations with Israel, US, and Quad countries for tech transfer and joint development.

Example: India-Israel Barak-8 *missile system is a successful co-development.* ***AUKUS and QUAD*** *platforms share AI-based surveillance and missile defence advancements.*

Conclusion:

India's successful neutralization of Pakistani air attacks underscores the vital role of air defence in 21st-century warfare. **Detection, tracking, and interception capabilities**—integrated through superior C3 systems—form the bedrock of India's strategic deterrence. As **threats evolve into AI-empowered, drone-based warfare**, India's air defence posture must remain dynamic, indigenous, and tech-driven to ensure **security, sovereignty, and strategic superiority**.

Read More: The Hindu
UPSC Syllabus GS 3: Internal Security

It's time India frame a National Security Doctrine

In an era marked by multidimensional threats ranging from state-sponsored terrorism to cyber warfare, and from border incursions to grey-zone tactics, the need for a coherent and codified **National Security Doctrine (NSD)** has never been more urgent for India. Despite being a nuclear power and having one of the world's largest militaries, India lacks a formal national security doctrine. As **K. Subrahmanyam**, the architect of India's nuclear doctrine, had once asserted**, "No nation can pursue effective security policy without doctrinal clarity."**

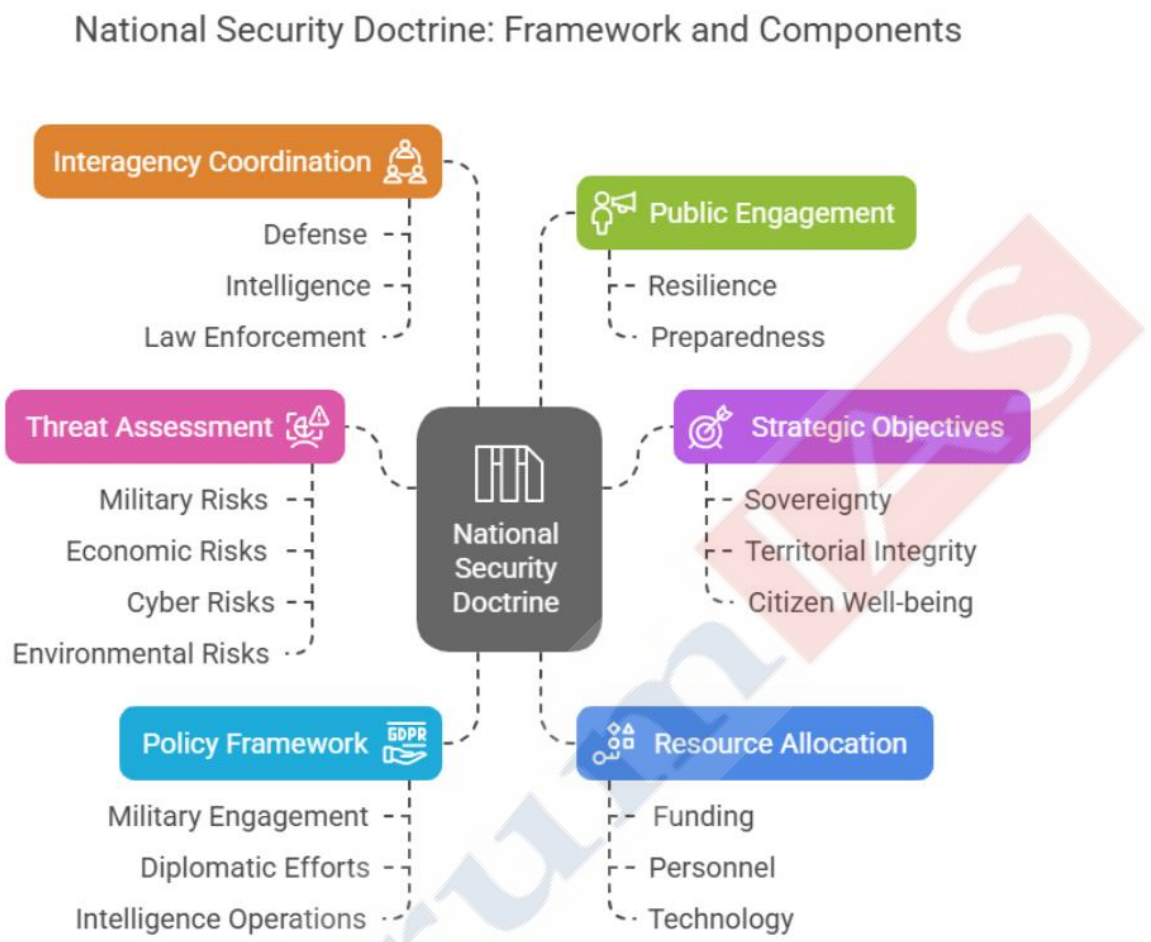
India, situated between two nuclear-armed adversaries—China and Pakistan—faces continuous threats. The **Kargil War (1999)**, **Uri Attack (2016)**, **Pulwama-Balakot Crisis (2019)**, and the **Galwan Valley clash (2020)** highlight the recurring security threats. While India's response has been measured and increasingly assertive, the absence of a formally articulated doctrine limits strategic foresight and long-term planning.

What is a National Security Doctrine?

A National Security Doctrine is a comprehensive framework of **guiding principles**, strategic beliefs, and operational postures that shape a nation's military, diplomatic, and internal security responses. It goes beyond reactive tactics, providing **predictability, strategic clarity**, and **inter-agency coordination**. It serves as:

- **A blueprint for defense and foreign policy.**
- **A guide to modern warfare readiness.**
- **A communication tool for deterrence.**
- **A confidence-building measure for both citizens and allies.**

India's only formal doctrinal articulation is the **2003 Nuclear Doctrine**, which emphasizes **"credible minimum deterrence"** and a **"No First Use"** policy. However, in the absence of a broader doctrine, India's responses to terrorism, cyber threats, or asymmetric warfare lack cohesive strategy.



Why Does India Require a Formal National Security Doctrine?

1. **Complex Geopolitical Neighborhood**: India is flanked by two nuclear-armed adversaries—China and Pakistan—with a history of war and incursions. As **per Kautilya's *Mandala Theory*, "the immediate neighbor will be your enemy." Doklam (2017) and Galwan (2020)** underscore the volatility of India's borders.
2. **Reactive vs. Proactive Posture:** Most Indian responses have been post-incident. A doctrine would help in shifting from **reactionary to preventive security**, as in the case of China's preemptive planning under the doctrine of "Active Defence".
3. **Inadequate Civil-Military Integration:** India lacks a unified command structure. While **Integrated Theatre Commands** are being developed, a doctrine would guide **civil-military synergy**, as seen in the U.S. with its **National Security Strategy (NSS)**.
4. **Institutional Coordination**: Multiple agencies **(defense, home, intelligence, MEA)** operate in silos. A doctrine provides the **Command, Control and Communication (C3) structure** vital for **"inter-agency coordination".**
5. **Ambiguity in Nuclear Posture:** Although the 2003 nuclear doctrine exists, ambiguity persists. Manohar Parrikar's 2016 remarks questioning **'No First Use'** led to controversy. A revised doctrine would clarify India's nuclear red lines and strengthen deterrence.

6. **Asymmetry in Strategic Signaling:** China's actions are informed by a **Sun Tzu-inspired doctrine**—"**subdue the enemy without fighting**." India lacks equivalent psychological and strategic messaging, which hampers geopolitical signaling.
7. **Terrorism and Unconventional Warfare:** Despite Balakot and surgical strikes, cross-border terror persists. India needs a doctrine that allows **proportionate and preemptive retaliation**, in line with the concept of **"massive but non-escalatory response."**
8. **Lack of Comprehensive Internal Security Vision:** Issues like Left-wing extremism, communal violence, and insurgencies are addressed ad hoc. A doctrine could integrate these concerns under **comprehensive internal security architecture**.
9. **Alignment of Foreign and Defence Policy:** Diplomacy and defence often operate in silos. A doctrine could ensure **foreign policy synergy**, akin to the **Nixon-Kissinger model**, where diplomacy was guided by a realist security doctrine.
10. **Persistent Multidimensional Threats:** India faces hybrid threats from China and Pakistan, including **cross-border terrorism**, **cyber-attacks**, **information warfare**, and **territorial aggression** (e.g., China's salami-slicing tactics in Ladakh). A doctrine provides **pre-emptive clarity.**

What is the Significance and Potential Impact of a National Security Doctrine?

1. **Strategic Clarity:** A doctrine institutionalizes India's long-term national security vision, enabling **structured threat assessment and resource allocation**.
2. **Inter-agency Coordination:** By delineating responsibilities, it fosters synergy between the **armed forces, Air Force, Strategic Forces Command, and space/cyber domains intelligence, home ministry, MEA, and scientific establishments** like DRDO.
3. **Strengthens Deterrence and Diplomatic Leverage**: It sends a **clear message** to adversaries regarding red lines and probable response thresholds—enhancing deterrence, especially in nuclear posturing. Helps create red lines. **For example, the U.S. "Pivot to Asia" doctrine gave coherence to its Indo-Pacific strategy, influencing allies like Japan and Australia.**
4. **Boosts Defence Reforms:** It helps prioritize reforms in line with strategic objectives—e.g., pushing **theatre commands, indigenization via Atmanirbhar Bharat**, and cyber defence.
5. **Improved Defence Budgeting:** The doctrine helps align defence allocations (~₹6.2 lakh crore in Union Budget 2024-25) with strategic priorities—e.g., cybersecurity, drone warfare, mountain warfare readiness.
6. **Counter-Terrorism Coherence:** A doctrine can embed **principles for counter-insurgency (COIN), intelligence-led policing, and technology deployment** in areas like J&K and the Northeast.
7. **Predictable Global Partnerships:** It enables partners like the **U.S., France, Japan, Australia** to understand India's strategic thinking—bolstering frameworks like **QUAD** and **IAF joint exercises**.
8. **Better Crisis Management:** Codified escalation ladders and decision matrices enhance India's ability to respond swiftly in crises—e.g., post-26/11 confusion could have been averted.
9. **Informed Public Debate:** A published doctrine strengthens democratic accountability and **informed citizenry**, countering misinformation and war hysteria.
10. **Security Beyond Borders:** It allows strategic outreach through **defence diplomacy**, maritime domain awareness (e.g., SAGAR policy), and regional leadership.

Indian Initiatives and Global Collaborations:

1. **2003 Nuclear Doctrine** – The only formal doctrine, emphasizing NFU and massive retaliation.
2. **Defence Planning Committee (DPC)** – Set up in 2018 to draft national security strategy.
3. **Theatre Command Model** – India is transitioning to integrated theatre commands, aligning with doctrinal frameworks.

4. **National Cyber Security Strategy (NCSS)** – Drafted but pending clearance; would fit within an NSD.
5. **QUAD Cooperation** – Enhances Indo-Pacific security matrix; doctrinal clarity will improve engagement.
6. **India-France Roadmap on Defence** – Includes joint doctrine planning, naval cooperation.
7. **U.S. Basic Exchange and Cooperation Agreement (BECA)** – Real-time geospatial intel sharing for targeted operations.
8. **Strategic Partnerships in Indo-Pacific**: QUAD, I2U2, Indo-Pacific Oceans Initiative (IPOI) signal intent to build strategic depth.

Challenges in Framing a National Security Doctrine:

1. **Political Reluctance and Lack of Consensus:** Doctrinal clarity may bind political options or be misread as aggression. Inter-ministerial coordination is weak; lack of **NSC (National Security Council) empowerment.**
2. **Civil-Military Divide**: Unlike the U.S. or Israel, India has historically maintained a separation between political and military decision-making.
3. **Siloed Institutions**: Ministries, armed forces, and intelligence often operate without unified planning.
4. **Doctrinal Rigidity vs Flexibility**: Balancing permanence of core principles with changing tactical needs is difficult.
5. **Technological Lag and Dependence:** Rapid tech advancements (AI, drones, hypersonic) make doctrines quickly outdated. Overdependence on imports for key defense technologies **(e.g., jet engines, high-end semiconductors)** undermines doctrinal self-sufficiency.
6. **Absence of a National Security Strategy Document**: India has no declassified strategy akin to the **U.S. National Security Strategy (updated every 4 years)**.
7. **Hybrid and Gray-Zone Warfare**: Blurred lines between war and peace (e.g., standoff without shots at LAC) challenge doctrinal responses.
8. **Lack of Strategic Culture** – As observed by **George Tanham (RAND),** India lacks long-term strategic thinking.

Way Forward:

1. **Institutionalize a Periodic National Security Strategy (NSS):** A periodic National Security Strategy (NSS) ensures a **regular assessment of threats**, evolving strategic priorities, and coordinated responses. Such a document provides **strategic continuity**, even amid changing governments, and strengthens **civil-military coherence**. **Example:** The **Kargil Review Committee Report (1999)** recommended such a strategy for India. However, India has yet to adopt a formal, institutionalized periodic NSS.
2. **Adopt a Tiered Doctrine Model:** A tiered model enables the development of sub-doctrines under a unified framework — covering **military defense**, **internal security**, **cybersecurity**, **intelligence**, and **diplomacy**. This structure promotes **inter-agency alignment**, efficient crisis management, and clarity of roles. **Example:** The **UK's Integrated Review (2021)** integrates military, diplomatic, development, and tech security into one overarching policy.
3. **Publish an Unclassified Summary for Strategic Communication:** A publicly available summary of the national security doctrine ensures **transparency**, shapes **strategic communication**, and acts as a tool for **international signaling**. It also builds public and global awareness of India's red lines and policy priorities. **Example: NATO's Strategic Concept (2022)** is an open document identifying adversaries (like Russia and China) and guiding collective defense.
4. **Legislate the NSD through Parliament:** Legislating the National Security Doctrine through Parliament will provide it with **democratic legitimacy**, **institutional permanence**, and ensure

continuity across governments. It would also formalize the roles of agencies and improve oversight. **Example:** The **Goldwater-Nichols Act (1986)** in the U.S. reformed military command structure and legislated national defense planning, enhancing inter-service cooperation.

5. **Institutionalize Strategic Education:** Embedding **strategic studies** and **national security thinking** in civil services, foreign services, police academies, and military training is vital. It fosters a shared understanding of India's national interests across institutions. **Example: Israel's National Security College** trains senior officials in integrated security and foreign policy thinking.
6. **Integrate NSD with Budgeting and R&D Prioritization:** The NSD must guide **defense budgeting**, capital procurement, and R&D efforts (e.g., DRDO, iDEX, DPSUs). This ensures funding supports doctrinal priorities like space, cyber, or missile defense, avoiding ad hoc resource allocation. **Example:** The **U.S. Quadrennial Defense Review (QDR)** aligns strategy with defense budgets and capability development cycles.
7. **Embed Cyber and AI Security in the Doctrine:** Next-generation threats like **cyber warfare**, **AI-driven disinformation**, and **digital infrastructure sabotage** must be explicitly addressed in the doctrine. This prepares India for hybrid warfare and emerging asymmetric threats. **Example: NATO's Cyber Defence Centre**.
8. **Link Foreign Policy with National Security Doctrine:** Foreign policy must support national security aims — through **strategic partnerships**, **economic corridors**, and **global influence operations**. A doctrinal linkage ensures India's diplomatic efforts reinforce its security architecture. **Example:** India's **Indo-Pacific Oceans Initiative (IPOI)**, **QUAD**, and **India-Middle East-Europe Corridor (IMEC)** are natural fits for alignment with a national security doctrine.

Conclusion:

India's rising economic and geopolitical profile demands **strategic maturity** anchored in a clear national security doctrine. As Chanakya warned, **"A kingdom is only as safe as its farthest borders."** Security today is not just about weapons but about **resilience, perception, and preemption**. A National Security Doctrine is not a war plan; it is a peace architecture rooted in strength, vision, and strategic foresight. As Sun Tzu said, **"The acme of skill is to win without fighting."** For India, framing a doctrine is the first step in **ensuring that there are no wars to win in the first place.**

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India-Pakistan Relations: Complexity, Conflict & Cooperation

India and Pakistan, two South Asian nuclear-armed neighbors, share a fraught relationship rooted in the Partition of 1947. While the two nuclear-armed neighbors have **fought four wars and multiple skirmishes**, their relations are also shaped by deep historical grievances, strategic rivalries, and sporadic peace efforts. In the latest tragic reminder of the enduring security threat, the **2025 Pahalgam terror attack** resulted in the deaths of civilians and injuries. The incident, allegedly perpetrated by Pakistan-backed groups like **The Resistance Front (TRF)**, has once again spotlighted the volatile dynamics between the two countries, particularly on the issue of **cross-border terrorism**.

Key Issues in India-Pakistan Relations: Evolution:

1. **Cross-Border Terrorism:** From the 1989 Kashmir insurgency to the 2001 Parliament attack, 2008 Mumbai attacks, Uri (2016), Pulwama (2019), and now Pahalgam (2025), terrorism remains the biggest concern. **ORF classifies Pakistan's** terror infrastructure as **"state-enabled non-state**

actors.". Pakistan has long been providing safe havens to terror groups like **LeT, JeM, and Hizbul Mujahideen**. The **2001 Indian Parliament attack**, **2008 Mumbai attacks**, **2016 Uri attack**, and **2019 Pulwama attack** are all linked to Pakistani-based terror outfits. **E.g. A 2023 report** by **Brookings Institution** identified Pakistan's **"proxy war" strategy in Kashmir** as a major destabilizing factor in South Asia.

2. **Kashmir Dispute:** The core territorial dispute stems from Pakistan's claim over J&K, while India asserts its legal accession. Post-2019 abrogation of Article 370, Pakistan downgraded diplomatic ties and internationalized the issue at various forums. While India asserts it as a domestic issue, the **UN Human Rights Council** has occasionally flagged concerns over human rights in the region**. Shyam Saran (ex-Foreign Secretary), "Pakistan treats Kashmir as the keystone of its identity" and C. Raja Mohan calls it Pakistan's Kashmir fixation "strategic inertia rooted in ideological rigidity."**
3. **Border and LoC Ceasefire Violations:** Over **5,000 ceasefire violations in 2020** alone, according to MEA. While the 2021 reaffirmation brought temporary calm, violations resumed in 2023.
4. **Water Disputes under the Indus Waters Treaty (IWT): Treaty Signed in 1960** under World Bank auspices. India has raised concerns post-Uri attack (2016) about revisiting the treaty. Pakistan raised objections to **India's Kishanganga and Ratle Hydropower Projects**. India invoked Article XII of the treaty to renegotiate terms in 2023. **World Bank's** urged both sides to resolve differences via neutral expert arbitration.
5. **Trade and Economic Relations:** Post-2019, Pakistan suspended bilateral trade. A report by **CUTS International** (2021) estimates potential trade loss of billion annually due to non-cooperation.
6. **Religious Radicalization: Export of extremism** through LeT, JeM, and D-Company operate from Pakistani soil. **UNSCR Reports**, highlight proliferation of madrassas and extremist hubs.
7. **Nuclear Brinkmanship and Arms Race:** Both nations maintain nuclear arsenals and credible deterrents. Post-Balakot (2019), India and Pakistan came dangerously close to conflict escalation, as noted in **RAND Corporation**'s 2021 assessment.
8. **Afghanistan, Narcotics and Drone Warfare:** India supports democratic stability, while Pakistan has been accused of covertly aiding Taliban factions. **USIP Report** (2023) said India fears increased terror influx via Afghanistan post-Taliban resurgence. India has close proximity to **Death Triangle (Formally Golden Triangle)** which increases the threat of narcotics and terrorism as seen in drone-based narcotics and arms drops in Punjab.
9. **Cyber Warfare and Disinformation:** Cyber espionage by Pakistani actors like **APT36** targeting Indian defense and research. CERT-IN reports several Pakistan-origin intrusions.
10. **Prisoners and Fishermen:** 300+ fishermen from both sides remain jailed. Cases of spies (e.g., Kulbhushan Jadhav) worsen mutual distrust. **International Court of Justice (ICJ)** ruled in Jadhav's favor in 2019.

Multilateral Groupings Involving India and Pakistan

1. **SAARC (South Asian Association for Regional Cooperation):** India and Pakistan are founding members. SAARC summits are often stalled due to bilateral tensions. Paralysed since 2016 after the Uri attack. **C. Raja Mohan** observed that "SAARC has been held hostage to bilateral tensions.
2. **Shanghai Cooperation Organisation (SCO):** Both are full members since 2017. Pakistan has blocked Indian proposals and boycotted certain events. India skipped SCO meetings in 2024 due to provocations.
3. **UN and Related Agencies:** Pakistan raises Kashmir issue frequently; India counters by stressing non-interference. **India's Stand**: Consistently maintains Kashmir is a bilateral issue under the **Shimla Agreement (1972)**.

4. **World Trade Organization (WTO):** Ongoing disputes over MFN status. India also withdrew Pakistan's MFN status in 2019.

Present Dynamics and Shifts:

1. **Union Government** follows a **"terror and talks cannot go together" doctrine**.
2. **Operation Sindoor and Balakot airstrike (2019)** marked a shift towards pre-emptive action and direct response to the terrorist attack.
3. Pakistan's internal economic crisis (USD reserves at critical levels as per IMF 2024 report) restricts its military adventurism.
4. **US withdrawal from Afghanistan** has left Pakistan more regionally isolated.
5. Think tank **Carnegie India** argues that the India-Pakistan equation is now less central to global diplomacy.

What are the Threats and Challenges Posed by Pakistan?

1. **State-Sponsored Terrorism:** ISI's deep links with groups like LeT and JeM are documented by the **FATF**, which kept Pakistan on the grey list until 2022.
2. **Cyber Espionage and Propaganda: CERT-In** flagged multiple attempts of phishing and propaganda campaigns from Pakistani IPs targeting Indian defence personnel.
3. **Smuggling and Narco-Terrorism:** Punjab Police has reported a surge in **drone-based smuggling** of arms and heroin from across the border.
4. **Border Infiltration:** IB and LoC infiltration attempts remain persistent. BSF recorded **over 200 infiltration attempts** in 2023 alone.
5. **Strategic Alliance with China:** The **China-Pakistan Economic Corridor (CPEC)** runs through PoK, challenging India's sovereignty. **Brookings** warns of a **"two-front" security risk** for India from the **Sino-Pak axis**.
6. **Propaganda Warfare**: Pakistan's ISPR targets international narratives (via social media).
7. **Nuclear Posturing**: Tactical nukes threaten escalation.

What are the Global Powers Policies Toward India-Pakistan?

1. **United States:** Views India as a strategic partner under **Indo-Pacific Strategy**. Maintains defence ties with Pakistan (e.g., 2022 F-16 upgrade aid) to keep leverage. **Carnegie Endowment** noted U.S. "wants to prevent escalation while balancing both ties." **Ashley Tellis** calls, US policy aims to **"contain chaos in Pakistan while investing in India."**
2. **China:** Strong strategic partner of Pakistan. China is **all-weather ally of Pakistan (CPEC, military aid) and supports Pakistan on Kashmir in UNSC.** Uses Pakistan to counterbalance India's regional influence. Engaged in infrastructure and military cooperation via **CPEC**, which India opposes.
3. **Russia:** Traditionally close to India, but now engages both countries, increasing ties with Pakistan in defense **(Mi-35, joint drills).** Supports **anti-terrorism under SCO; has recently conducted trilateral exercises** with both India and Pakistan separately.
4. **OIC (Organisation of Islamic Cooperation):** Supports Pakistan's stance on Kashmir, though many Gulf nations now have improved ties with India (e.g., UAE, Saudi Arabia).
5. **Gulf Countries (UAE, Saudi Arabia):** Brokered 2021 ceasefire. UAE plays economic neutral; strong trade with both. **Brookings Doha Center** noted UAE's role in Indo-Pak thaw.
6. **European Union:** Concerned with human rights in Kashmir, supports bilateral dialogue and is a major trade partner for both countries.

Way Forward: "A Unique Blend of Light and Tight Approach":

1. Hard Strategy: Asserting Deterrence and National Security: Hard strategies are coercive tools used to safeguard sovereignty and deter hostile actions by Pakistan, especially in light of state-sponsored terrorism and cross-border aggression.

- **Surgical and Cyber Strikes:** Precision military operations across the border and digital warfare targeting enemy infrastructure. **Examples**: **2016 Surgical, 2019 Balakot Air Strikes.** Lt. Gen. D.S. Hooda (Retd.), who oversaw the 2016 strikes, has emphasized integrating military and digital tools for **"surgical precision and strategic messaging."**
- **Financial Warfare and Strategic Messaging**: Deterrence through visible action. Economically isolate Pakistan to choke terror funding and impose global accountability. **Example**, India lobbied successfully for Pakistan to be placed on the **Grey List** (2018–2022), tightening scrutiny on terror financing. **IMF and World Bank Conditionalities**, India uses diplomatic influence to condition economic aid to Pakistan on counter-terror reforms. **C. Raja Mohan and Brahma Chellaney argues for**, **"Diplomatic strangulation through financial multilateralism has long-term strategic impact", and "cost imposition" strategy respectively.**
- **Defence Modernization:** Acquisition of Rafale jets, S-400 systems, and indigenous missile development (e.g., Agni-V, BrahMos). Focus on **theatre commands** and **artificial intelligence in warfare**. A strong military posture deters adventurism and gives India strategic superiority along the LoC and international border. Late Gen. Bipin Rawat advocated for **"technologically enabled integrated response systems to handle conventional and hybrid threats."**
- **Doctrine of Proportional Response**: Balakot (2019) set a precedent. **Former Army Chief Gen. Bipin Rawat**: "Talks can follow only after complete dismantling of terror infrastructure." Strengthen Border Security Force (BSF) and tech surveillance. Conduct **surgical and cyber-strikes** on credible threats.
- **Global Model:** Israel's **hard deterrence model** cited as an example. Also amend **IWT** terms and limit water flows as leverage.

2. Soft Strategy: Building Bridges and Quiet Diplomacy: Soft strategies focus on dialogue, diplomacy, and cultural engagement to reduce hostility and build long-term peace foundations.

- **Backchannel Talks:** Quiet negotiations on contentious issues like terrorism, water-sharing (Indus Waters Treaty), and trade. **Example**, UAE-brokered talks (2021) led to reaffirmation of the **2003 LoC ceasefire**. **Sharat Sabharwal (Former Indian High Commissioner to Pakistan)** stresses **"silent diplomacy often succeeds where loud declarations fail."**
- **People-to-People Ties:** Sports (e.g., cricket diplomacy), cultural exchanges, pilgrimages (Kartarpur Corridor). **Examples**: **Kartarpur Sahib Corridor (2019)**: A rare success in India-Pakistan relations facilitating Sikh pilgrimage. Artists and intellectual exchanges—though currently suspended—help humanise relations.
- **Third-Party Mediation:** Using neutral players like **UAE** or **Saudi Arabia** to open informal channels. **Example**: UAE-brokered backchannel led to the 2021 LoC ceasefire renewal. UAE Ambassador to India termed it a **"silent bridge between turbulent neighbours."**

3. Integrated Strategy: Combining Carrot and Stick: India increasingly favours a hybrid approach blending hard deterrence with calibrated engagement.

- **Israel's "Iron Fist with Silk Glove" Model:** A doctrine where strong military responses are paired with soft outreach (technology, diplomacy). **Application to India**:
    - **Military deterrence (Balakot) + Kartarpur diplomacy.**
    - **Strategic signaling: India uses restraint but also retaliates when red lines are crossed.**

- **Expert Commentary: Gen. Bipin Rawat,** "Hybrid response to hybrid threats." **Example**: Simultaneously downgrading diplomatic ties post-Article 370 revocation (2019) while maintaining backchannels and trade through third parties like the UAE. **ORF**: Suggests that India's calibrated use of power and peace is aligned with the regional power doctrine. **Brookings India**: Advocates "controlled engagement" to avoid prolonged hostility while neutralising tactical threats.

Hybrid Threats = Terrorism, cyberattacks, propaganda warfare, economic sabotage.
Hybrid Response = Integrated use of military, cyber, economic, diplomatic, and social tools.

Conclusion: From Conflict to Constructive Engagement:
India-Pakistan relations are a complex blend of history, hostility, and hope. While structural issues remain deeply entrenched, evolving geopolitics, changing domestic priorities, and increasing global pressure on state-sponsored terrorism may open windows for cautious engagement. As **Shivshankar Menon**, former NSA, aptly put it — ***"Peace with Pakistan is desirable, but it must be on terms that ensure security and stability for India."*** The path forward requires realism, resilience, and a calibrated strategy that combines deterrence with dialogue.

Read More: The Hindu
UPSC Syllabus GS-2: Bilateral relations

Boom in Foreign University Branch Campuses in India: Can They Deliver Quality Education?

India is currently witnessing a pivotal moment in its higher education landscape, with foreign universities entering the domestic space to establish physical campuses. India, with a youth population of over **500 million aged 5–24 years**, stands at the cusp of a demographic dividend. Yet, its **Gross Enrollment Ratio (GER)** in higher education remains at a modest **27.3% (AISHE 2020–21),** significantly lower than global peers like the **USA (88.2%) or China (51.7%).** To bridge this gap, the **National Education Policy (NEP) 2020** envisions raising **GER to 50% by 2035**, an ambitious target that necessitates substantial expansion in infrastructure, diversity in course offerings, and internationalization of Indian higher education**.**

What is the University Grants Commission (UGC) 2023 regulatory framework for Foreign Higher Educational Institutions (FHEIs)?

Amid this backdrop, the **University Grants Commission (UGC)** in 2023 rolled out a regulatory framework allowing **FHEIs** to set up campuses in India. From **Deakin University and University of Wollongong** in GIFT City to **University of Southampton** in Gurugram, the movement has seen rapid momentum. The **Illinois Institute of Technology (IIT), USA**, recently became the first American university to gain UGC approval for a Mumbai campus—signaling both opportunity and the need for caution.

How Foreign University Branches opening and Expansion has taken place in India?

- **Pre-Liberalization Restrictions:** Prior to 1991, India's education sector was almost entirely public and protectionist. Foreign academic collaboration was limited to student exchanges and research MoUs.
- **Post-Liberalization (1991–2005):** The liberalization of the Indian economy saw a modest increase in global academic engagements. However, there were no formal policies to allow FHEIs to open campuses.

- **2005 Foreign Education Providers Bill**: This bill aimed to regulate foreign institutions in India but lapsed in 2010 due to opposition over commercialization concerns.
- **2005–2010 Attempts:** The **Foreign Educational Institutions Bill, 2010**, proposed under the UPA-II government, aimed to regulate and allow foreign universities to enter India. However, it lapsed due to lack of consensus in Parliament.
- **Rise of Joint Programs:** In absence of full-fledged branches, Indian institutions partnered with foreign universities for **dual degrees**, **credit transfers**, and **twinning programs**. For example, **IIT Bombay–Monash University** Research Academy, and **OP Jindal Global University's** extensive global collaborations.
- **NEP 2020 Shift:** The NEP laid the foundation for institutional autonomy, internationalization, and "global standards" in Indian education, recommending the entry of **Top 100 global universities** to set up Indian campuses.
- **UGC Regulations (2023):** For the first time, a legal and regulatory framework was instituted, giving formal entry routes to FHEIs, underpinned by quality assurance and local relevance.

What are the UGC Guidelines for Foreign University Campuses in India?

- **Objective and Legal Framework:** The 2023 UGC Regulations aim to allow Foreign Higher Educational Institutions (FHEIs) to establish campuses in India, aligning with the National Education Policy (NEP) 2020. The goal is to internationalize Indian higher education while ensuring academic parity with the foreign institution's main campus.
- **Eligibility of Foreign Institutions:** FHEIs must be ranked among the **top 500 globally** in overall or subject-specific rankings or possess **demonstrated excellence** in a specialized area. These rankings are determined by the UGC from time to time.
- **Programmes and Degrees Offered:** FHEIs can offer **certificates, diplomas, degrees, and research programmes** at undergraduate, postgraduate, doctoral, and post-doctoral levels. Degrees awarded in India will bear the **name and seal of the parent institution** and are considered **equivalent to both the home and Indian qualifications**.
- **Admission, Fee Collection, and Scholarships:** FHEIs may admit students and collect fees **only after UGC's final operational approval**. They are encouraged to offer **need-based scholarships and fee concessions** to Indian students.
- **Campus Infrastructure and Staffing:** Campuses must be built using the FHEI's **own infrastructure**—sharing with Indian institutions is not allowed. They have full **autonomy over faculty recruitment**, but faculty qualifications must match the standards of the home campus.
- **Mode of Delivery:** Courses **must be delivered in-person**; online or distance learning is not allowed. However, **up to 10%** of programme content may be delivered online.
- **Governance and Approval Mechanism:** The UGC handles a **single-window application** process. After evaluation by a **Standing Committee**, a Letter of Intent (LoI) is issued. Final operational approval must follow within **2 years** (extensions possible), after which the FHEI can begin academic operations.
- **Student Protection and Grievances:** FHEIs must maintain **grievance redressal mechanisms**. In the event of **programme disruption or campus closure**, they must provide **alternative arrangements** to safeguard students' interests.
- **Regulatory Restrictions and Legal Compliance:** FHEIs must comply with **FEMA and FCRA regulations** for funding, property acquisition, and collaborations. They are **not allowed** to set up franchises, study centres, or representative offices outside of the approved campuses. Indian courts will have **exclusive jurisdiction** in disputes.

What is the Significance and Importance of Foreign University Campuses?

1. **Access and Capacity Building:** According to the **Economic Survey 2022-23**, India needs **800–900 universities** and **40,000–45,000 colleges** in the next decade to meet projected demand from **43 million new students**. FHEIs can ease this pressure.
2. **International Exposure and Competitiveness:** Students gain access to **global pedagogy** and **research culture** without bearing the costs of overseas education. As per **QS Global Student Survey**, 73% of Indian students consider international exposure critical to career success.
3. **Curbing Brain Drain:** Over **7.5 lakh Indian students studied abroad in 2022**, according to MEA. With quality education at home, FHEIs could help **retain talent** and **foreign exchange**.
4. **Research and Innovation Boost:** Collaborations like **IIT Delhi–University of Queensland** and **IIT Bombay–Monash University** show the potential for joint research. Branch campuses could institutionalize these efforts.
5. **Diplomacy and Soft Power:** Education partnerships strengthen **bilateral ties**, aligning with India's **Act East Policy**, **India-U.K. Roadmap 2030**, and **India-Australia Comprehensive Strategic Partnership**.
6. **Local Economy & Employment:** Campuses can catalyze regional development, provide local employment, and foster innovation hubs akin to **Silicon Valley–Stanford** or **Oxford–Thames Valley** clusters. As per NITI Aayog, retaining students could save **$15-20 billion annually**. Campuses like **NYU Abu Dhabi** created **5,000+ local jobs**—a model India can emulate.
7. **Judicial Backing**: The **Supreme Court in TMA Pai Foundation v. State of Karnataka (2002)** upheld **institutional autonomy**, supporting foreign universities' entry.

What are the Indian Initiatives, Collaborations, Schemes, and Programs for Promotion of FEHIs?

1. **National Education Policy (NEP) 2020**: Advocates for **"internationalization at home,"** encouraging foreign collaborations and overseas campuses of Indian institutions.
2. **Study in India Programme**: Targets foreign students to study in India, aiming to enhance **India's global educational footprint.**
3. **UGC's Dual Degree Framework**: Allows students to earn degrees from Indian and foreign universities concurrently.
4. **National Institutional Ranking Framework (NIRF)**: Promotes transparency and benchmarking to attract credible international institutions.
5. **GIFT City Model**: Offers foreign universities **100% tax exemption**, **no exchange control**, and **regulatory flexibility**, making it India's own **education SEZ**.
6. **Research Collaborations**: IIT-Queensland, IITB-Monash, and Ashoka-Sciences Po reflect India's intent to embed global best practices through joint research.
7. **New Education Policy Budgetary Provisions**: ₹1.12 lakh crore was allocated in Budget 2023-24 for the education sector, with a focus on higher education and digital expansion.
8. **National Digital University (NDU)**: Though not foreign, it exemplifies India's effort to scale higher education digitally, providing a model for hybrid collaboration with foreign universities.
9. **SPARC (Scheme for Promotion of Academic and Research Collaboration):** Facilitates joint research and academic exchanges.
10. **GIAN (Global Initiative of Academic Networks):** Brings global faculty to Indian classrooms.

Challenges Facing Foreign University Campuses in India:

1. **Brand Perception Gap**: Many FHEIs entering India are not **"Ivy League" equivalents**. In India's competitive landscape (IITs, IIMs, Ashoka, ISB), these branches risk being perceived as "**diploma mills**". This could impact their ability to attract top-tier students.

2. **Academic Narrowness**: Most foreign campuses focus on market-driven fields like **Business and Computer Science**, lacking the **interdisciplinary approach** or **research diversity** seen in traditional Indian universities. This limits their appeal to students seeking a broader academic experience.
3. **Infrastructure Deficits**: Foreign campuses often operate out of **rented vertical buildings**, lacking the traditional **campus amenities** like green spaces, sports facilities, and libraries, affecting the overall student experience and institutional identity.
4. **Regulatory Compliance Complexity**: Navigating Indian regulations, such as **FCRA**, **FEMA**, and **land acquisition norms**, remains complex. These bureaucratic hurdles can be a significant barrier for foreign universities seeking smooth entry into the Indian market.
5. **Marketing Over Academic Substance**: Heavy investment in **marketing campaigns** sometimes overshadows the **academic quality** of these campuses. Without **strong faculty, curriculum depth, or student support**, flashy marketing can damage credibility and long-term trust.
6. **Limited Research Capacity**: Most foreign campuses focus on **teaching** rather than **research**, lacking **doctoral programs** or research facilities. This reduces their ability to contribute to global academic discussions and innovations.
7. **Student Skepticism**: Indian students are value-conscious. A foreign degree must offer **clear returns on investment** in terms of **employability** and **recognition**. High fees and unclear benefits may deter students.
8. **Global Headwinds**: The international higher education sector faces **financial challenges** and **geopolitical uncertainties**. Many foreign universities may reassess their expansion strategies due to post-COVID financial strains and political instability.

What can be the Way Forward?

1. **Focus on Quality, Not Quantity**: Only top-tier institutions with academic depth should be allowed. **Australia's Tertiary Education Quality and Standards Agency (TEQSA)** model can offer guidance.
2. **Tailor to Indian Needs**: Programs must align with India's **skill gaps**, regional priorities (e.g., Agri-tech in Punjab, AI in Bengaluru), and **local language and culture**.
3. **Long-Term Infrastructure Investment**: Real campuses with research centers, hostels, and sports facilities are essential. **ISB Hyderabad** can serve as a model.
4. **Balanced Curriculum**: Move beyond just STEM. Encourage **liberal arts, humanities, and interdisciplinary courses**, critical for holistic education.
5. **Regulatory Autonomy with Accountability**: Like **Singapore's EduTrust Scheme**, India can offer autonomy with regular audits to ensure quality.
6. **Collaboration with Indian Institutions**: Encourage joint degrees, research hubs (e.g., **IIT Madras-Zurich ETH**) to combine global and local strengths.
7. **Incentives for Tier-II Cities**: To decongest metros and ensure equitable growth, promote campuses in underserved regions with sops (e.g., land grants, PPPs).
8. **Feedback Loop Mechanisms**: Empower NAAC/NIRF to evaluate foreign campuses regularly and create a public dashboard for transparency.

Conclusion:

Critics like Prof. Amartya Sen argue that **"education must not be purely market-driven"**, while **Nandan Nilekani** supports **"competitive disruption"** in higher education. As India's decision to open its doors to foreign universities represents a **historic shift in higher education policy**. But as **Philip Altbach**, renowned higher education scholar, warns, "Without depth, internationalization becomes branding." For India to truly benefit, the process must be **strategic, inclusive, and quality-driven**. If executed well, this initiative could redefine India as not just a **consumer** but also a **global provider** of world-class education.

Read More: The Hindu
UPSC Syllabus GS-2: Education

Urban Mobility in India- Challenges and Way Forward

Indian cities are characterized by increasing levels of congestion, pollution, road accidents and inequality in access to mobility. The need for better urban mobility in order to build inclusive, safer and more sustainable cities cannot be underestimated.

Status of Urban Transport in India:

Major Modes of Public Urban Transport:

- Buses are the prime mover for both inter-city and intra-city travels in most urban centres. However, in recent times there has been a loss in ridership. Other modes include metro rail, trams, and local trains.
- Intermediate public transport system (IPT): All Indian cities feature large numbers of auto rickshaws, taxis, cycle rickshaws and forms of informal car pooling.
- The range of public transport services vary considerably across cities. For example: Only Mumbai, Kolkata, and Chennai have extensive suburban rail services whereas Delhi has limited suburban rail services.
- Currently, 17 Indian cities have operational metro rail (**Kolkata, Delhi, Chennai, Bengaluru, Hyderabad, Jaipur, Gurgaon, Mumbai, Kochi, Lucknow, Ahmadabad, Nagpur, Pune, NOIDA, Navi Mumbai, Kanpur, and Agra**), with Delhi having the largest metro rail system.
- Kolkata has India's only remaining tram system

Problems faced by Urban Transport in India:

1. **Unprecedented Transport Growth:** According to NITI Aayog, the number of registered motor vehicles has increased from 5.4 million in 1981, to 210 million in 2015 . This rapid growth in demand in the absence of widespread public transport system has caused a rapid increase of private car ownership in India.
2. **Inadequate Public Transport:** Only 63 out of 458 cities with populations over 1 lakh have formal bus services, and India has just 1.2 buses per 1,000 people, far below global benchmarks (China has about six buses for 1,000 people). Public transport is often overcrowded, unreliable, and poorly maintained, deterring commuters – 37% avoid it due to overcrowding, and 28% cite delays and irregular schedules. Lack of integration between different modes (metro, buses, suburban rail, auto-rickshaws) leads to inefficient transfers and inconvenience. Further, a CSE study points out that the share of public transport is expected to decrease from 75.5% in 2000-01, to 44.7 per cent in 2030-31, while the share of personal transport will be more than 50%.
3. **Urban Pollution:** According to a WHO study 14 out of the top 15 most polluted cities in the world belong to India. Vehicular pollution has been one of the major contributors to rising urban air pollution in Indian cities along with other factors such as construction activity, road dust and industrial activity.
4. **Urban Congestion:** Major Indian cities like Delhi, Mumbai, Kolkata and Bengaluru are ranked among world's most congested cities. For example: Average speed for vehicles in Bengaluru is reported as 17 km/h. These high levels of congestion have huge economic implications in the form of reduced productivity, fuel waste, and accidents. Further, there is an **acute shortage of parking spaces** both on and off the streets in the urban centres.

5. **Road safety- Traffic injuries and fatality:** India faces a severe road safety crisis, with over 172,000 deaths reported in 2023-averaging 474 fatalities daily-making its roads among the world's deadliest. The major reasons for traffic crashes include poor quality of roads, poor traffic management, unsafe and overcrowded vehicles and unsafe driving behaviour.
6. **Equity Issues:** Unplanned urbanization in India has led to gentrification (as per upper and middle socio-economic class) of city centres and lower income groups are forced to live in peripheral suburbs which have increased their cost and time they allocate to commute. Most of the lower income groups and urban poor fail to afford private transport and even public transport are high for them. For example, a CSE study ranks Delhi Metro as the second most unaffordable metro (after Hanoi in Vietnam) with lower income group people spending nearly 22% of their monthly transport on Delhi Metro fares.
7. **Mobility for women:** Safety or the lack thereof, is the single biggest factor constraining women's mobility. According to Action Aid UK, 79% of women in major Indian cities reported being harassed on streets. Overcrowding in public transport adds to insecurity and safety issues with a large number of women complaining about harassment in public transport across major Indian cities like Delhi and Mumbai.

Government Initiatives to address Urban Transport issues:

1. **Jawaharlal Nehru National Urban Renewal Mission JNNURM, 2005**: JNNURM was launched in 2005 and closed in 2014 (now succeeded by **Atal AMRUT Mission**). It attempted to improve the public transport system in larger cities through funding of public transport buses, development of comprehensive city mobility plans and supporting city transport infrastructure projects.
2. **National Urban Transport Policy, 2006**: The policy envisages safe, affordable, quick, comfortable, reliable and sustainable urban transport through establishment of quality focused multi-modal public transport systems.
3. **Green Urban Transport Scheme, 2016:**. The scheme aims to improve non-motorised transport infrastructure such as dedicated lanes for cycling, pedestrians, increasing access to public transport, use of clean technologies and adoption of intelligent transport systems (ITS).
4. **Mass Rapid Transit/ Transport Systems (MRTS)**: The metro rail has come up as a favoured alternative of mass transport in Indian cities. In 2017, the government introduced new Metro Policy which aims to improve collaborations, standardising norms, financing and creating a procurement mechanism so that the projects can be implemented effectively.
5. **Bus Rapid Transport System (BRTS):** BRTS segregates the movement of buses from all other transport modes, and introduces other changes in the road infrastructure that are associated with safety. BRTS is an important component of AMRUT (Atal Mission for Rejuvenation and Urban Transformation)
6. **National Transit Oriented Development Policy, 2017:** The policy framework aims to promote living close to mass urban transit corridors like the Metros, monorail and bus rapid transit (BRT) corridors.
7. **Sustainable Urban Transport Project (SUTP):** The project in partnership with Ministry of Urban Development and UNDP aims to promote environmentally sustainable urban transport in India.
8. **Personal Rapid Transit System (PRT):** It is a transport mode combining small automated vehicles, known as **pods**, operating on a network of specially built guideways. In 2017, the National Highway Authority of India (NHAI) had called the expression of interest (EOI) for launching India's first driverless pod taxi systems on a 70 km stretch from Dhaula Kuan in Delhi to Manesar in Haryana.
9. **National Public Bicycle Scheme (NPBS):** In 2011, NPBS was launched to build capacity for the implementation and operation of cycle sharing systems across the country. The first public bicycle sharing (PBS) initiative — Trin Trin was launched in Mysuru.

10. **Promotion of Electric Vehicles:** Indian Government plans to have an all-electric fleet of vehicles by 2030. For promotion of electric vehicles **FAME (Faster Adoption and Manufacturing of (hybrid &) Electric vehicles.** Under FAME – the government provides subsidies and incentives for electric buses, two-wheelers, and charging infrastructure, making clean mobility more affordable and accessible.

Institutional Challenges:

1. **Gaps in Laws and regulations:** There is no central, state or local level that comprehensively covers urban transport requirements and issues in Indian cities. Further, the weak enforcement and lacunae in existing laws such as the Motor Vehicles Act, 1988 fail to manage fast motorization in Indian cities.
2. **Poor Institutional Framework:** Functions of Urban transport system are performed by multiple agencies under the central, state and city governments which lack coordination and makes accountability difficult.
3. **Land as a Barrier to development of Transport Infrastructure**: High cost of land acquisition and time-consuming processes has been a major hindrance to integrated urban transport infrastructure. For example, land acquisition issues have delayed the East-West metro Corridor Project in Kolkata over years.
4. **Human Resource Challenges:** Lack of urban transport skills amongst city and state officials is a major challenge in effectively implementing transport projects.
5. **Absence of Reliable Transport Data:** The lack of standardised, systematized data and scientific analysis of urban transport statistics is a major barrier in assessing impact of various ongoing government initiatives and formulate a robust urban transport plan.
6. **Lack and Delay in release of funds**: The urban infrastructure projects have a long gestation period which requires locking of huge amount of funds for a longer period of time. This creates problems in accessing the required funds, thereby impacting timely completion and maintenance of projects.

NITI Aayog Recommendations:

It calls for a **3C Framework (Clean, Convenient and Congestion free)** for transforming mobility in India. To achieve this, it lays down the following action-agenda:

1. Connect Bharat: NITI Aayog calls for a **Safe, Adequate and Holistic Infrastructure (SAHI)** for the Indian population including women, elderly and the disabled. Major recommendations for achieving this:

- Increased emphasis on safety and accessibility.
- Leveraging multiple modes of transport – road, rail, coastal and inland waterways, small regional airports, ropeways etc.
- Higher usage of data for holistic mobility needs.

2. Optimize Travel footprint: It calls for increased emphasis to reduce congestion caused by passenger and goods flow in urban areas. Major recommendations include:

- Integrated land use– Planning residential and commercial complexes in an integrated manner so that travel time is reduced.
- Focused policy based measures for optimizing travel.
- Data-based measures such as intelligent transport systems.

3. Promote Seamless Public Transport: It calls for an efficient and convenient public transport to address the issue of air pollution and congestion in Indian cities. Major recommendations include:

- Data-driven planning and urban transport, with a clear hierarchy amongst different modes- from non-motorized (pedestrians, cycles) to public and lastly private transport.
- Focus on multi-modal systems.
- Make public transport affordable, comfortable and accessible for urban India, to ensure better adoption.

4. Adopting Green Modes and Technologies: It calls for rapid adoption of electric vehicles and non-motorized transport (NMT). Major recommendations include:

- To improve adoption of non-motorized transport, the routes and paths should be planned so that they integrate seamlessly with public transport.
- To ensure safety for NMT users by outlining norms & dedicated traffic signals should be a key priority.
- There should be a clear push towards clean technologies. This has to be enabled through ecosystem development which includes domestic manufacturing, deployment of charging infrastructure etc.

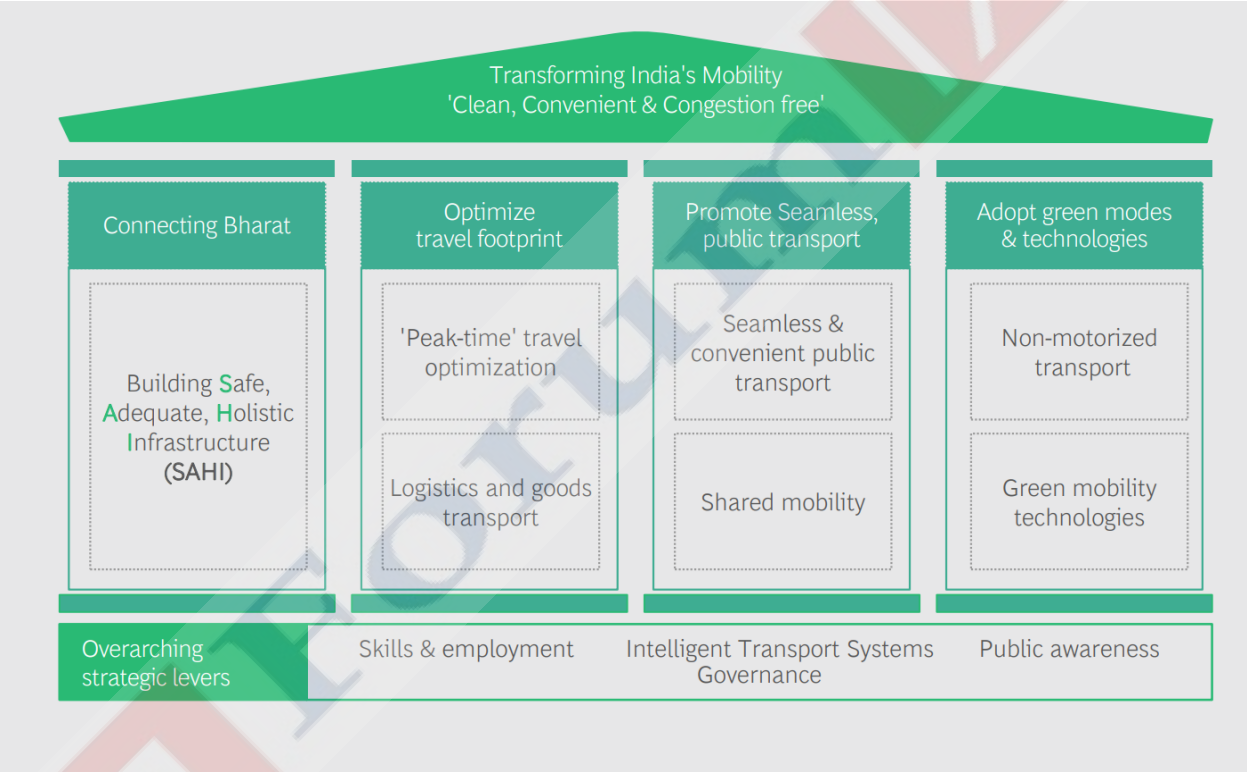

Fig 2

For effective execution of these actions-agenda, the NITI Aayog recommends to optimise the following **strategic enablers:**

1. **Skill development** which will ensure high employability and address the issue of human resource demand.
2. **Intelligent Transport systems** based on ongoing technological developments.
3. Well-defined **Governance** mechanism involving different stakeholders.
4. A strong **public awareness** and communication campaign.

International Best Practices:

SINGAPORE:

- According to McKinsey report titled "**Elements of success: Urban transportation systems of 24 global cities"** (2018), Singapore's public transport system is the best and most affordable system in the world.
- Nearly 80% of trips in Singapore are performed on Public Transport comprising of bus, MRT, LRT, Taxis.
- Singapore has one of the highest supplies of public transport per capita in the world. A well planned and extensive public transport system coupled with travel demand restraint measures, like area licensing system, vehicle quota system, congestion pricing etc. has resulted in decreasing registration of private cars and high usage of public transport. Singapore has also introduced "Incentives for Singapore's Commuters" – a scheme which incentivises commuters to shift their travel time to an earlier or later time belt to avoid the peak travel period on trains and thus avoid overcrowding.

MEXICO CITY- Right to Mobility: In 2014, Mexico City passed a new law which explicitly guarantees the right to mobility and aims at expanding urban mobility through sustainable transportation. The law also created a new mobility hierarchy, placing pedestrians and cyclists above motorists and prioritizing active transport.

Best Practice in India:

Ahmedabad BRTS Corridor: Features that stand out:

- For the first three months, the Ahmedabad Municipal Corporation (AMC) ran BRTS free and then made design changes based on commuter feedback.
- It provides affordable Smart cards for commuters.
- Integrated Transportation Management System (IMTS) which includes Advanced Vehicle Tracking System (AVLS), Fleet Management System (FMS), Automatic Fare Collection System (AFCS), Passenger Information System (PIS), Passenger announcement (PA), and Vehicle Scheduling and Dispatching (VSD).
- CNG Buses.
- Safe and secure BRT bus stops with a standard attractive form for presenting passengers information such as signages, route details and graphics.

Way Forward:

1. To address the **institutional challenges** there is a need for better cooperation among different transport agencies, departments, and ministries as well as better coordination of transport and land-use policies. Further, there should be adequate funding to address various issues plaguing public transport infrastructure.
2. To address the issues of **urban congestion and urban air pollution**, it is important to augment mass and share transit capacity and discourage use of private cars by enforcing restraint measures through parking policy, low emissions zones approach, tax measures and congestion pricing.
3. **Well engineered, safe infrastructure** for travel should be ensured. Further, there is an urgent need to address the issue of low woman mobility by ensuring **women safety** through gender-sensitive transport policies, dedicated seats/ coaches and emergency helplines.
4. There should be focus on **enhancing non-motorised transport**. Focus should be to encourage use of non-motorised transport for short distances. Further, Pedestrian zones, bike lanes should be made to ensure safety to commuters. For example, well designated Bike-lanes and bike-sharing solutions have promoted use of bicycles as a mean of transport in cities like Amsterdam and Paris.

5. Commuters should be provided with **multiple modes of connectivity**. To ease out travelling, a single smart card can be provided. For example, London's Oyster "smart" card enables a commuter to change from one mode to another with minimal loss of time or effort.

Conclusion:

Urban transportation in India is undergoing significant transformation, with expanding metro and BRT networks, modernization of stations, and a push for multimodal integration. However, challenges like congestion, insufficient public transport, and environmental impact remain. Addressing these requires continued investment, policy innovation, and a focus on inclusive, sustainable mobility solutions.

UPSC Syllabus GS-3: Transportation