

Forum IAS

7 PM COMPILATION

16th to 28th February, 2023

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
- ❖ Wide use of charts, diagrams and info graphics
- ❖ Best-in class coverage, critically acclaimed by aspirants
- ❖ Out of the box thinking for value edition
- ❖ Best cost-benefit ratio according to successful aspirants

[Kurukshehra February 2023 Summary] Decarbonisation of Transport Sector – Explained, pointwise

Topic:- Economic development

Sub topic:- Infrastructure: Energy, Ports, Roads, Airports, Railways etc.

Issues with Mental Health and Mental Healthcare in India – Explained, pointwise

Topic:- Social Justice

Sub topic:- Issues relating to development and management of Social Sector/Services relating to Health

[Yojana February 2023 Summary] Youth and Health – Explained, pointwise

Topic:- Social Justice

Sub topic:- Issues relating to development and management of Social Sector/Services relating to Health

Generative AI (Artificial Intelligence): Benefits and Challenges – Explained, pointwise

Topic:- Science and Technology

Sub topic:- Awareness in the fields of IT, and Computers

Lithium Reserves in India: Strategic Significance and Concerns – Explained, pointwise

Topic:- Human and Economic Geography

Sub topic:- Distribution of key natural resources across the world (including South Asia and the Indian sub-continent)

Global Sea Level Rise: WMO Report – Explained, pointwise

Topic:- Environment and Bio-diversity

Sub topic:- Conservation, environmental pollution and degradation

Adoption of EVs: Challenges and Solutions – Explained, pointwise

Topic:- Science and Technology

Sub topic:- indigenization of technology

Domestic Manufacturing of APIs (Active Pharmaceutical Ingredients): Status, Challenges and Solutions – Explained, pointwise

Topic:- Economic development

Sub topic:- changes in industrial policy and their effects on industrial growth

[Kurukshehra February 2023 Summary] Powering Growth in Agriculture Sector – Explained, pointwise

Topic:- Economic development

Sub topic:- storage, transport and marketing of agricultural produce and issues and related constraints

Winter Heatwaves – Explained, pointwise

Topic:- Geophysical Phenomena

Sub topic:- Geophysical Phenomena

The Issue of Menstrual Leaves – Explained, pointwise

Topic:- Social Justice

Sub topic:- mechanisms, laws, institutions and Bodies constituted for the protection and betterment of vulnerable sections.



[Kurukshetra February 2023 Summary] Decarbonisation of Transport Sector – Explained, pointwise

Introduction

The most critical and pressing issue in front of the world and coming generations is to contain the global temperature rise within 1.5°Celsius. Greenhouse gases (GHGs) are the reason for this temperature rise. Therefore, all the mechanisms and sustainable alternatives must be implemented to mitigate the climate risk. Climate change is having profound impacts on India. This includes adverse impacts on agriculture, water resources, forest and biodiversity, health, coastal management, and an increase in temperature. Heat waves have become more common and severe with many cities reporting temperatures above 48°Celsius. The decline in agricultural productivity is the significant impact of climate change on India. Recognising the impact, India is championing climate action to achieve the nationally determined climate goals, mainstream sustainability, and reduce the carbon footprint. In this context, decarbonisation of transport sector is vital to achieve the climate goals.

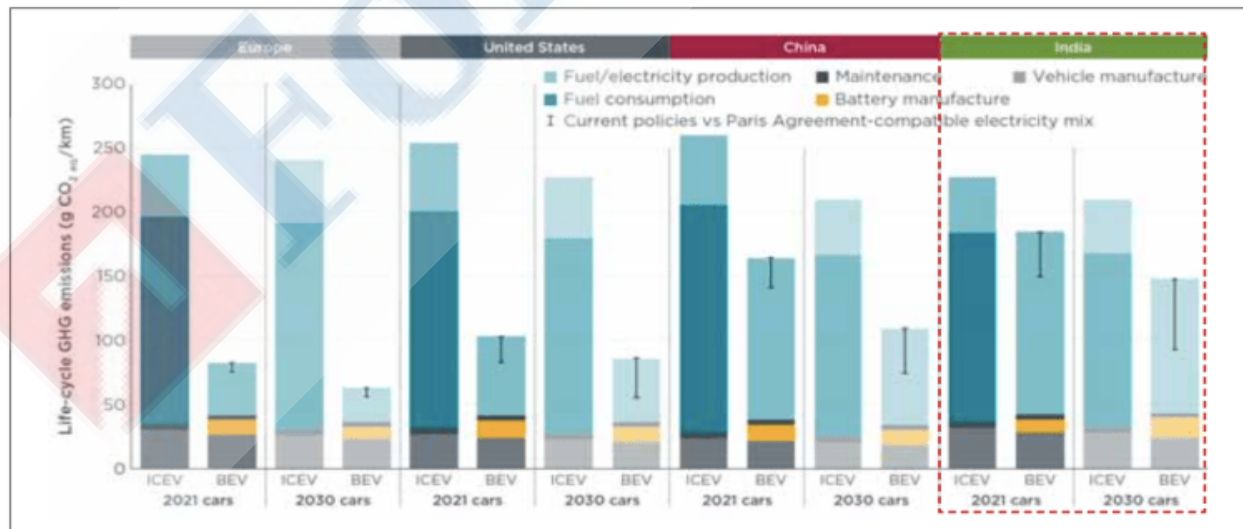
Current Status of Transportation in India

The average **carbon footprint of a person in India is 0.56 tonnes per year**, compared to the global average of four tonnes per person per year. India's transport demand is expected to increase by 2.7 times in over 30 years. Bus transport in India accounts for 38% of passenger km, though its share in overall registered vehicles in India is just around 3.5%. Two-wheelers account for 76-80% of the total registered automotive in India. Last-mile connectivity is still a big issue and mainly depends on three-wheelers and sub-seven-meter buses.

Sale of electric two-wheelers has jumped from 4,073 units in June 2021 to 42,260 in July 2022. The prices of electric buses is falling rapidly. In a [recent tender](#) by the Convergence Energy Services Limited (under Ministry of Power), the price discovered for EV buses has come to be 27% and 25% below diesel and CNG buses respectively (without subsidy).

India is the biggest manufacturer and market for two wheelers globally. The same status is expected to be carried over to EV segment. The EV segment is led by start-ups at present, but large traditional manufacturers are also scaling-up their EV segments.

Lifetime emissions from EVs are 19-34% lower than (Internal Combustion Engines) ICE vehicles.



Lifetime Emissions of EVs vs ICE in Different Countries

Source: Kurukshetra February 2023

Initiatives for Decarbonisation of Transport Sector

Shift to Zero Tailpipe Emissions Mode: The **National Electric Mobility Mission Plan (NEMMP) 2020** is a National Mission document providing the vision and the roadmap for the **faster adoption of electric vehicles** and their manufacturing in the country. As part of the NEMMP 2020, Department of Heavy Industry formulated the **[Faster Adoption and Manufacturing of \(Hybrid &\) Electric Vehicles in India](#)** (FAME India) Scheme in the year 2015. Its aim is to promote manufacturing of electric and hybrid vehicle technology and to ensure sustainable growth of the same.

The 1st Phase of FAME India Scheme was implemented through four focus areas namely: **(a)** Demand Creation, **(b)** Technology Platform, **(c)** Pilot Project and **(d)** Charging Infrastructure. Market creation through demand incentives was aimed at incentivizing **all vehicle segments** i.e. 2-Wheelers, 3-Wheelers Auto, Passenger 4-Wheeler vehicles, Light Commercial Vehicles and Buses.

The 2nd Phase (FAME II) is a 3-year subsidy programme. It aims at supporting the **electrification of public and shared transportation**. Since the launch of the the remodelled FAME II in June 2021, the sales have increased rapidly e.g., sale of two-wheelers have jumped from 4,073 to 42,260 between June 2021-June 2022.

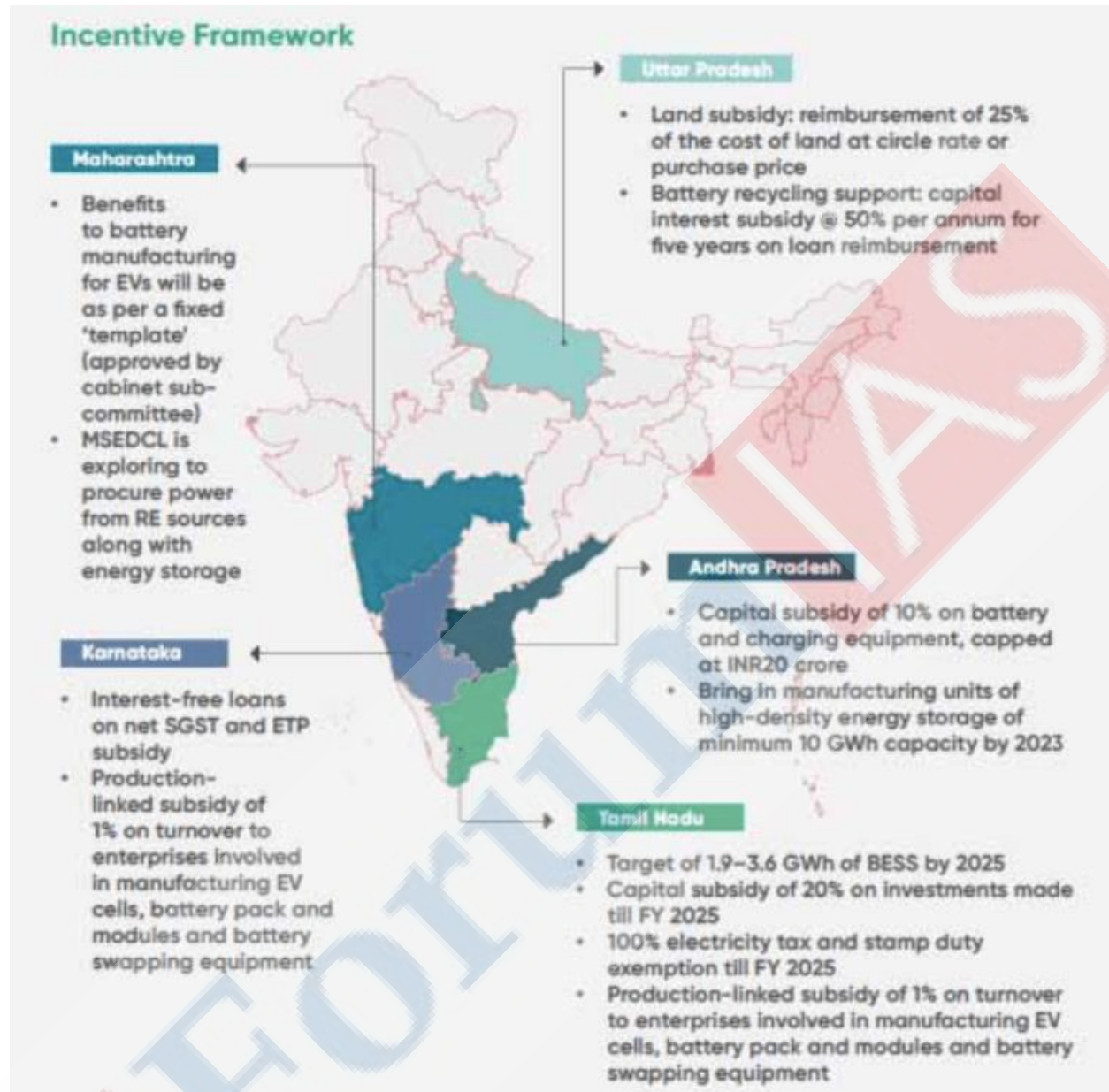
The Government has **nearly doubled the FAME 2 subsidy outlay** at INR 5,172 crore in the Union Budget 2023-24. This is 78% more than the INR 2,900 crore that it had earmarked in the Budget for FY2022-23.

EV Value Chain: The Government is trying to establish India as a leading producer across the full electric vehicle (EV) value chain. India has a chance also to become the global hub of manufacturing for the entire EV Value chain (except raw material mining). Therefore, billion-dollar incentive programs such as the **[Advanced Chemistry Cell Program](#)** with an outlay of US\$ 2.5 billion over five years were rolled out and have received an overwhelming response from the industry.

Similarly, to promote manufacturing of EV auto components, **[PLI for Advanced Auto Components](#)** (US\$ 3.5 billion) has been launched. This will pave the way for a smooth transition of existing auto parts manufacturing in India and produce global champions.

EV Policies: States have also provided several fiscal and non-fiscal supports, in addition to the incentives provided by the Union Government. More than 22 states have declared their EV policies. Several states have also rolled out the **incentives for battery manufacturing**.

Indian Railways have launched their EV policy. They not only want to phase out all ICE vehicles used by Indian railways in offices etc., but also to **put the charging stations at all electrified railway station parking spaces**. This will significantly **boost the charging infrastructure availability** and help railways achieve their net zero carbon emission by 2030.



Source: Kurukshetra February 2023

Promoting Environmentally Friendly Technology: India is focusing on catalyzing, growing and fuelling the entrepreneurs in the country to create businesses with clean technologies such as hydrogen, electric mobility, batteries, etc. Green technologies are driving sustainable development in India. Such technologies maximise energy efficiency and preserve the environment while saving money.

Shoonya – Zero Pollution Mobility: It is a consumer and corporate-facing campaign hosted by NITI Aayog. The campaign aims to accelerate the transition of vehicles used for ride-hailing and deliveries into electric vehicles (EVs) by creating awareness and demand for zero-pollution rides and deliveries in Indian cities. The ecosystem it has created by bringing together a dedicated group of industry stakeholders, corporate partners, and consumers is being utilized to build awareness around EVs.

Challenges to Decarbonisation of Transport Sector

First, The initial purchase price of electric two-wheelers with fixed batteries is still greater than that of internal combustion engine vehicles. On a total cost of ownership basis, EVs are cheaper. However, high initial costs act as a deterrent to adoption.

Second, the 2-Wheeler EV segment is being driven by start-ups and new entrants. Established players in 2-wheeler segment seem to be reluctant to join the EV bandwagon. This can limit the scale-up and expansion of the segment.

Third, despite policy initiatives, there is **severe shortage of charging infrastructure**. Lack of charging infrastructure has limited adoption of EVs. The setting-up of charging infrastructure is not lucrative and appealing proposition as of now due to low market penetration of EVs. Hence, there seems to be catch-22 situation.

Fourth, Despite Government push, the adoption of public transport has been low.



Z

ZERO-CARBON LIFESTYLE



- Using staircase instead of lifts.
- Use public transport over private transport.
- Solarize your homes.



Fifth, the manufacturers have not yet focused on the commercial vehicle EV segment, which has a large share in the transport sector and remains a large emitter.

Way Forward for Decarbonisation of Transport Sector

First, to meet the needs of EVs, primarily four-wheelers, cargo three-wheelers, Light commercial vehicles (LCVs), and buses, there is a need to **develop fast charging technology**.

Second, Government-led firms like BHEL/BEL can work together to build a local supply chain for charger manufacturing. Further technical assistance can be obtained from research institutions such as IISc and labs such as CPRI/CSIR/ARCI.

Third, Opportunity charging and hybrid battery storage concepts (with fixed and switch battery) should be investigated for intercity transportation.

Fourth, Rural battery swap stations can alter the landscape of EV adoption and battery storage. It has the potential to increase electricity availability and quality in remote places. For example, in rural locations, the battery switch station might be powered by localised solar power (small setups). These switch stations can **function as micro power grids**, supplying extra power to the grid while also powering nearby villages/houses, in addition to functioning as **EV exchanges**. Suitable models should be developed to scale-up such swap stations.

Fifth, there is a need for developing a **mission plan for Advanced Chemistry Cell (i.e. battery) recycling**. This is especially significant since more than 95% of the original essential minerals in these ACC batteries may be **recovered and reused in cell production**. Many countries have already made the use of recycled materials in new ACC cells mandatory. India should adopt a similar approach.

Sixth, German commercial vehicle manufacturers have committed to launching light-duty and heavy-duty electric vehicles as well as developing a dedicated charging network in Germany. All large manufacturers (Traton Group, Daimler, and Volvo) are **cooperating with each other** and investing in zero-emission commercial vehicle charging infrastructure to **mitigate risks and boost asset utilisation**. A similar strategy can be adopted by Indian manufacturers.

Seventh, the **electric bicycles** need to be promoted. Although the prices of electric bikes are currently high, leasing companies, fleet operators, aggregators, financiers, etc., can make it a viable option. e-Commerce and hyper-local delivery start-ups can utilise e-bikes to reduce their carbon footprint.

Eighth, Since EV is an evolving space, capacity building at all levels, along with upskilling and reskilling, is very important. It all starts with the government officials at the municipal level who interact for things like charging infra, incentives, etc. The sensitisation of the latest guidelines, rules, incentives, etc. should be **well communicated through regular training**.

Ninth, the decarbonisation of transport sector and transition to EVs will require creation of future ready workforce. NITI Aayog is working with IITs to nudge them to start EV-specific courses. More than 15 IITs have already started the courses at the PG level. This has to trickle down to diplomas and other technical and non-technical institutes.

Conclusion

The Government has laid an ambitious outline and policies to direct the country towards a cleaner, greener, and more connected world. The industry is also reciprocating the same, but the speed needs to pick up on all sides, including manufacturing and consumer acceptance. Decarbonisation of Transport sector is vital to achieve the Net Zero target. It would require close cooperation among all stakeholders; Government, Business and the citizens.

Syllabus: GS III, Conservation.

Source: Kurukshetra February 2023, [Economic Times](#), [PIB](#)

Issues with Mental Health and Mental Healthcare in India – Explained, pointwise**Introduction**

Mental disorders are now among the top leading causes of health burden worldwide, with no evidence of global reduction since 1990. Suicides rates in India are amongst the highest when compared to other countries at the same socio-economic level. The latest survey by India's National Institute of Mental Health and Neurosciences (NIMHANS) found that nearly 150 million Indians are in need of mental healthcare services, but fewer than 30 million are seeking care. This shows several issues with mental healthcare in India including access and social attitude to mental health. The Government has taken several initiatives to improve access to mental healthcare services in addition to gradually changing the discourse on mental health. However, as evident in the data, there is a need for further effort to address the issues.

What is the status of Mental Health in India?

The WHO defines Mental Health as, *“Mental health is a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community. It is an integral component of health and well-being that underpins our individual and collective abilities to make decisions, build relationships and shape the world we live in“.*

The WHO calls Mental health as a basic human right. And it is crucial to personal, community and socio-economic development.

According to the WHO, mental illness makes about 15% of the total disease conditions around the world. In 2019, India's suicide rate was at 12.9 per 1,00,000 persons. This was higher than the regional average of 10.2 and the global average of 9.0. Suicide has become the leading cause of death among those aged 15–29 in India.

In 2017, an estimation of the burden of **mental health conditions** for the States across India revealed that as many as **197.3 million people (~14% of the population) required care for mental health conditions**. This included around 45.7 million people with **depressive disorders** and 44.9 million people with **anxiety disorders**.

According to the **National Mental Health Survey** conducted by NIMHANS in 12 States, the prevalence of mental morbidity is high in urban metropolitan areas. Nearly 1 in 20 persons suffer from depression. 0.9 % of the surveyed population were at high risk of suicide.

According to the NCRB data, 1,64,033 people committed suicide in 2021, a 6.2% rise in comparison to 2020.

What are the harmful effects of poor Mental Health?

Impact on Physical Health: A study found that positive psychological well-being can reduce the risks of heart attack and stroke. On the other hand, poor mental status can lead to **poor physical health** or harmful behaviour. Depression has been linked to many **chronic illnesses**. These illnesses include diabetes, asthma, cancer, cardiovascular disease, and arthritis.

Impact on Relationships: Mental-health conditions during adolescence and young adulthood can have a significantly negative impact on the development of safe and healthy relationships with peers, parents, teachers, colleagues and partners.

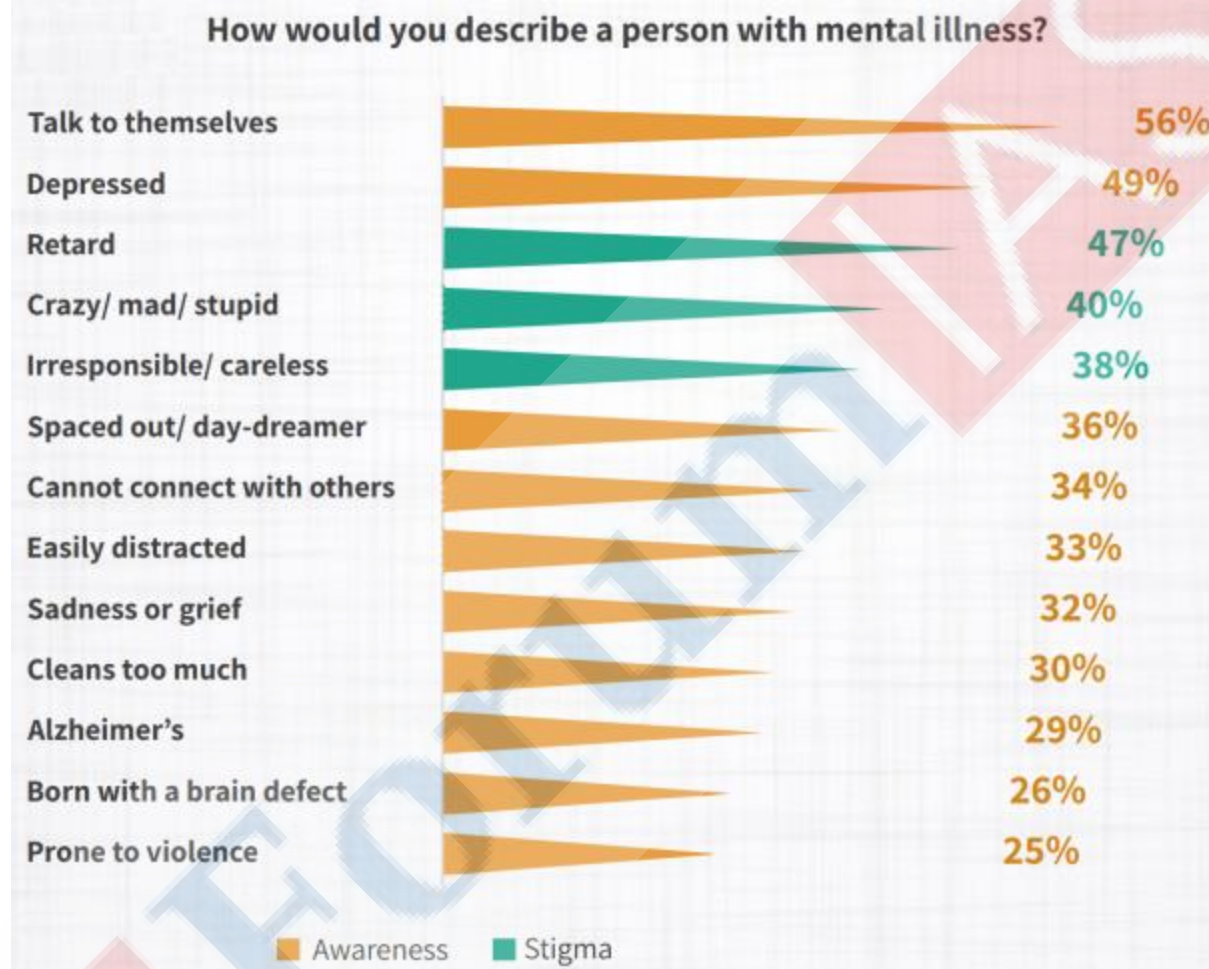
Impact on Productivity: It impacts a person's ability to concentrate and engage in productive activities.

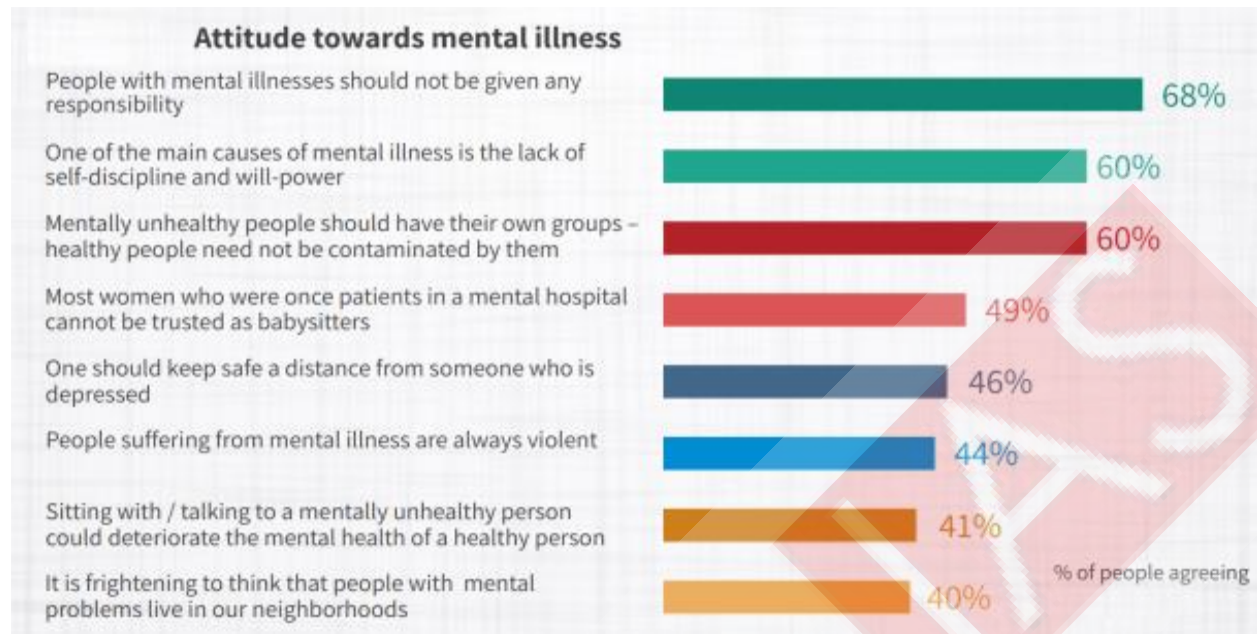
The **WHO Report on Mental Health and Development** (2010) highlighted the risks of a **cyclical relationship between vulnerability and poor mental health**, in which people with such conditions are a vulnerable group subject to stigma, discrimination, violence, marginalization and other violations of their human rights.

What are the reasons for poor status of Mental Health in India?

Lack of Awareness and Sensitivity: In India, mental health issues are not considered as healthcare issues. Any person suffering from mental issues is considered weak. **Stigma and discrimination** often undermine social support structures. Persons suffering from such issues are often tagged as 'lunatics' by the society. This leads to a vicious cycle of shame, suffering and **isolation of the patients**.

A survey conducted in 2018 showed that while 87% of the respondents showed some awareness of mental illness, **71% also used terms associated with stigma**.





Source: WEF

Lack of Mental Healthcare Personnel: There is a severe shortage of mental healthcare workforce in India. According to the WHO, in 2011, there were **0.301 psychiatrists** and **0.047 psychologists** for every 100,000 patients suffering from a mental health disorder in India. In contrast, the ratio in most developed countries is in excess of 10.

Gap in Treatment: At present, only 20-30% of people with mental illnesses receive adequate treatment. One major reason for such a wide treatment gap is the problem of inadequate resources.

Low budget Allocation: Developed countries allocate 5-18% of their annual healthcare budget on mental healthcare, while India allocates roughly 0.05% (Organization for Economic Co-operation and Development, 2014) of its healthcare budget. This is the lowest among all G20 countries. Despite a rise in mental illness issues, the Union Ministry of Health allocated less than 1% of its budget to directly deal with psychological illnesses in 2022.

Changed Lifestyle: Increased use of certain kinds of social media is exacerbating stress and mental illness, especially among the young people. Social media **detracts from face-to-face relationships**, which are healthier, and reduces investment in meaningful activities. More importantly, it **erodes self-esteem** through unfavourable social comparison. In addition, some experts contend that the **shift to nuclear families** has reduced the avenues of relieving one's anxieties as family members are not emotionally available at most crucial times.

Income Inequalities: Mental issues are closely linked with poverty. People living in poverty are at greater risk of experiencing mental health conditions. On the other hand, people experiencing severe mental health conditions are more likely to fall into poverty through loss of employment and increased health expenditure.

What steps have been taken to improve Mental Health in India?

Legal Measures

The Mental Healthcare Act, 2017: The Act makes several provisions to improve the state of mental health in India. The Act rescinds the Mental Healthcare Act, 1987 which was criticised for failing to recognise the rights and agency of those with mental illness. The Act seeks to ensure rights of the person with mental illness to receive care and to **live a life with dignity**. It provides the **Right to Access to Healthcare:** Every person shall have a right to access mental health care

and treatment from mental health services run or funded by the appropriate Government. It also empowers person with mental illness to **make an advance directive** that states how he/she wants to be treated for the illness.

The **Act decriminalised suicide** stating that whoever attempts suicide will be **presumed to be under severe stress**, and shall not be punished for it.

Rights of Persons with Disabilities Act, 2017: The Act **acknowledges mental illness as a disability** and seeks to enhance the Rights and Entitlements of the Disabled and provide an effective mechanism for ensuring their empowerment and inclusion in society.

Schemes and Initiatives

National Mental Health Programme (NMHP): Keeping with the WHO's recommendations, the programme was introduced in 1982 to provide mental health services as part of the general healthcare system. The **District Mental Health Programme (DMHP)** component of the NMHP has been sanctioned for implementation in 704 districts for which support is provided to States/UTs through the National Health Mission.

Facilities made available under DMHP at the Community Health Centre (CHC) and Primary Health Centre (PHC) levels, include outpatient services, assessment, **counselling/ psycho-social interventions**, continuing care and **support to persons with severe mental disorders**, drugs, outreach services, ambulance services etc. In addition to above services there is a provision of 10 bedded in-patient facility at the District level.

Generating Awareness: To generate awareness among masses about mental illnesses **Information, Education and Communication (IEC) activities are an integral part of the NMHP.** At the District level, sufficient funds are provided to each District under the DMHP (under the Non-communicable Diseases flexi-pool of National Health Mission) for **IEC and awareness generation activities** in the community, schools, workplaces, with community involvement.

Under the DMHP various IEC activities such as awareness messages in local newspapers and radio, street plays, wall paintings are undertaken by the States/UTs.

National Tele Mental Health Programme: The Government has announced a National Tele Mental Health Programme in the Budget of 2022-23, to further improve access to quality mental health counselling and care services in the country.

Kiran: A 24/7 toll-free helpline called *Kiran* was established by the Ministry of Social Justice and Empowerment in 2020 to offer support to those dealing with anxiety, stress, depression, suicide thoughts, and other mental issues.

Manodarpan: Students will receive psychosocial help as part of an effort under the *Atmanirbhar Bharat Abhiyan*, with the goal of improving the students' mental health and overall well-being. Its components include **Advisory Guidelines** for students, teachers and faculty of School systems and Universities along with families; National level database and directory of counsellors; Toll-free helpline; Handbook on Psychosocial Support etc.

Issuance of Guidelines/Advisories: Guidelines/ advisories on management of mental illness have been issued by the Government. All the guidelines, advisories and advocacy material can be accessed on the website of the Union Ministry of Health and Family Welfare under 'Behavioural Health – Psychosocial Helpline'.

What steps can be taken further?

There is a need of an urgent and well-resourced 'whole-of-society' approach to protect, promote and care for the mental health of people. This should be based on the following pillars.

First, there is a need to **address the deep stigma** surrounding such issues which prevents patients from seeking timely treatment and makes them feel shameful, isolated and weak.

Second, mental health should be made an **integral part of the public health programme** to reduce stress, promote a healthy lifestyle, screen and identify high-risk groups and **strengthen interventions** like counselling services. Special emphasis should be given to schools. In addition, special focus should be on groups that are highly vulnerable to mental health issues such as victims of domestic or sexual violence, unemployed youth, marginal farmers, armed forces personnel and personnel working under difficult conditions.

Third, Infrastructure should be improved for mental health care and treatment. Innovative models are required to **deepen the penetration of services and staff**. ASHAs can be trained for this purpose. Community health workers (ASHAs) can not only **educate and sensitize women** and children about mental diseases but also guide them to reach the right expert in their locality.

Fourth, The above interventions will require **enhanced allocation to mental healthcare** in the Budget. Substantial investment will be needed to **address the wide treatment gap** in the health infrastructure and human resources.

Fifth, Careful mapping and research needs to be undertaken to **produce quality data**, that is essential to understand the size of the problem. This in turn should be utilised to implement a comprehensive approach, supported by heightened political commitment, scientific understanding and a citizen driven movement.

Sixth, the WHO has recommended Three Paths to transformation towards better Mental Health.



DEEPEN VALUE AND COMMITMENT

- Understand and appreciate intrinsic value
- Promote social inclusion of people with mental health conditions
- Give mental and physical health equal priority
- Intensify engagement across sectors
- Step up investment in mental health



RESHAPE ENVIRONMENTS

- Reshape physical, social and economic characteristics of different environments for mental health, including
 - homes
 - schools
 - workplaces
 - health care services
 - communities
 - natural environments



STRENGTHEN MENTAL HEALTH CARE

- Build community-based networks of services
- Move away from custodial care in psychiatric hospitals
- Diversify and scale up care options
- Make mental health affordable and accessible for all
- Promote person-centred, human rights-based care
- Engage and empower people with lived experience

Source: WHO

Conclusion

The status with respect to mental issues has worsened since COVID-19 pandemic. The mental healthcare system in India is under-equipped to deal with the crisis. Urgent interventions, in terms of enhanced budget, increased workforce, and improved awareness are necessary to address the challenge.

Syllabus: GS II, Issues relating to development and management of Social Sector/Services relating to Health.

Source: [Indian Express](#), [Indian Express](#), [Economic Times](#), [PIB](#)

[Yojana February 2023 Summary] Youth and Health – Explained, pointwise**Introduction**

The youth constitute nearly half of India's population. Youth contribute to the economic growth of the country as it is the most productive age group being employed. Much of the economic growth potential of India is derived from the vibrant and highly skilled youth population in the country. Youth face a lot of health issues because of their physiological state, behaviours, diet, work and other factors, many of which are related to their behavioural habits.

Youth Health Issues

Mental Health: Clinical depression has been one of the leading causes of illness and disability among young adults and adolescents, followed by suicide. The reasons include poor scholastic or workplace performance, violence, poverty and unemployment, stigma, marginalisation and discrimination, peer pressure etc. Challenges like non-availability of mental health services as well as not recognising mental health issue as a reason to seek healthcare worsen the situation.

Alcohol and Drug Use: Alcohol and drug use is largely associated with various high risk behaviours that can cause communicable and non-communicable diseases like HIV/AIDS, hypertension, cardiovascular diseases and liver diseases, etc. Also, **mental health is compromised** in such individuals as well their family members due to financial burden that follows.

Tobacco Use: Majority of the individuals who use tobacco in any form (smoking or chewing) begin doing so in their adolescence. This is usually combined with alcohol dependence, increasing the risk of various illnesses significantly. Tobacco can cause cancer of oral cavity, throat, oesophagus and lungs and many other health issues. In addition, tobacco consumption increases the risk of hypertension, diabetes mellitus, heart diseases, stroke, vascular diseases etc.

Physical Inactivity: It has been estimated that **only 20% of the young adults are known to exercise adequately or be involved in sports activities** (longer than 30 minutes per day and 5 days a week). Less physical activity causes increase in risk factors and diseases including obesity, hypertension, diabetes mellitus, heart diseases and other chronic diseases. Physical inactivity can impact mental health adversely.

Diabetes and Hypertension: Diabetes is becoming potentially epidemic, with 1 in every 10 adult having diabetes. 1 in every 5 adults in India have hypertension. In both cases, majority are not aware that they have diabetes or hypertension. Recent years have seen more and more young people developing diabetes at earlier age. The major reasons for this is reduced physical activity and unhealthy diet.

Other Health Problems: These include injuries in the form of accidents, self-harm, workplace accidents etc. The violence in the form of interpersonal violence, domestic violence, workplace violence, bullying ragging, sexual violence can take place.

These health problems that have early onset during youth can have long bearing effects at older age, specially the chronic diseases. Early onset can reduce longevity, quality of life, increase expenses and can lead to early complications during older age.

Improving Health of the Youth

There are three secrets of healthy life: **Balanced Diet, Regular Physical Activity** and **Sufficient Sleep**. The youth often lack on one or more of these aspects. Though there has been a series of Government initiatives- from both health sector as well as other sectors, however, those are yet to catch the full attention of youth. The *Ayushman Bharat* programme with health and wellness

centre component has focus on **nirogi** or **preventing illness by adoption of healthier lifestyle**. 'FIT India' initiative is aimed at increasing exercise habits of people including youth.

Initiatives by Government for Improving Health of the Youth

Sl. No	Programmes/Initiatives	Features
1.	Rashtriya Kishor Swasthya Karyakram (RKSK)	<ul style="list-style-type: none"> The programme's main strength is its health promotion approach. The focus of the programme is shifted from the clinic-based approach to prevention and promotion and reaching the adolescents in their own environment which includes their communities or families or schools.
2.	Adolescent Friendly Health Clinics (AFHC)	<ul style="list-style-type: none"> It includes all health issues from sexual and reproductive health to injuries, violence, substance abuse, nutrition, NCDs, etc. The components of AFHC are acceptable, equitable, accessible, appropriate, comprehensive.
3.	Peer Education Programme	<ul style="list-style-type: none"> The selected peer educators have to ensure that the adolescents benefit from RKSK. These peer educators are called 'Saathiya'. Four peer educators (two boys and two girls) are selected per village/1000 population/ASHA habitation to reach out to adolescents.
4.	Menstrual Hygiene Scheme	MoHFW launched a scheme for promotion of menstrual hygiene in adolescents. It mainly focuses on increasing the awareness, increasing access and usage of sanitary napkins along with its safe disposal.
5.	Health and Wellness Centres under Ayushman Bharat Programme	The HWCs promote a comprehensive health approach by preventive and promotive interventions.
6.	FIT India	This initiative is aimed at adoption of healthier lifestyle in youth by getting involved in sports and other related activities.
7.	Other Health Programmes	Various health programmes like National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke. (NPCDCS), Reproductive, Maternal, Newborn, Child Plus Adolescent Health (RMNCH+A), National AIDS Control Programme (NACP), National Mental Health Programme (NMHP) and others also strive in improving youth health.

Source: Kurukshetra February 2023

Making Health of Youth a Mass Movement

This requires optimal utilisation of every possible avenue for improving health of this age group. It requires interventions at schools, colleges and workplaces amongst other. It demands that the **school health services are strengthened** and **work as early intervention centres** for dealing with the rising incidence of various disease. There is no structured and focused programme to promote health among college students. This is the age group which has queries and concerns mostly unanswered regarding the mental health, sexual health, drug as well as personal health concerns.

The **workplace health** has to be promoted by installing weighing scales in bathroom, exercise time and equipment in large offices as well as **encouraging healthy food** in cafeteria menu. The official policies on timely care seeking when not feeling well and **reducing stress in workplace** should be promoted. There is a need for **improving health seeking behaviour** of youth who

often resort to self-remedies. There is a need for **improving family and community participation** in improving health of youth in India.

Healthy Lifestyle

There is a lot of **stigma associated with mental health issues**. This is a reason people do not seek health care. However, mental illnesses are very similar to any physical illness. With right advice from trained doctors and with medications, both physical and mental illnesses can be treated. It is time to **start talking about mental health** issues. There is need to **destigmatise mental health**.

Regular physical activity is zero-cost effort, which one can do for good health. According to WHO and other health agencies, people should engage in at least **150 minutes of moderate intensity aerobic physical activity per week** or at least **75-150 minutes of vigorous-intensity aerobic physical activity**. India has been **ranked 8th among countries with the lowest physical activity globally**.

Reports have shown that **3 out of 4 adolescents and young people are not physically active** enough as per the given recommendations. A study showed that barriers to low physical activity are personal attributes, perceived negative consequences, sociocultural environment, lack of time etc. Identification of these barriers and steps to overcome these are required.

Regular and at least **six to eight hours of sleep boosts immunity**, reduces stress and keeps us away from many health. Therefore, making one's sleep cycle regular and ensuring that enough sleep on daily as well as weekly basis has to be an approach of every person.

Sports, Health and Youth

The leading health body, the World Health Organization has established a Sports and Health programme to capitalise the potential of people to lead healthy lives through promoting participation in sports and working with the sports community. It has been established that physical activity through various sports can **boost confidence**, improve **social life**, lead to **psychosocial and personal development** and help in **prevention of substance abuse**.

Conclusion

Youth constitute around half of India's population and are the foundation of country's economic growth and development. Though, otherwise healthy population, the youth face a host of problems due to their age, behaviour and other factors which can have long-term effect during old age. Prevention of ill health effects in youth can have long-term benefits individually, at family level and at national level. The policies aimed at youth should be targeted at healthier lifestyle, adoption of regular physical activity and health prevention and promotion measures. Healthy youth today will make healthy nation tomorrow.

Source: Yojana February 2023

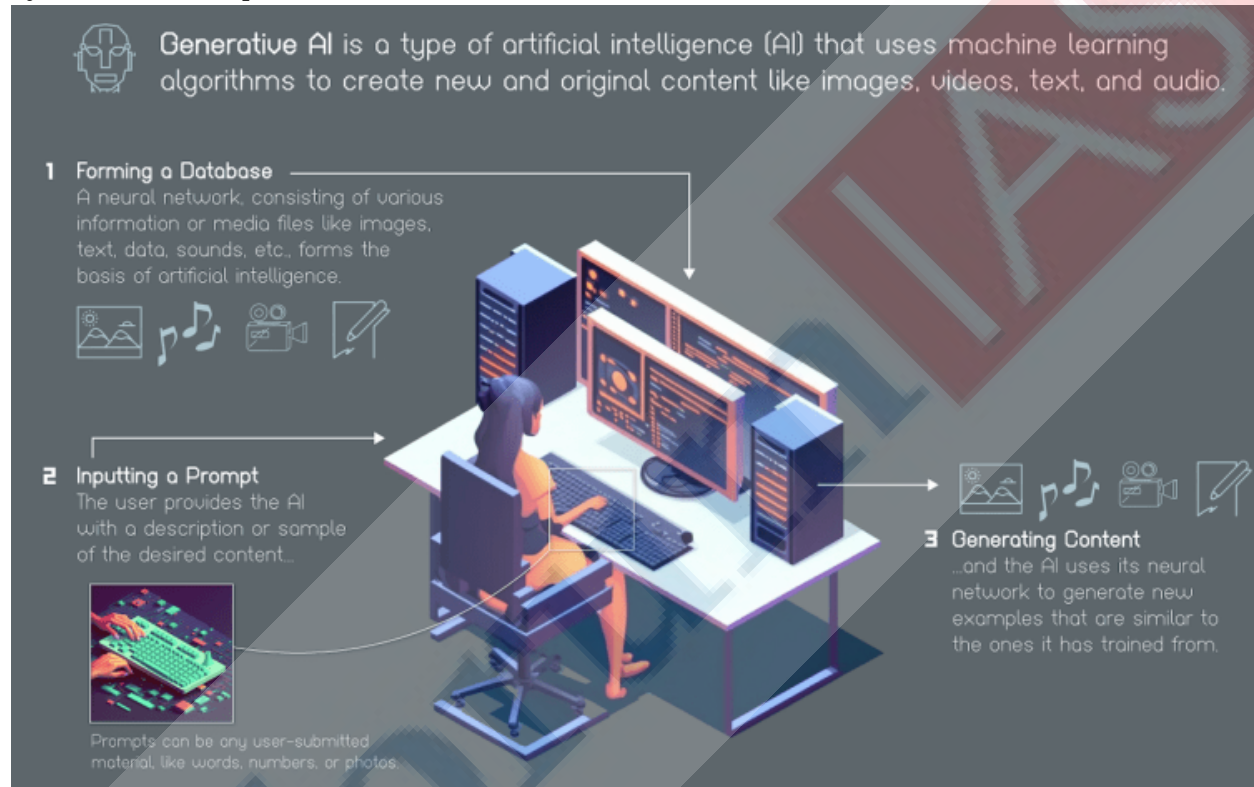
Generative AI (Artificial Intelligence): Benefits and Challenges – Explained, pointwise

Introduction

Since its release, ChatGPT has received a lot of attention. While, the users are marvelling at its 'human-like' responses, technology experts are debating the potential applications and concerns associated with Generative AI (Artificial Intelligence). Generative AI has the potential to revolutionise almost every field of human activity. However, the possibility of misuse of the technology and loss of skilled and semi-skilled jobs has prompted calls for more cautious approach in the development of the Generative AI.

What is Generative AI?

Generative AI uses **Artificial Intelligence and Machine Learning algorithms** to enable machines to **generate new content** (machine generated). Systems use previously created content, such as text, audio, video, images, and code. The term 'Generative' refers to the ability of the models to learn how to **create new data rather than simply recognising it**. For example, a generative model may learn how to generate images that resemble faces given a set of parameters (such as the eyes, hair, or skin colour etc.). The content (text, image etc.) generated by AI is so 'authentic', that it is difficult to distinguish whether the content has been generated by human or computer.



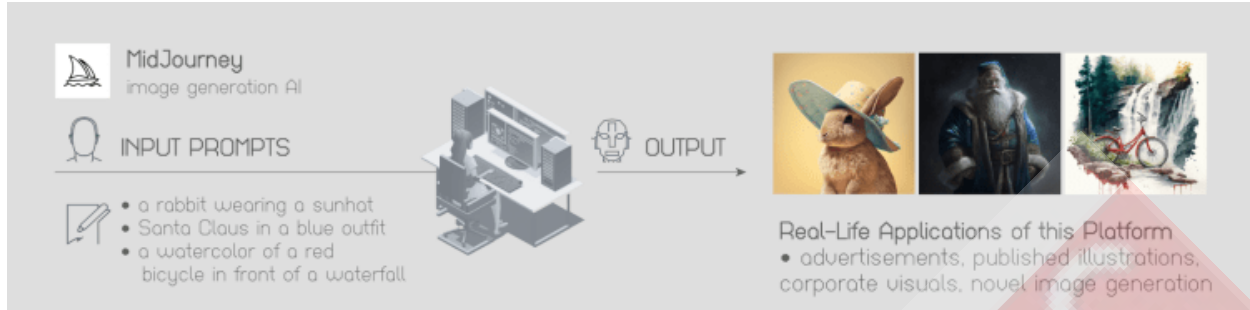
Source: [WEF](#). The above image has been created by Generative Artificial Intelligence developed by Midjourney Labs. The text prompt to generate the image was 'A technical illustration of a woman sitting behind a desktop computer on a long table, isometric view, 3D rendering, realistic...'

What are the applications of Generative AI?

The applications of Generative AI are wide and still evolving.

Motion Picture Industry: Applications of Generative Artificial Intelligence in the movie industry is wide. It can be utilized to alter the background/landscape according to the need (rather than wait for required conditions to exist e.g., a movie scene requiring cloudy weather can be shot under any weather conditions, and the background can be altered later on using AI). Images or videos of Actors at various ages are also possible with Generative AI technology. By using **face synthesis** and **voice cloning**, artist's/actor's original voice can be matched with a lip-sync. This will also help in archiving artefacts after restoration for future references.

Search Engine Services: Generative Artificial Intelligence has the capability to take search engine services to the next level, e.g., Text to Image translation may be utilized to provide search results. It can also be used to produce **realistic photographs from textual descriptions of objects** like birds and flowers.



Source: WEF. Images created by Midjourney through Generative Artificial Intelligence using Text Prompt.

Security Services: Generative Artificial Intelligence can create front-on photos from photos taken at different angles and vice versa for face verification or face identification systems. Such systems can be deployed at airports, international border check-points etc.

Healthcare: Semantic-Image-to-Photo Translation can convert inputs that are semantic images or sketches to photo-realistic images e.g., if X-ray or any CT scan images can be converted to real images, **diagnosis can be much more accurate.**

Advertising: Generative AI can create new advertisements based on existing ones, making it easier for companies to reach new audiences.

Location Services: This involves converting satellite images to map views. This can be a huge step towards venturing into unexplored geographic locations.

The possible applications of Generative AI are still being explored and can expand considerably as the technology evolves further. It can expand to fields like education, content creation, banking among others.

What are the benefits of Generative AI?

Increased Efficiency: Generative Artificial Intelligence can be used to automate tasks that would otherwise require manual labor. This can **help businesses save time and money**, as well as increase efficiency e.g., it can be used to generate images and videos quickly and accurately, which can be used in marketing campaigns or other projects.

Improved Quality: Generative Artificial Intelligence can help improve the quality of content generated. It can be used to create high-quality images and videos that are **more visually appealing** than those created manually. Additionally, it can be used to generate text that is **more accurate and relevant** than text created by humans.

Faster Results: Generative Artificial Intelligence can help businesses get results faster than they would with manual labor. It can create images and videos in a fraction of the time it would take a human to do the same task. This can help businesses get their projects done at a much faster rate.

Cost Savings: By automating tasks, businesses can reduce their labor costs and save money. Additionally, it can help businesses reduce costs associated with creating content, such as images and videos.

Improved Decision Making: By using Generative AI, businesses can generate data that can be used to make better decisions e.g., it can be used to generate data that can be used to make decisions about marketing campaigns or product development. Applications in the medical field can help in better diagnosis.

Increased Creativity: Businesses can generate new ideas and concepts that can be used to create new products or services.

Improved Customer Experience: Businesses can generate content that is **more accurate and relevant** to their customers. This can help businesses create a better customer experience and increase customer satisfaction.

What are the concerns associated with Generative AI?

Accuracy: Despite the advancements, the Generative AI technology is not fool proof and produce erroneous content. The Machine Learning Algorithms depend on the quality of the input data. Erroneous or inaccurate data can generate inaccurate results.

Increase Biases: Generative Artificial Intelligence systems can **perpetuate and amplify existing biases**. If the models are trained on biased, non-inclusive data, they will generate biased outputs, such as offensive or discriminatory language, demeaning and degrading imagery, and prejudicial content. A rights-group in the US pointed out the example of an AI-based generative imagery programme showing images of only white men for the prompt 'CEO'.

Malicious Purposes: Generative AI systems can create content for malicious purposes, such as **deepfakes**, disinformation, and propaganda. It can also generate offensive or inappropriate content. Nefarious actors may use AI-generated media to **manipulate people and influence public opinion**. It can be misused by enemy States, or non-State actors to destabilise domestic peace by spreading misinformation.

Read More: [Take a Step to Regulate Deepfakes](#), [Threat of Deepfakes in India](#)

Low Quality Output: It may also produce low-quality and less accurate information, specifically in the context of complex engineering and medical diagnosis.

Concern over Data Privacy: Data privacy issues can arise from using generative AI in different industries, such as healthcare, since it involves collecting private information about individuals.

Limitations in Creativity: AI uses past data as a template for future work. It means that the output produced by Generative AI is usually based on something that has already happened rather than anything genuinely creative. In short, AI systems lack creativity, originality and human ingenuity. AI Systems cannot generate new ideas by themselves, they can only make associations based on the data fed into them by humans.

Issues Related to Copyright: It can be challenging to determine who is **responsible for the content generated by a Generative AI system**. The acquisition and consent model around the training data and intellectual property issues make it difficult to hold anyone accountable for any harm resulting from its use. In addition, there are concerns related to **use of copyrighted content to train AI systems**. The work derived from such content can have copyright implications. Getty Images has sued Stable Diffusion in the London High Court, accusing them of using its images illegally.

Risk of Unemployment: Although it is too early to make certain judgements, there is a risk that generative AI could contribute to unemployment in certain fields. This could happen if generative AI automates tasks or processes previously performed by humans, leading to the displacement of human workers.

Environmental Concerns: AI systems require a lot of computing power. This has implications for environments, in terms of energy consumed in operating AI systems. An analyst pointed out that training a transformer model just once with 213 million parameters can emit carbon emissions equivalent to 125 air-flights between New York and Beijing. GPT3 has 175 billion parameters, so its emissions would have been much larger.

What should be done going ahead?

First, To address bias and fairness, researchers can use techniques such as de-biasing and **fair representation learning**, which can help to remove biases present in the training data.

Second, Researchers can also use techniques such as counterfactual data generation, which can help to generate more diverse and representative training

Third, There is need to add rigour and responsibility to developing AI technology, **develop and enforce ethical guidelines**, conduct regular audits for fairness, identify and address biases, and protect privacy and security.

Fourth, There is need to add **adequate policy, regulation, awareness, and education guardrails** to develop and use Generative AI services ethically and responsibly. China has proposed a policy for the same. Some measures include requirement for the users of Generative AI to ensure that **any doctored content using the technology is explicitly labelled** and can be traced back to its source. The regulation also mandates people using the technology to edit someone's image or voice, **to notify and take the consent of the person** in question.

Fifth, Intellectual property law must find a way to protect artists from copies that erode the value of their original work, but at the same time encourage them to continue to be inspired by others. The US Copyright Office has already declared that AI generated art is not entitled to intellectual property protection as it lacks the 'nexus between the human mind and creative expression', which is necessary to invoke copyright protection.

Conclusion

The Generative AI is a revolutionary technological development. However, as is the case with every new technology, it has several associated concerns. A pragmatic approach is necessary that can minimize the negative impacts of technology. A cooperation at a global level will be required to establish the norms and standards, as well as checking misuse of the technology that can transcend national boundaries.

Syllabus: GS III, Awareness in the fields of IT and Computers

Source: [Mint](#), [Mint](#), [The Hindu](#), [WEF](#)

Lithium Reserves in India: Strategic Significance and Concerns – Explained, pointwise

Introduction

The Union Ministry of Mines recently announced the major discovery of [lithium reserves in India in Jammu and Kashmir](#). The Geological Survey of India (GSI) has established 5.9 million tonnes of **inferred lithium resources** in the Salal-Haimana area of Reasi District in Jammu and Kashmir. Lithium is considered a strategic element because of its use on batteries used in Electric Vehicles (EVs). The finding of the reserves is being considered as a game-changer in India's transition towards green mobility.

Types of Reserves and Resources (United Nations Framework Classification (UNFC) System)

Mineral Reserve: *Economically mineable* part of *measured* and/or *indicated* mineral resource.

Probable Mineral Reserves: *Economically mineable* part of *indicated* or in some cases, a *measured* mineral resource.

Proven Mineral Reserves: *Economically mineable* part of *measured* mineral resource.

Mineral Resource: A Mineral Resource (Remaining or Additional Resource) is the balance of the Total Mineral Resources that *have not been identified as Mineral Reserve*.

Measured Mineral Resource: That part of mineral resource for which tonnage, density, shape, physical characteristics, grade and mineral content can be estimated with a *high level of confidence*, i.e., based on detailed exploration.

Indicated Mineral Resource: The tonnage, density, shape, physical characteristics grade and mineral content can be *estimated with reasonable level of confidence* based on exploration, sampling and testing information, location of borehole, pits, etc.

Inferred Mineral Resource: Tonnage, grade and mineral content can be estimated with *low level of confidence inferred from geological evidence*.

Note: Resource is a broader and more general term than Reserve. Resource includes identified material that may be less well characterized, possibly of lower grade and less certain to be economically recoverable. Resources can be converted to Reserves by additional drilling or changes in economic factors, such as price or technology.

At present, the GSI has established '**Inferred Resources**' of Lithium. Thus, in pure technical terms, the deposits found in J&K are **not Reserves but Resources**, although in common parlance they are being referred as Reserves. GSI will undertake further research to establish the economic viability of mining Lithium. Actual Reserves may turn out to be less than 5.9 million tonnes of Inferred Resources.

About Lithium and Its Uses

Lithium is a soft, shiny grey metal found in the earth's crust. It is a highly reactive and alkaline metal.

Lithium is a key element for new technologies and finds its use in ceramics, glass, telecommunication and aerospace industries. The well-known uses of Lithium are in **Lithium ion batteries**, lubricating grease, high energy additive to **rocket propellants**, optical modulators for mobile phones and as convertor to tritium used as a raw material for **thermonuclear reactions** (fusion).

It is also used to make alloys with aluminium and magnesium, improving their strength and making them lighter e.g., Magnesium-lithium alloy – for armour plating, Aluminium-lithium alloys – in aircraft, bicycle frames and high-speed trains.

Due to its utility in diverse applications, it also referred as 'White Gold'.

What is the current status of Lithium reserves and extraction?

A World Bank study suggests that the demand for critical metals such as lithium (Li) and cobalt is expected to rise by nearly 500% by 2050.

The global electric vehicle market is projected to reach US\$ 823.75 billion by 2030, registering a Compounded Annual Growth Rate (CAGR) of 18.2% from 2021 to 2030, India's market is projected to register a CAGR of 23.76% by 2028. India is seeking to secure its critical mineral supplies and build self-sufficiency in this sector.

India's Lithium Reserves

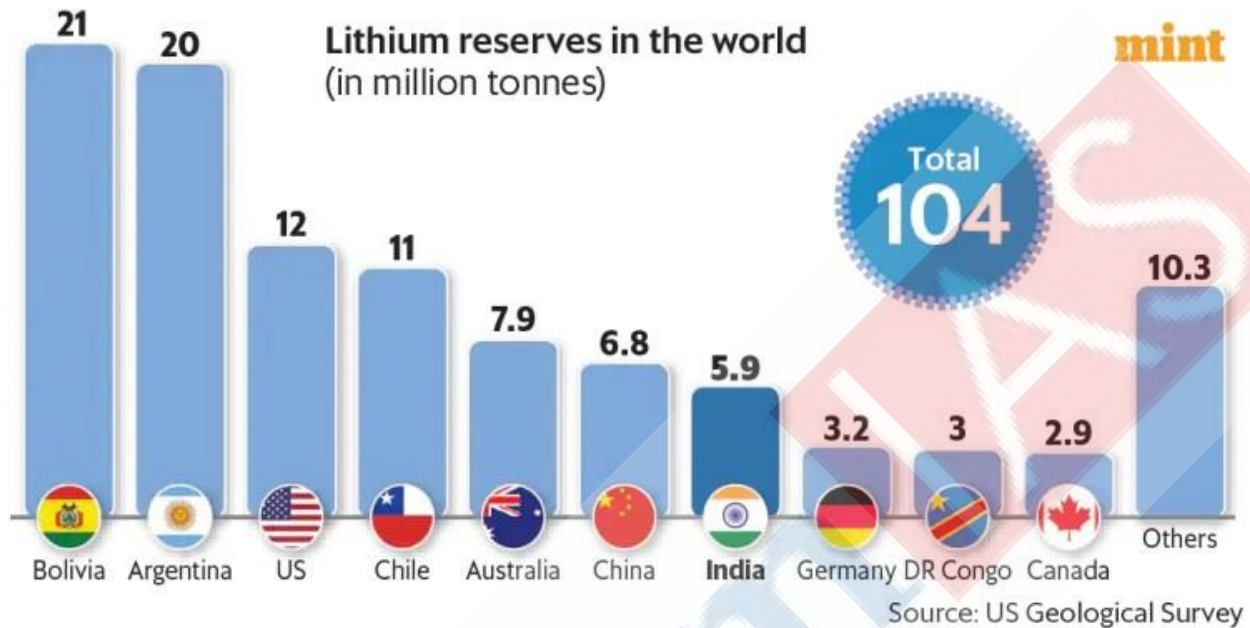
The discovery of 5.9 million metric tonnes of lithium has been made in J&K. This is the first major lithium reserve that has been found in India. Earlier, a survey led by the Atomic Minerals Directorate for Exploration and Research showed the presence of 1,600 tonnes (inferred category) of lithium resources in the Marlagalla area of Karnataka's Mandya district.

Global Lithium Reserves

South America is a particularly rich supply of the metal, the three nations of Bolivia, Chile, and Argentina are collectively referred to as the 'Lithium Triangle'. China currently controls 77% of the global lithium-ion battery manufacturing capacity and is home to 6 of the world's 10 manufacturing companies.

Fields of white gold

India may account for 5.7% of global reserves if the discovery in J&K is confirmed.



Source: Mint

What steps have been taken by the Government to Explore Lithium Reserves in India?

The Atomic Energy Act, 1962 permits **Atomic Minerals Directorate** (a constituent unit of Department of Atomic Energy) for exploration of Lithium in various geological domains of the country. For the first time, the National Mineral Exploration Policy of 2016 recognised the need to explore these minerals.

Every year, as per approved annual **Field Season Programme** (FSP), the Geological Survey of India (GSI, an attached office of Ministry of Mines) takes up different stages of mineral exploration viz. **reconnaissance surveys** (G4), **preliminary exploration** (G3) and **general exploration** (G2) following the guidelines of **United Nations Framework Classification** (UNFC) and **Mineral Evidence and Mineral Content Rules** (MEMC-2015) for augmenting mineral resource for various mineral commodities including lithium.

What is the Significance of Lithium Reserves for India?

Reducing Dependence on Imports: In FY2020-2021, India imported lithium and lithium ion worth INR 173 crore and INR 8,811 crore respectively. The demand is likely to rise multifold in the future. The finding of lithium reserves in India will reduce dependence on imports.

Affordable Transition: : The discovery of domestic deposits of lithium will help the expanding the EV ecosystem at reasonable and affordable costs, and make the transition to green mobility more economical.

Meet Government Objectives: This will also help advance the Government's ambitious plan of 30% EV penetration in private cars, 70% for commercial vehicles, and 80% for two and three-wheelers by 2030 for the automobile industry.

Potential to become Major Producer: The majority of the global reserves are located in regions with severe water stress limiting their ability to scale-up production. India has a potential to replace global lithium supply chains.

Li-ion Battery Ecosystem

ISRO's Vikram Sarabhai Space Centre has developed and qualified lithium ion cells of capacities ranging from 1.5Ah to 100Ah for use in satellites and launch vehicles. Following the successful deployment of indigenous Lithium-ion batteries (LiBs) in various missions ISRO has decided to transfer the technology to manufacturers to set up facilities for producing lithium ion cells in the country. The Government wants EVs to make up at least 30% of new automobile registrations by 2030 and has focused on developing the value chain for batteries.

Looking to encourage local manufacturing of lithium-ion cells, the Union Government doubled the import duty on lithium-ion cells to 10% in April 2021 and later announced a performance-linked incentive (PLI) for advanced chemistry cell (ACC) batteries.

What are the challenges in extraction of Lithium?

Geological Stability: According to the seismic zonation map of India, the whole of Jammu and Kashmir, comes under seismologically active Zones IV and V and is also ecologically sensitive. Mining in geologically unstable region will be a major challenge.

Environmental Consequences: Extracting Li from hard rock mines, similar to what has already been proposed in J&K, entails **open-pit-mining** followed by roasting the ore using fossil fuels. Open-pit-mining, refining, and waste disposal from these processes substantially degrades the environment, including **depletion and contamination of waterways and groundwater**, diminishing of **biodiversity**, and considerable air pollution.

Environmental Justice: According to a 2018 study that examined the socio-environmental implications of lithium mineral extraction, lithium mining has produced environmental justice challenges. It is claimed that over the last four decades, sufficient research has not been performed to address the sustainability difficulties posed by lithium mining and processing, particularly the question of its impacts on local populations.

Mining Policy: The absence of an **integrated mining policy for strategic metals and minerals**, and poor domestic capabilities could hinder exploitation of the recently discovered reserves.

Security Threat: Certain terror groups have threatened against mining of lithium reserves. Security concerns can hamper development of mining industry, especially in attracting labor.

Availability of Technology: India lacks technology to extract lithium and purify it. Lithium is mixed with rocks and other minerals. It would require breaking the rocks, removing volatile chemicals with evaporation and magnetic impurities with magnets besides other chemicals and processing. There is no prior experience in extracting Lithium, nor tested domestic technology. There is lack of established Lithium extraction industry.

What should be done going ahead?

First, The Government can explore technology transfers and tie ups with the lithium metal extraction industry from abroad in the short term, while simultaneously developing domestic technical expertise and know-how.

Second, the Confederation of Indian Industry (CII) has urged the Government to establish '**India Rare Earths Mission**' to reduce reliance on China. It has urged the Government to **encourage private sector mining** in the sector and diversify sources of supply for these strategic raw minerals.

Third, CII has also recommended that the public sector firm Indian Rare Earths Limited (IREL), administered by the Department of Atomic Energy, should be **split into two entities**. While IREL should primarily focus on Thorium mining (for Nuclear Power generation), the second entity should pursue other minerals including Rare Earths and Lithium.

Fourth, the Government can make rare earth minerals a part of the 'Make In India' campaign, similar to China's 'Made in China 2025' initiative that focuses on new materials, including permanent magnets that are made using rare earth minerals.

Read More: [Rare Earth Elements: Strategic Importance and Reducing Import Dependence – Explained, pointwise](#)

Conclusion

The finding of Lithium Reserves in India has great strategic importance. It can reduce India's dependence on Imports and make India self-reliant as it transitions to Green Mobility. It can ensure that India's story of dependence on imports of fossil fuels is not repeated as the economy enters a new green energy era. However, the Government must proactively address the potential challenges in extraction of Lithium and quickly scale-up domestic Lithium production.

Syllabus: GS I, Distribution of key natural resources across the world; GS III, Infrastructure: Energy; GS III, Conservation.

Source: [The Hindu](#), [Times of India](#), [Mint](#), [Business Standard](#), [Indian Bureau of Mines](#)

Global Sea Level Rise: WMO Report – Explained, pointwise

Introduction

The World Meteorological Organization (WMO) has released a Fact Sheet, 'Global Sea Level Rise and Implications'. The fact sheet has made some alarming observations. It notes that the sea level has risen at the rate of 4.5mm per year during 2013-22. The rise has been linked to climate change. Even in the low greenhouse gas emission scenario, the sea level rise of 0.6 metre is expected by 2100. A rise of this magnitude can have disastrous consequences for Island States as well as coastal cities. WMO has termed the sea-level rise a '**major economic, social and humanitarian challenge**'.

What are the key highlights of WMO Report on Sea Level Rise?

First, Sea-level rise threatens several low-lying small islands and high-population coastal cities.
Second, The impacts of average sea-level rise is further exacerbated by storm surges and tidal variations.

Third, Human influence was very likely **the main driver of these Sea-level increases** since at least 1971.

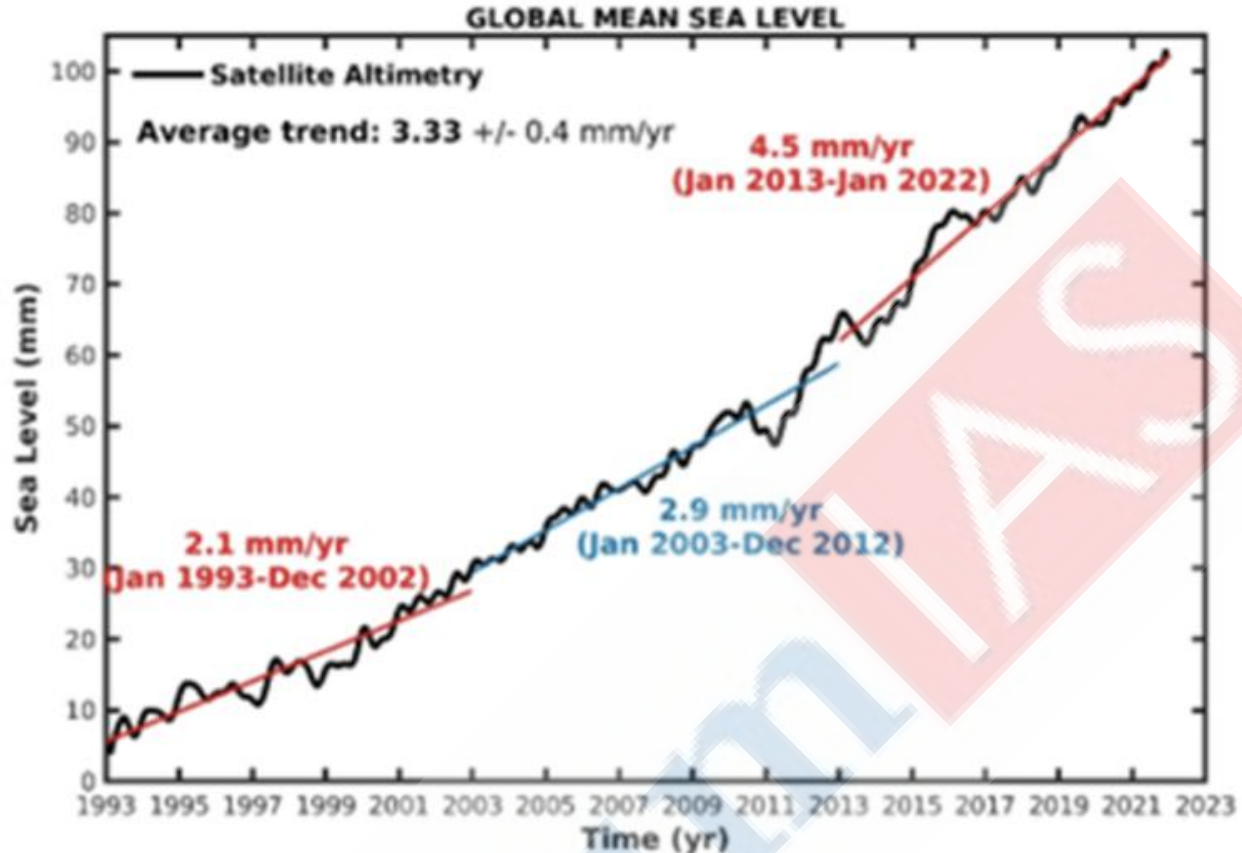
Fourth, The global ocean has **warmed faster over the past century** than since the end of the last deglacial transition (around 11,000 years ago).

Fifth, Thermal expansion explained 50% of sea-level rise during 1971–2018. Among other factors, **Ice loss from glaciers** contributed 22%, **ice sheets** 20% and **changes in land-water storage** 8%. The rate of ice-sheet loss increased by a factor of four between 1992–1999 and 2010–2019.

Sixth, Sea-level rise is not globally uniform and varies regionally.

Seventh, Over the next 2000 years, global mean sea-level will rise by about 2-3 m if warming is limited to 1.5°C, 2-6 m if limited to 2°C and 19-22 m with 5°C of warming.

Eighth, Continued sea-level rise will increase **risks to food security** in vulnerable regions between 1.5°C and 2°C Global warming level. Sea-level rise poses a distinctive and **severe adaptation challenge** as it implies dealing with slow onset changes. Increased frequency and magnitude of extreme sea-level events which will escalate in the coming decades. There are significant impacts and challenges to those populations faced with sea-level rise living in coastal urban areas in least developed and low-middle income countries.



Sea-level rise since 1993 based on satellite measurements
(WMO State of the Global Climate Report).

Source: Sea Level Rise, WMO Fact Sheet. The trend indicates that the rate of sea-level rise is increasing. The rate was 2.1mm/year between 1993-2002, 2.9mm/year between 2003-2012, and 4.5mm/year between 2013-2023. The sea level has risen by ~100mm since 1993.

What are the reasons for Sea Level Rise?

Ocean Thermal Expansion: Instrumental records reveal that the world's oceans have warmed since 1955, accounting for more than **80% changes in the energy content of the Earth's climate system** during this period. During the period 1961 to 2003, the 0-3000 m ocean layer has absorbed up to 14.1×10^{22} Joules, equivalent to an **average heating rate of 0.2 Watts/m²** (per unit area of the Earth's surface). Warming of ocean water leads to expansion contributing to rising oceans. WMO estimates that thermal expansion contributed ~50% of the observed rise in water levels (i.e., contributing ~2.3mm/year rise between 2013-2023. It contributed to a rise of ~1.6mm/year between 1993-2002).

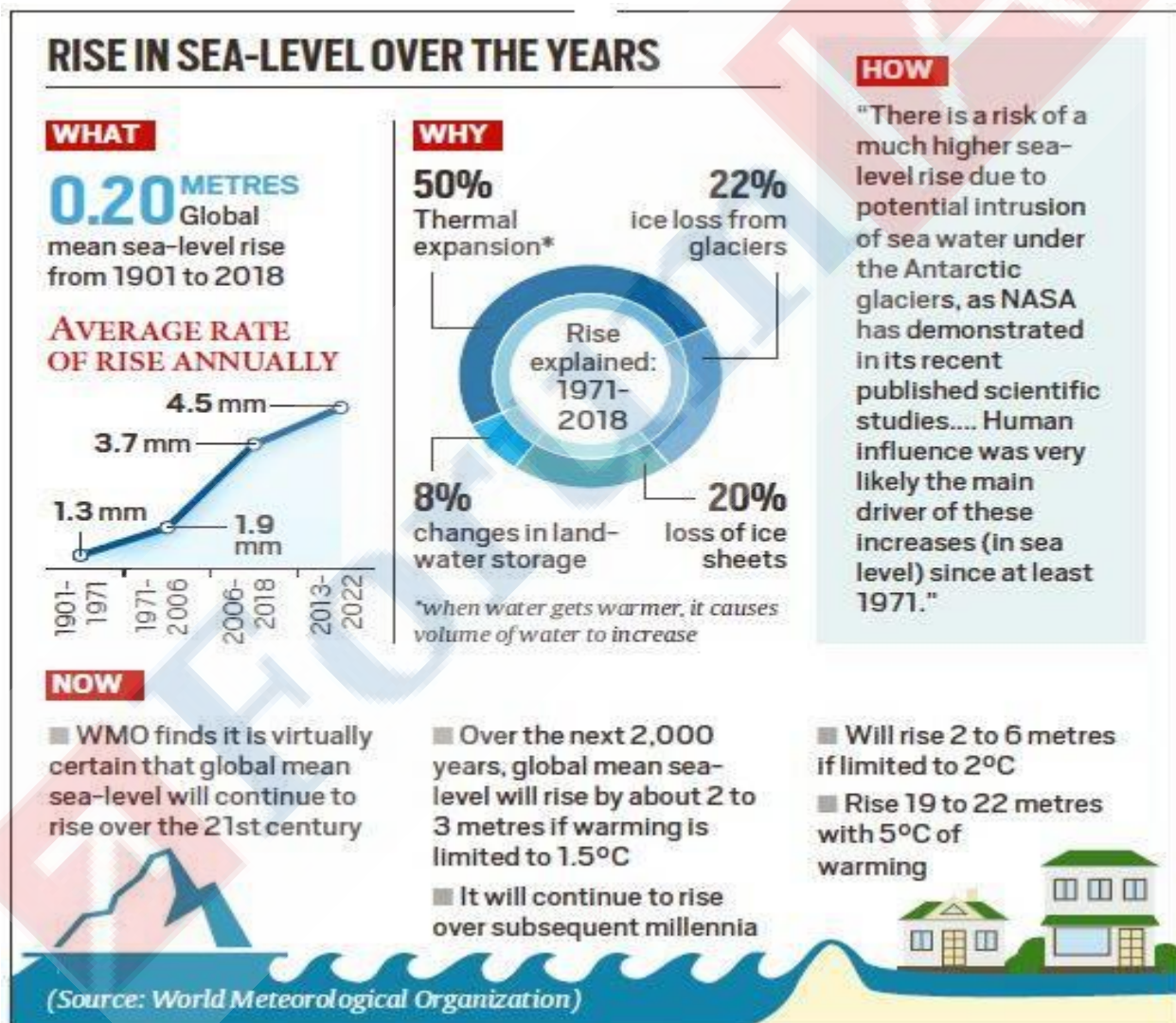
Glacial Melt from Greenland and Antarctica: According to the IPCC AR4 (Assessment Report), it is very likely (> 90% probability) that the Greenland Ice Sheet (GIS) shrunk from 1993 to 2003. An assessment of the data suggests shrinking of Greenland Ice Sheet (~50-100 Gigatons/year) contributing to **rising global sea levels of 0.14 to 0.28 mm/yr from 1993 to 2003**. There is a risk of a much higher sea-level rise due to potential intrusion of **sea water under the Antarctic glaciers**, as NASA has demonstrated in its recent published scientific studies.

Loss of Snow on Land: Snow cover has decreased in most regions, especially in spring as confirmed by Satellite observations. This means less water trapped in snow and more water in the oceans, leading to rise in water levels.

Permafrost: Permafrost and seasonally frozen ground in most regions have displayed large changes in recent decades. Temperature increases at the top of the permafrost layer of up to 3°C since the 1980s have been reported. Permafrost warming has also been observed with variable magnitudes in the Canadian Arctic, Siberia, the Tibetan Plateau and Europe.

All the above reasons are attributable to global warming caused by accumulation of Greenhouse Gases generated by anthropogenic activities.

Relative Sea Level Changes Due to Vertical Land Motions: At the local scale, vertical land motions such as uplift or subsidence of the ground due to tectonic and volcanic activity, sediment loading, groundwater pumping, and oil and gas extraction can produce sea level variations relative to the seafloor.



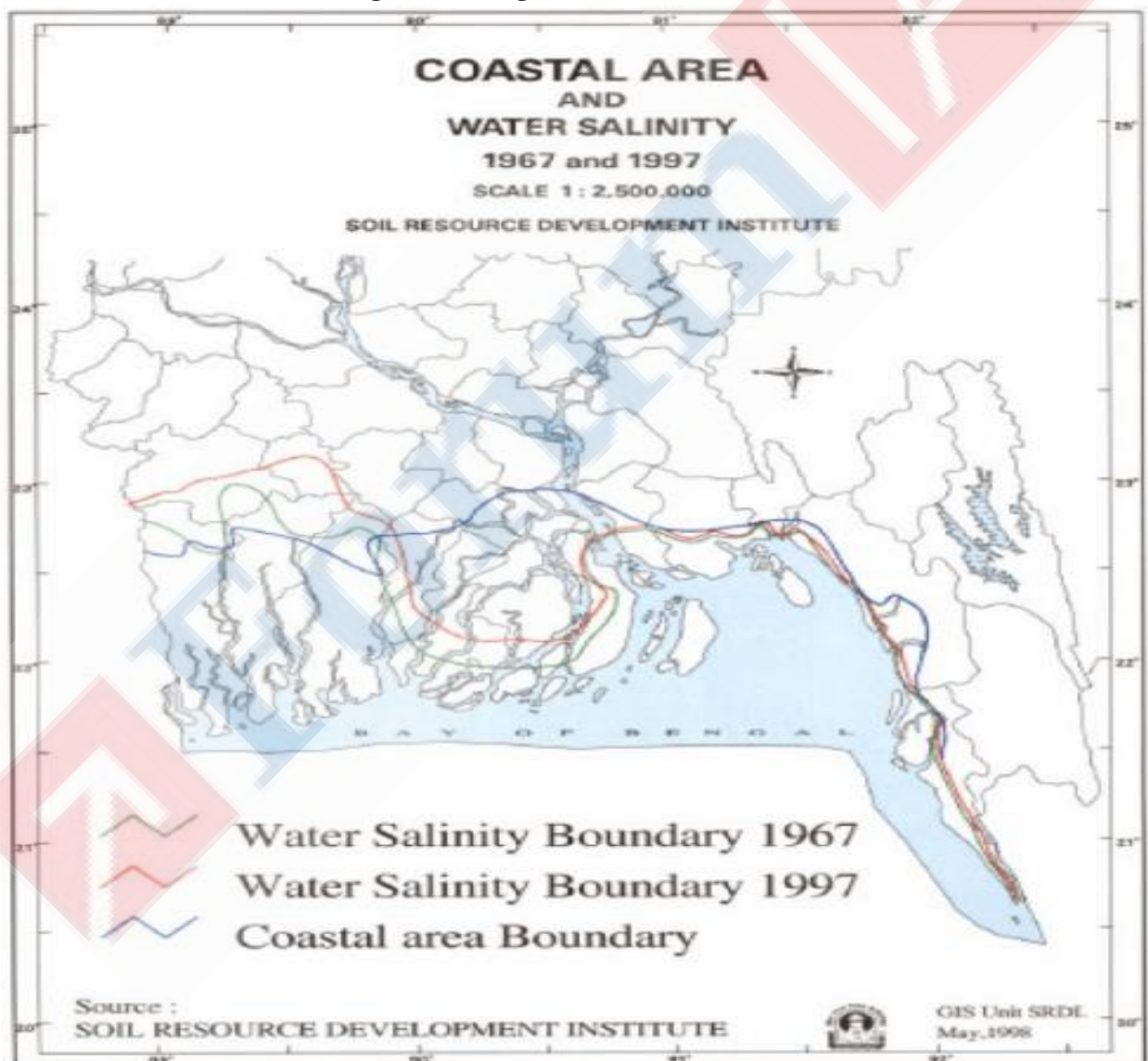
Source: Indian Express

What are the harmful impacts of Sea Level Rise?

Impact on Island States and Coastal Cities: (a) Large coastal urban centers located on low-lying coastal areas will become prone to **flooding**. Initially, the coast may suffer **episodic**

inundation, but later this may become permanent; **(b) High and low tide lines will advance landward**, part of the present intertidal zone will become permanently submerged and, consequently, significant land loss is likely to occur; **(c) It will cause extensive submergence of low-lying deltaic plains**. Large coastal urban centres like Mumbai, Chennai, Kolkata, New York, London, Shanghai, Dhaka, Bangkok, Jakarta, Lagos, Cairo, Copenhagen, Los Angeles, Buenos Aires and Santiago etc. are vulnerable. This may lead to large scale displacement of population; **(d) Storm Surges can become more destructive** as was evident during landfall of hurricane Sandy in New York and Cyclone Idai in Mozambique; **(e) Small Island States with low elevation like Kirbati, Maldives, Solomon Islands, Micronesia, Tuvalu, Palau etc. face threat of complete submergence** with rise in sea levels. This will lead to large scale **climate-induced migration**.

Impact on Freshwater: Freshwater in coastal delta and estuaries will get contaminated by salt sea-water. Water and soil salinity along the coast will increase with the rise in sea levels, destroying normal characteristics of coastal soil and water. This is already happening in Sunderbans delta in West Bengal and Bangladesh.



Landward movement of Water Salinity Boundary in Sunderbans, Bangladesh

Impact on Coastal Ecosystems: The Sundarbans are the largest mangrove forest in the world, covering 6,500 sq. km. The Sundarbans will be completely lost with 1m rise in ocean levels (World Bank, 2000). This will be a great loss of heritage, biodiversity, fishery resources, life and livelihoods. Salinity intrusion has led to 'top-dying' disease in Sundari trees. A 2018 report has pointed out that in the last 30 years, 1.44 million cubic meters of Sundari trees, have been lost to 'top-dying' disease.

Impact on Fisheries and Aquaculture: The rise in sea level will have a significant impact on fish habitat and their breeding ground. Rise in water levels will change the location of river estuaries. This will have significant impact on fisheries, aquaculture and consequently on the livelihoods of coastal population.

Coastal Erosion: Sea level rise will cause increased coastal erosion as water will wash out top soil of the coast. In addition to this, the **backwater effect** is accelerated by sea level rise that will also cause erosion. The forecasted land erosion will lead to displacement of coastal population.

Impact on Agriculture: The landward shift of water salinity boundary will cause **salinity intrusion** in land which will **decrease agricultural production** in coastal areas. It will also cause soil degradation. Salinity also diminishes the germination rate of some plants. A World Bank (2000) study suggested that increased salinity alone from a 0.3 metre sea level rise will cause a net reduction of 0.5 million metric tonnes of rice production. Salinity intrusion degrades soil quality which in turn inhibits rice production.

Impact on Health: Reduction of freshwater in coastal regions can cause water-related diseases like diarrhoea. Decrease in food production can contribute to malnutrition among coastal population. Flooding in coastal areas can increase outbreaks of water-borne diseases like cholera.

Extreme Events: Coastal countries will face extreme events. Cyclones are already intensifying rapidly **due to more moisture and heat** from warming of oceans. Cyclones are bringing more rain than earlier e.g., Super Cyclone Amphan (2020) caused large-scale flooding and inundated tens of kms inland with saline water.

Cascading and Compounding Impacts: Sea-level rise will bring cascading and compounding impacts. Losses of coastal ecosystems and ecosystem services, groundwater salinization, flooding and damage to coastal infrastructure will cascade into **risks to livelihoods, settlements** (causing displacement), **health, well-being, food security, water security, and cultural values** in the near to long-term.

What should be done going ahead?

Reduce Carbon Footprint: Greenhouse gases are a key cause of sea-level rise. It will be beneficial to minimise sea level rise by reducing the amount of greenhouse gases emitted each year and developing containment mechanisms. The **transition to green energy** must be expedited.

Climate Action Plan: Many cities and Nations do not have plans to address climate change. Hence, preparing a climate action plan from individual cities to international level will synchronize the efforts to tackle the sea level rise. There is also a need for an international alliance and agreement, similar to the Paris Climate Agreement, that is explicitly dedicated to looking into the issue of sea level rise. Developed countries must step-up climate finance and technology transfer to the developing countries to enhance their capacity for adaptation and mitigation.

Ecosystem-based Solutions: Coastal wetlands, marshes, and mangrove swamps can hold sediments and expand vertically at rates equal to or greater than the mean rate of sea level rise. These habitats can **absorb carbon 40 times faster per hectare** than tropical forests, making them extremely beneficial for reducing climate change. Wetlands provide **natural buffers** for

coastal communities during rainstorms and hurricanes. They soak up rain and storm surge water.

Conclusion

WMO Fact sheet on Sea Level Rise has indicated that the rate of water-level rise in oceans is increasing rapidly. Major urban centres and island Nations are vulnerable to the rising water levels. This will have widespread economic, social and humanitarian impacts. There is a need for coordinated action at the global level to address the challenge. Else the consequences can be disastrous.

Syllabus: GS I, Changes in critical geographical features; GS III, Conservation, Environmental pollution and degradation.

Source: [WMO](#), [WMO](#), [Indian Express](#), [World Bank Environment Department](#), [Institute for Social and Economic Change](#)

Adoption of EVs: Challenges and Solutions – Explained, pointwise

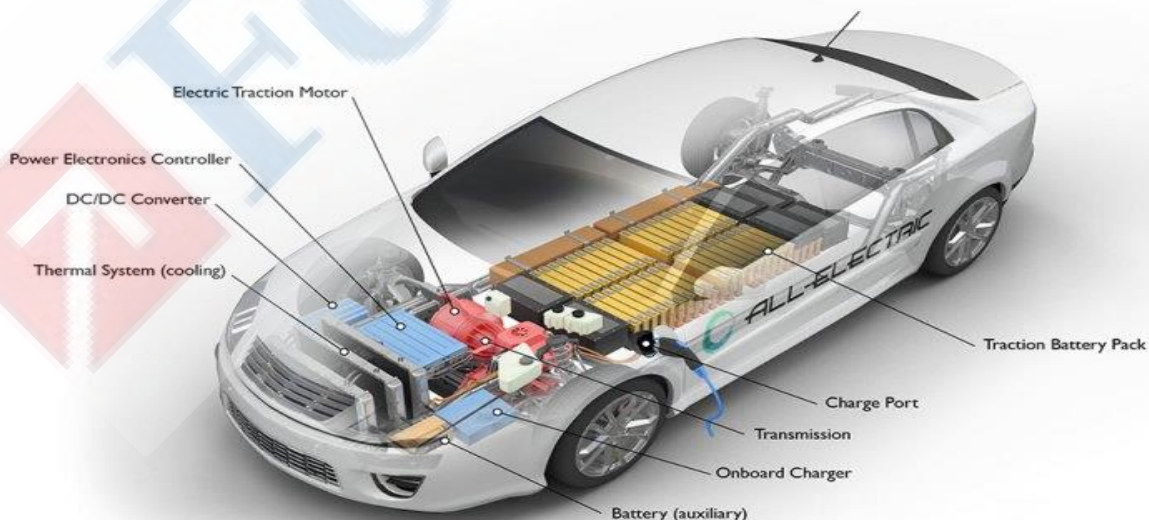
Introduction

The Government is pushing hard for transition to Green Economy. One vital aspect of this transition is transition to Green Mobility. Enhancing the share of Electric Vehicles in transportation is necessary to ensure green mobility. The finding of Lithium deposits in J&K and possibility of developing domestic battery manufacturing ecosystem in India has led to new excitement about EVs. However, the adoption of EVs still faces several hurdles. Addressing these challenges is necessary to ensure greening and decarbonisation of the transportation sector.

What are EVs and their benefits?

Electric Vehicles (EVs) have an electric motor instead of an Internal Combustion Engine (ICE). ICE-based vehicles work on fossil fuels. EVs use a **large traction battery pack to power the electric motor**. The power to run the vehicle is provided by the motor (instead of fuel-engine in ICE vehicles). Because an EV runs on electricity, the vehicle emits **no exhaust from a tailpipe**. An EV does not contain the typical liquid fuel components, such as a fuel pump, fuel line, or fuel tank.

All-Electric Vehicle



afdc.energy.gov

Key Components of an All-Electric Car

Battery (all-electric auxiliary): In an electric drive vehicle, the auxiliary battery provides electricity to power vehicle accessories.

Charge port: The charge port allows the vehicle to connect to an external power supply in order to charge the traction battery pack.

DC/DC converter: This device converts higher-voltage DC power from the traction battery pack to the lower-voltage DC power needed to run vehicle accessories and recharge the auxiliary battery.

Electric traction motor: Using power from the traction battery pack, this motor drives the vehicle's wheels. Some vehicles use motor generators that perform both the drive and regeneration functions.

Onboard charger: Takes the incoming AC electricity supplied via the charge port and converts it to DC power for charging the traction battery. It also communicates with the charging equipment and monitors battery characteristics such as voltage, current, temperature, and state of charge while charging the pack.

Power electronics controller: This unit manages the flow of electrical energy delivered by the traction battery, controlling the speed of the electric traction motor and the torque it produces.

Thermal system (cooling): This system maintains a proper operating temperature range of the engine, electric motor, power electronics, and other components.

Traction battery pack: Stores electricity for use by the electric traction motor.

Transmission (electric): The transmission transfers mechanical power from the electric traction motor to drive the wheels.

Source: Department of Energy, US

Benefits of EVs

Lower running costs: The running cost of an electric vehicle is much lower than an equivalent ICE vehicle. Electric vehicles use electricity to charge their batteries instead of using fossil fuels like petrol or diesel. **EVs are more efficient**, according to one estimate, EVs can convert ~60% of the electrical energy from the grid to power the wheels, but petrol or diesel cars can only convert 17%-21% of the energy stored in the fuel to the wheels. The efficiency combined with the electricity cost means that charging an EV is cheaper than fuel based vehicles.

Low Maintenance Cost: EVs have very low maintenance costs because they have lesser moving components compared to ICE vehicles (e.g., Electric vehicles don't have gears and there are no complicated controls). The **servicing requirements for EVs are lesser** than the conventional petrol or diesel vehicles. Therefore, the yearly cost of running an electric vehicle is significantly low.

Zero Tailpipe Emissions: EVs can help **reduce carbon footprint** because they have zero tailpipe emissions (carbon-dioxide emissions through combustion of fossil fuels). This can **reduce air pollution** as well as slow down the pace of global warming. EVs are thus essential for greening of transportation sector. Even if emissions from the production of electricity (like thermal power plant) are taken into account, petrol or diesel vehicles emit almost 3 times more carbon dioxide than the average EV.

Noise Pollution: Electric Motors function silently, and produce much less noise compared to IC Engines. This can address noise pollution in urban areas or near highways.

What are the challenges to adoption of EVs?

Lack of Infrastructure: At present, charging stations comprising of both slow and fast charging capabilities are available for all kinds of vehicles in the market. However, the **number of the charging stations is inadequate**. This implies their availability is restricted and even the ones that are deployed do not function optimally. Hence, the lack of charging infrastructure is a major hindrance to the adoption of EVs at scale.

Performance: The EV manufacturers have been unable to implement the practicality of EVs being 'value for money' for consumers. The original equipment manufacturer (OEMs) are not developing EVSE (Electric Vehicle Supply Equipment). As a result, the companies that are into EVSE are unsure about the types of EVs, charging technology and its time of launch. This uncertainty does not allow the EVSE OEMs to do long term planning.

Range Anxiety: It refers to an EV owner's fear that the vehicle's battery does not have sufficient charge for it to reach the destination. It is linked to how far the EV can travel on a single battery charge and the availability of charging points. This is a consequence of limited infrastructure and duration of battery charge.

Long time for Charging Batteries: The battery charging time is much longer than the time taken for refuelling the ICE vehicles. Fast charging can result in overheating of batteries, hence it is avoided. This reduces the acceptability of EVs.

Financial Constraints: The initial cost of owning an electric car is currently higher than that of ICE vehicles mainly due to the cost of the battery. Manufacturers anticipate cost parity by 2025 – if not sooner. They are collaborating with the electric car battery production supply chain to lower costs and improve overall efficiency. Apart from this, limited credit options and high EMI make it tough for the EV Sector to operate.

Battery Technology: One of the most significant barriers to EV adoption is the battery manufacturing process and supply chain. To enable EVs, new mining and supply networks are required. The lithium-ion battery is the most common and frequently utilised EV energy source. India has no manufacturing capacity for Lithium-ion cells and relies completely on imports of EV batteries. This also increases costs.

Challenges to Adoption of EVs

Certain critical challenges are limiting the adoption of EVs. Castrol had undertaken a global survey to estimate the 'tipping point': the threshold where the consumers will shift their preference from Internal Combustion Engine (ICE) based vehicles to EVs.

1 Cost

- 63% consumers feel EVs are **out of their budget**.
- In India, the 'tipping point' of cost is **US\$ 30,000** i.e., the consumers will shift to EVs when their price falls below this threshold.
- The Global 'tipping point' is **US\$ 36,000**.

2 Charge Time

- ICE vehicles can be **refuelled in matter of minutes**.
- 68% consumers say 'charging time' is important buying parameter. Current systems can **take hours to charge**.
- In India, the 'tipping point' for **charge time is 35 minutes** while global average is 31 minutes.
- **New generation chargers** that can charge within 30 minutes are becoming more affordable.

3 Range

- 73% consumers say the **distance EV can travel between successive charges (range)** is an important factor.
- In India, the 'tipping point' for range is **400 kms**. The Global average is 469 kms.
- Present range of most EVs is **~350 kms**.

4 Charging Infrastructure

- 64% consumers say they'll shift to EVs if there is charging infrastructure to meet their driving habits.
- Charging infrastructure might emerge as the most critical bottleneck. High charge time would mean longer waiting time, which will reduce adoption.

Created by | ForumIAS

What are the possible solutions to increase adoption of EVs?

First, the range anxiety problem can be addressed by **increased battery efficiency** and **expansion of charging points**. Battery efficiency can be improved by further research, and expansion of charging points need greater investments.

Second, Battery swapping can also tackle range anxiety. And it could be very efficient, especially for certain types of EVs and in certain geographies. In battery swapping, the discharged battery can be replaced by a charged battery. This will cut down the waiting time required in charging the battery.

Read More: [Battery Swapping Policy: Provisions, Benefits and Challenges – Explained, pointwise](#)

Third, Because of the lengthy charging time, chargers must be placed in regions where people may leave their automobiles for extended periods of time. This needs a reconsideration of the charging geography. **Setting up charging stations nearer to offices, commercial complexes** can play a key role.

Fourth, To raise the overall reliability and quality of their products, there is a need to prioritise the domestic production of key components for batteries. The country's reliance on imports of these components may have an impact on India's international trade policies or EV objectives.

Fifth, The Government must **promote private investment in battery manufacturing** plants and achieve economies of scale, while also focusing on the newer technologies.

Sixth, Stabilizing the policy environment by focusing on tax breaks and non-fiscal incentives might assist to alleviate demand uncertainty, allowing the business to reach economies of scale

Seventh, Using renewable energy sources can make the use of electric vehicles more eco-friendly. The electricity cost can be reduced further if charging is done with the help of renewable energy sources installed at home, such as solar panels.

Syllabus: GS III, Environment, Conservation.

Source: [Mint](#), [WEF](#), [NITI Aayog](#), [Business Standard](#)

Domestic Manufacturing of APIs (Active Pharmaceutical Ingredients): Status, Challenges and Solutions – Explained, pointwise

Introduction

Officials from the Union Ministry of Health recently noted that India has started making 29 out of 43 '**critical**' **Active Pharmaceutical Ingredients** (APIs) that were imported earlier. This will go a long way in reducing dependence on China. This is the outcome of the Product-Linked Incentive (PLI) scheme for pharmaceutical goods launched by the Department of Pharmaceuticals in 2021. Achieving self-sufficiency in domestic manufacturing of APIs will help India become the global hub of pharmaceutical industry.

What are the APIs?

The Active Pharmaceutical Ingredient (API) is the **biologically active component of a drug product** (tablet, capsule, cream, or injectable) that **produces the intended health effects**. An example of an API is the acetaminophen contained in a pain relief tablet. The active ingredient in a biological drug is called a **Bulk Process Intermediate** (BPI). An example of a BPI is the insulin in medicine to treat diabetes. Combination therapies have more than one active ingredient, each of which may act differently or treat different symptoms. APIs find application in high-quality drugs that are used to treat different diseases.

What is the current status of APIs manufacturing in India?

The global pharmaceutical market is ~ US\$ 1.2 trillion with API market of ~US\$ 182.2 billion and is estimated to reach US\$ 245.2 billion by 2024. The pharmaceutical industry in India is **3rd largest in the world** (in terms of volume) and **14th largest in terms of value**. The Indian industry has a strong network of 3,000 drug companies and about 10,500 manufacturing units.

The India active pharmaceutical ingredients market is estimated to be valued at US\$ 19.9 billion in 2021 and is expected to exhibit a growth rate of 8.3% between 2021-2028. At present, API contributes ~25% to the Indian pharmaceutical market and the rest is contributed by formulations. The API industry in India is **highly fragmented** with about 1,500 units.

The Indian pharmaceutical industry is having distinct advantage due to the following factors: **(a)** Low Manpower cost (Even lesser than that of China); **(b)** Huge domestic market, high economic growth rate, penetration of health insurance schemes; **(c)** Availability of large pool of skilled

manpower including Scientists, Researchers (PhDs), Biotechnologists, Pharmacists (B Pharm, M Pharm), Lab Technicians, Microbiologists etc.; **(d)** Favorable policy support of 100% FDI under automatic route for Greenfield pharma. 100% FDI is also allowed in Brownfield pharma; wherein 74% is allowed under the automatic route and thereafter through government approval route.

What are the challenges faced in manufacturing APIs in India?

External Dependence: **(a) Key Starting Materials (KSMs)** are the building blocks for intermediate chemicals and the final synthesis of API. Raw materials for most of the API intermediates are currently not produced in India; **(b) Solvents:** Most of the API synthesis involves **use of solvents**. At present, India has huge dependence on China for the solvents. India is importing most common solvents such as methanol, IPA etc. from China; **(c) API synthesis** requires chemicals other than KSM and solvents. These can be acid, base, reaction promoter, catalyst, surfactant etc. India currently depends on China for these chemicals as well. India lacks domestic capabilities in **fermentation processes** to manufacture key intermediates/ KSMs for steroidal APIs and China dominates; **(d) APIs** are other components are primarily imported from China, US, Italy among others. The overdependence makes domestic industry vulnerable to disruptions in supply chain and fluctuations in prices. China's earlier crackdown on polluting industries, primarily pharmaceutical and chemical industries, had led to a sudden hike in the prices of APIs by 25%-30%, thereby reducing margins for Indian drug makers.

Technology Readiness & Associated Issues: Many of the fermentation-based APIs have ceased manufacturing in India due to **large installed capacities and economy of scale available in China** and high domestic infrastructure and utilities cost. Strain improvement and other process improvements are required for manufacturing APIs, which have not taken place in India. As each APIs have specific strain and process requirements, **readymade technologies are not available in India** for many of the APIs. However, the technological and scientific base to develop the strains and processes is available in India. In case of chemical APIs, technologies are available for some and the rest could be developed in India with some R&D.

High Comparative Cost: **(a) Scale of Manufacturing:** Indian APIs are on an average 20% more expensive than those manufactured in China. Augmenting production of APIs to match the scale generated by Chinese companies is possible, but it would result in increased production cost and thus could hamper the profitability of pharmaceutical exports; **(b) Availability and Cost of Land:** MSMEs face challenges in terms of **affordability and availability of land;** **(c) High Infrastructure Cost:** Average size of a SEZ in China is 10-15 times bigger than in India, with subsidized land, common waste treatment and utilities, reducing the physical infrastructure costs.

Inadequate Financial Support: The cost and availability of finance in India is extremely high. This is compounded by restrictive banking practices, such as insistence on collateral to extent of 100% of the borrowed funds. Government support is not enough. The Government grant of funds is also extremely slow and long, making the project non-viable. Government funding is focused on 'innovative products and ideas', whereas much of the API and intermediates business is generic in nature, which is not supported by the government funding schemes. According to a study conducted by the Indian Pharmaceutical Alliance, the cost of finance in China is about 5% - 7% compared to 11% -14% in India.

Low Profit Margins: Profits margins are higher for Finished Formulations (FPPs) compared to APIs. Hence, pharma companies focus more on FPPs.

Why are the reasons for China's Competitiveness in Manufacturing of APIs?

The relative advantages of Chinese pharmaceutical companies, in comparison to other countries including India are: **(a)** Economies of scale of manufacturing plants, Lower capex requirements due to large Special Economic Zones (10-15x the size of Indian SEZs); **(b)** Easier availability and

low capital cost; **(c)** Ease in obtaining regulatory and statutory permissions; **(d)** Availability of physical infrastructure such as roads, water supply etc.; **(e)** Availability of land at comparatively economical rate; **(f)** Fiscal incentives; **(g)** Government support for manufacturing; **(h)** Industry-academia collaboration; **(i)** Overall business environment and speed of execution; **(j)** Flexible labor policy; **(k)** Availability of patented process leading to KSM/APIs; **(l)** Lower logistics costs owing to predictable inland transportation and well-developed transport infrastructure; **(m)** Robust R&D sector, China is world leader in Chemical R&D.

The imports from China works out to be cheaper and cost effective for the pharmaceutical companies.

High dependence on a single source can have a cascading effect

High dependence on China

Chinese APIs account for around 70% of all imported APIs in volume terms.

Supply disruption and cost trends in China

Prices of most commonly used APIs have shot up anywhere between 50% and 200% due to increasing wages and other costs in China, scenarios like the coronavirus outbreak and impurity-related issues.

Rise in formulation prices and drop in margins

Prices of drugs to shoot up to meet high API costs

Increasing healthcare costs and decrease in capex

- Cost of treatment for patients to shoot up
- Pharma firms reduce capex

Drug shortages

High cost

Job cuts

Increased healthcare burden

Shutdown of companies

Source: PwC. High Dependence can have a cascading impact including drug shortages, increased healthcare burden, shutdown of firms and loss of employment.

What steps have been taken by Government to promote manufacturing of APIs in India?

Draft Pharmaceutical Policy 2017: The Draft Pharmaceutical Policy 2017 prepared by the Department of Pharmaceuticals aims to provide a comprehensive policy to 'guide and nurture

pharmaceutical industry of India to enable it to maintain and enhance its global competitive edge in **quality and prices**. The Policy envisages making **essential medicines affordable to common people**, making the industry self-reliant by **promoting indigenous production of drugs**, encourage research and development and **ensure quality of medicines** which are exported as well as consumed domestically. Strategies for realising these goals consist of a variety of mechanisms such as pricing mechanism, compulsory license and FDI.

Umbrella Scheme – Development of Pharmaceutical Industry: The Department had launched an umbrella scheme namely ‘Scheme for Development of Pharmaceutical Industry’ during 2017-18, with an objective to increase the efficiency and competitiveness of domestic pharmaceutical industry; so as to enable them to play a lead role in the global market and to ensure accessibility, availability and affordability of quality pharmaceuticals for mass consumption.

This scheme is a **Central Sector Scheme (CS)** with a total financial outlay of INR 480 crore for a 3-year period till 2019-20 and comprises of five sub-schemes namely: **(a)** Assistance to Bulk Drug Industry for Common Facility Centre; **(b)** Assistance to Medical Device Industry for Common Facility Centre; **(c)** Assistance for Cluster Development; **(d)** Pharmaceutical Promotion and Development Scheme (PPDS); **(e)** Pharmaceutical Technology Upgradation Assistance Scheme (PTUAS).

Scheme on Promotion of Bulk Drug Parks: The Government, in March 2020, approved a scheme on Promotion of Bulk Drug Parks for **financing Common Infrastructure Facilities** in 3 mega Bulk Drug Parks, in partnership with States. The scheme has financial implication of INR 3,000 crore for next five years. The Government of India is providing Grants-in-Aid to the States with a maximum limit of INR 1000 crore per bulk drug park. Parks will have common facilities such as solvent recovery plant, distillation plant, power & steam units, common effluent treatment plant etc. The scheme is expected to reduce manufacturing cost of bulk drugs in the country and dependency on other countries for bulk drugs.

Production Linked Incentive (PLI) Scheme: It was approved in March 2020. It aims for promotion of domestic manufacturing of critical KSMs, Drug Intermediates and APIs in the country with financial implications of INR 6940 crore for next 8 years. The scheme aims to boost domestic manufacturing of APIs by **attracting large investments** in the sector to ensure their sustainable domestic supply. It will lead to incremental sales to the tune of INR 46,400 crore and also significant additional employment generation over next 8 years.

In 2021, the Department of Pharmaceuticals had launched a product-linked incentive (PLI) scheme for pharmaceutical goods and in-vitro diagnostic medical. The financial outlay under this scheme is INR 15,000 crore over a period of 6 years.

Champion Sector: In May 2020, the Government, identified Pharmaceuticals as ‘Champion Sector’ along with leather, gems and jewellery, renewable energy, textiles etc. to provide hand-holding for investors with a focus on improving India’s manufacturing capabilities.

High-Level Committee of Experts: A high-level committee of experts has been formed by the Government in May 2020, to **recommend reforms in India’s drug regulatory system** so that approval processes can be fast-tracked. The committee would study the current drug regulatory system and submit recommendations for reforms to bring the system in line with global standards and make it more efficient.

What should be done going ahead?

Scale and Process: In order to manufacture economically viable APIs, the engineering and scale aspect of technology development should be focused. Creation of **mega drug manufacturing clusters** with **common infrastructure** such as effluent treatment plants, steam boilers, power back-up etc. should be the top priority. Additionally, investment in fermentation sector is needed.

Products: Along with production of various catalysts, solvents, reagents and KSMs, recovery and reuse of solvents is also an important aspect to be looked into specially from downstream processing. India should focus on manufacturing antibiotics, amino acids, vitamins, and sartans.

Coordination and Collaboration: Government should encourage Indian companies working in these segments to collaborate for technology development or quick technology transfer. Option of international collaboration can also be explored. **Academia-Industry collaborations** for innovation need to be strengthened.

Policy Interventions: (a) Towards API security in the country and ensuring uninterrupted supply, national stockpile needs to be built up for generic medicines of critical illness; (b) A National Authority can be constituted for advanced research in chemical drug development and biotechnology based products; (c) Contract Manufacturing Organizations (CMOs) for APIs can be developed in association with academic labs; (d) Early stage Government R&D support should be provided to academia for pilot development of APIs, for establishing viability; (e) Creation of new **Centers of Excellence** for API development region wise; (f) Drugs manufactured through indigenously produced API and intermediates shall be given **preference in Government procurement**; (g) Customs duty structure for imported APIs should be relooked to facilitate indigenous production; (h) Issues relating to land acquisition, ease of doing business, environmental clearances, taxation, etc need to be smoothened and brought at par with best global practices; (i) Single window clearance system and priority license renewal system should be established for companies manufacturing APIs; (j) Adequate investments to be provisioned for manufacturing next generation APIs; (k) Alternate locations (such as Vietnam, Indonesia, etc.) shall be explored for sourcing KSMs/DIs/APIs till developing indigenous capabilities.

Conclusion

India is already one of the largest manufacturer of pharmaceuticals in the world. However, the sector is vulnerable to external shocks due to high import dependence, especially on China, for APIs. The Government should focus on achieving self-reliance in this strategic sector, just like its focus on semiconductor industry. A focused approach with targeted interventions can enable a quick turnaround as domestic industry already possesses expertise on many aspects. Removing import dependence for APIs is necessary to achieve the vision of *Atma Nirbhar Bharat*.

Syllabus: GS III, Changes in industrial policy and their effects on industrial growth.

Source: [The Times of India](#), [TIFAC](#), [PwC](#)

[Kurukshestra February 2023 Summary] Powering Growth in Agriculture Sector – Explained, pointwise

Introduction

Agriculture is the mainstay of Indian economy, despite the rise of manufacturing and services sectors. The sector contributes 15% to the GDP and provides livelihood to almost two-thirds of the total working population in the country. Agriculture is also the key source of raw materials for textile, sugar, food, medicine (primarily Ayurveda), and new age health and fitness products. Like other industries agriculture, especially irrigation, requires substantial energy inputs. According to estimates, agriculture uses 20% of electricity consumed at national level. Farmers have installed nine million diesel pump sets for groundwater irrigation. The high consumption of power in the agriculture sector is concerning especially in context of India's climate goals. The Government has set a target to eliminate the use of diesel in the sector by 2024, thus making the agriculture power sector green. Renewable energy (RE) has emerged as the most viable and

sustainable option to address the environment concerns. It can also boost farmer income and conserve natural resources. The Government has taken several steps to empower farmers with RE Systems to make them energy self-sufficient. The Union Ministry of New and Renewable Energy (MNRE) administers several Central Government-sponsored initiatives and facilitates associated research, design, development, and manufacturing to promote RE systems/devices in agriculture.

Renewable Sources to Power Agriculture Sector

Biogas

Biogas is one of the most popular and versatile form of RE deployed extensively in rural India to serve many purposes. At present, over **five million biogas plants of various capacities are operational** in the country. Biogas plants generate the high calorific value (5,000 kcal per cu.m.) gas by **decomposition of organic materials** such as cattle dung, agricultural wastes, poultry droppings, night soil and municipal wastes.

Biogas is used as **clean fuel** for cooking, lighting, motive power etc. It is also used in diesel engines to substitute diesel up to 80%, however, 100% replacement of diesel may be achieved by using **Biogas Engines**. The digested slurry from biogas plants, a by-product, is used as a **nutrient enriched organic manure for improving crop yield** and also **maintain soil health**.

Biogas plants help with **waste management, reduce energy costs, improve soil fertility** and **curb carbon emissions**. Proper waste management on farms leads to better cleanliness and hygiene which improves the living conditions and health of the community. The biogas sector has helped **generate employment** for both skilled and unskilled rural people.

Government of India is promoting installation of biogas plants by providing subsidy through two major schemes: **(a) New National Biogas and Organic Manure Programme (NNBOMP)** for biogas plants in size range of 1 cu.m. to 25 cu.m. per day; **(b) Biogas Power Generation (off-grid) and Thermal Energy Application Programme (BPGTP)** for setting up biogas plants in the size range of 30 cu.m. to 2500 cu.m. per day. This corresponds to power generation capacity range of 3 kW to 250 kW for thermal energy/cooling applications.

GOBARdhan: The Government of India has launched a dedicated GOBARdhan (Galvanising Organic Bio-Agro Resources Dhan) scheme (Swachh Bharat Mission Grameen Phase-2) with twin objectives: **(a)** To make the villages clean; **(b)** Generate clean power from organic wastes. The scheme also aims to **increase income of farmers** by converting biodegradable waste into **compressed biogas (CBG)**. Technical and financial assistance under the scheme is attracting entrepreneurs for establishing **community based CBG plants** in rural areas. CBG is a purified form of biogas (98% purity of methane content) which makes it suitable for use as **green and clean fuel** for transportation or filling in cylinders at high pressure (250 bar). Scheme is also promoting rural employment and income generation opportunities for rural youth and others.

Recently, Asia's largest CBG plant was inaugurated at Sangrur, Punjab with an FDI investment of INR 220 crores. CBG plant offers a much needed **substitute for burning crop stubbles**. The Sangrur plant can consume 300 tonnes of paddy straw every day. It is claimed that this plant will reduce the burning of stubble on 40,000-45,000 acres of fields, resulting in an annual reduction of 150,000 tonnes of carbon dioxide emissions. This will help India meet its CoP-26 climate change targets of reducing carbon emissions.

Read More: [Biogas: Advantages and Challenges – Explained, pointwise](#)

Biomass

Biomass is another potential source of RE in rural India that provides power for household needs and irrigation. Biomass materials used for power generation primarily include bagasse, rice husk, straw, crop waste and agricultural residues. A study estimated surplus biomass

availability at about 230 million metric tones per annum covering agricultural residues corresponding to a power potential of 28GW.

MNRE has been implementing **biomass power/cogeneration programs** since mid-90s. Over 800 biomass power and bagasse/ non-bagasse cogeneration projects aggregating to over 10,206 MW capacity have been installed with central financial assistance from the Government of India. Power from biomass is generated by installing **biomass gasifiers** in proximity to the source of raw materials to reduce costs. In Bihar, a gasifier based business model for power generation and distribution uses rice-husk as source material. A series of more than 80 biomass gasifier plants supplies power to nearly 300 villages and hamlets on payment basis. People generally use electricity for household, business lighting, charging of mobile phones and operation of irrigation pumpsets. Irrigation pumps powered by rice-husk electricity are cheaper, long lasting and more eco-friendly than diesel powered pumps. Irrigation facility at low cost allows farmers to increase crop intensity and also improves crop yield. It can help reduce the emission intensity of power use in agriculture sector.

Solar

Government of India has made a strong commitment to explore and tap the vast potential of solar energy for driving the development of various economic sectors vis-à-vis meeting the targets of COP-26. Addressing the energy concerns in agriculture sector, a large number of solar devices/ equipments have been developed and deployed that include solar water pumps, solar dryers, solar dusters etc.

PM-KUSUM

PM-KUSUM (*Pradhan Mantri Kisan Urja Surksha Evan Utthaan Mahaabhiyan*) scheme, launched in 2019, has emerged as a real game changer for energy security of farming community and greening the power use in agriculture sector. It is one of the largest initiatives of the world to provide clean energy to more than 35 lakh farmers and enhance their income. The scheme is being implemented through its three components with specific objectives.

Component A: Decentralised Grid Connected Solar Power Plants (Target – 10,000 MW): This component intends to make farmers 'Urja Data' by installing small solar power plant (up to 2 MW capacity) on **barren, fallow, pasture or marshy land**, and selling the generated power to electricity Distribution Companies (DISCOMS) on a pre-determined rate. In case of cultivated lands, solar panels may be set up in such a manner that chosen crops may grow under the panels. In addition to individual farmers, cooperatives, panchayats, and Farmer Producer Organisations (FPOs) can also be beneficiary under the scheme.

A farmer may earn up to INR 25,000 per acre per year if the plant is installed by a developer; and up to INR 65,000 if the plant is installed individually through loan. The RBI has notified this component under **priority sector lending** that allows competitive rates and soft terms. The Union Government provides financial incentive to DISCOMS for purchase of power from such solar plants. About 73.45 MW cumulative capacity of small solar plants have been installed under this component so far, out of which 48.2 MW has been added during 2022.

Component B: Installation of Standalone Solar Powered Agriculture Pumps (Target – 20 lakh): Under this component, individual farmers can replace their existing diesel pumps with solar pumps through Central Financial Assistance (30% of the benchmark cost) and State Government's subsidy (30%). The remaining 40% will be borne by the farmer, but bank finance for 30% is available, so farmer will have to initially pay only 10% of the cost.

Groups of farmers, water user associations and community/ cluster-based irrigation systems are also eligible for financial assistance. All solar pumps installed under the scheme will be

equipped with **remote monitoring systems** to facilitate their monitoring on a real time basis. Solar pumps will reduce the irrigation costs of about INR 50,000 per year for a 5 HP pump.

Component C: Solarisation of existing Grid-connected agriculture pumps (Target – 15 lakh): Under this component, **exclusive power feeders** for agricultural purposes will be solarised by installing solar power plants of required capacity. The farmer will get **day time reliable power for irrigation free of cost** or at a tariff as fixed by their respective States.

In addition to day time reliable power and increase in farmer's income, the scheme also has direct employment generation potential. According to estimates, each solar installation creates ~ 25 job years per MW. After complete implementation, the scheme will lead to an annual reduction of 1.38 billion litres in diesel consumption per year, thus, reducing the import bill on account of petroleum products. The scheme will also lead to reducing carbon emissions by as much as 32 million tones per annum.

Solar PV (Photo Voltaic) Pumping Systems

Among many solar devices/equipments developed so far, **solar water pumps** are the most popular ones with wide scale adoption across the country. Technically called Solar PV (Photo Voltaic) pumping systems, these are of great utility specifically in low head situations like water lifting from canals, shallow wells and dug wells, farm ponds etc. Solar PV systems can be best used with pressurized systems. Large size solar pumps in a canal command area to irrigate crops with sprinklers.

Solar Powered Irrigation

Success Story

▶ Availability of quality water had always been an issue in Gosaba island of Sunderban region in West Bengal. Farmers were unable to grow Rabi crops. Farm ponds, which harvest rainwater during monsoon, were the only source of water for irrigation in the post-monsoon period. As a solution, solar-powered drip irrigation system was installed in the island. Solar panels were installed near the pond and a nano pump (0.1 HP) was used for lifting water from the pond to a tank (1,000 litre) placed at 2.5 meter height on a platform. During day-time, water get lifted to the tank and the stored water is applied to high-value vegetable crops through drip irrigation by gravity method. The farmer, in whose farm the drip irrigation system was installed, is now able to grow vegetables round the year. There was 20 per cent to 30 per cent more yield; saving of 40 per cent to 60 per cent water; 40 per cent saving of labour; and an increase in the cropping intensity by up to 300 per cent as compared to traditional practices. The economics of the cultivation under solar drip system for an area of 725 sq.m. indicated that the system is quite profitable in terms of gross return, net return and output – input ratio.

▶ Farmers at Chakhaji Village in Pusa Block, Samastipur, Bihar are reaping benefits of solar-powered irrigation through a successful business model. Solar panels have heralded a new era of improved irrigation, carbon-free air, and increased income for farmers. An entrepreneur at the village has 20 solar panels and irrigates 30 acres for 110 farmers at a charge fixed for hourly supply. A solar powered 5-HP submersible pump provides approximately one lakh litres of water per day on a sunny day, enough to irrigate 20-25 acres of land. Another entrepreneur supplies irrigation water to 50 acres for 100 farmers. In addition to seasonal vegetables, farmers now cultivate high value fruits as well. Solar-powered water is available for eight hours a day, but most farmers make do with just 2-4 hours. Farmers' income has increased substantially.

Source: Kurukshetra February 2023

Conclusion

Renewable Energy can play a vital role in providing power to agriculture sector. Due to immense potential and scope of renewable energy in agriculture sector, Government is focusing on decentralised RE systems and products. MNRE has recently released a framework (2022) to promote RE based applications that are used for earning livelihoods. A special focus on engaging all stakeholders, skill development and capacity building would scale up RE-based livelihood applications. However, financing for the end-users and enterprises would be critical to enable the adoption of solutions and scale-up of the sector. There has been a visible impact of renewable energy in the Indian agriculture during the last few years. RE based decentralised and distributed applications have benefitted millions of farmers in villages by meeting their energy needs in an environment friendly manner.

Syllabus: GS III, Infrastructure: Energy; GS III, Conservation.

Source: Kurukshetra February 2023

Winter Heatwaves – Explained, pointwise**Introduction**

In March of last year (2022), meteorologists in India issued the first heat wave warning of the year. They were anticipating an exceptionally early summer with some of India's highest temperatures ever recorded.

But, **this year**, India Meteorological Agency issued the year's **first heat wave advisory in February**. It stated that regions of India's western region could reach temperatures of 98.6 degrees Fahrenheit or higher (37C). Some parts of India, on the other hand, are experiencing **temperatures that are exceptional for mid-March and are at least 9 degrees above average**. Experts are concerned about the exceptionally high temperatures.

Similarly, several parts of Europe witnessed an unprecedented winter heat wave at the beginning of 2023. The Washington Post report called it an **"extreme event"**. Experts said that temperatures increased 10 to 20 degrees Celsius above normal.

According to the report, at least seven countries recorded their hottest January weather ever. These included Poland, Denmark, the Czech Republic, the Netherlands, Belarus, Lithuania, and Latvia.

Therefore, it becomes important to understand the reason behind the winter heat wave that has become a global phenomenon this year.

What are the factors causing winter heat waves?**In India**

- **Weak Western Disturbances:** Western disturbance is the factor that keeps the temperature in control during Feb and March. However, this year, western disturbances have been weak due to which wind is lacking moisture for adequate rainfall. It is causing dry spells over the plains and subdued rainfall or snowfall over hills
- **Climate change:** In terms of climate change, the Middle East is warming faster than other regions near the equator, and it is acting as a source of warm air that blows toward India.
- **Anti-cyclone formation:** The anticyclone is forming over the northeastern part of the Arabian Sea, which has now moved over southwest Rajasthan. Due to this anticyclone, hot and dry winds from Balochistan, South Sindh, and Thar Desert are reaching northwest India as well as Gujarat, Maharashtra, and Karnataka.

- **Possibility of El Nino Year:** The last three years have been La Nia years. Scientists have predicted a high likelihood that this year will be an El Nino year. It has a significant impact on weather and climate patterns and is linked to drought and poor monsoons in India. This may also contribute to a winter heat wave in India.

In Europe

- **Heat dome:** According to the Washington Post, the European continent is experiencing an unusually warm spell due to the creation of a heat dome over the region.

Other General Factors

- **Air flowing in from the northwest** rolls in over the mountains of Afghanistan and Pakistan, so some of the compression also happens on the leeward side of these mountains, entering India with a bristling warmth.
- **Lapse rate** – the rate at which temperatures cool from the surface to the upper atmosphere – is declining under global warming. In other words, global warming tends to warm the upper atmosphere faster than the air near the surface. This in turn means that the sinking air is warmer due to global warming, and thus produces heat waves as it sinks and compresses.

What are heat waves?

Qualitatively, heat wave is a condition of air temperature which becomes fatal to the human body when exposed. Quantitatively, it is defined based on the temperature thresholds over a region in terms of actual temperature or its departure from normal. In certain countries, it is defined in terms of the heat index based on temperature and humidity or based on the extreme percentile of the temperatures.

How heat waves are different from Heat domes?

While both are connected, they are not the same. Weather patterns with a high-pressure system aloft and sinking air at the surface are called heat domes. Whereas A heat wave is a lengthy period of extremely hot weather that can be generated by a variety of weather patterns, including heat domes, as well as other factors such as a strong ridge of high pressure or a lack of cloud cover.

What are the Implications of heat waves?

Reduced agricultural productivity: Crops, like human bodies, thrive within a fairly narrow range of temperatures. While a small temperature increase can lead some plants to produce more, heat over 90 degrees Fahrenheit leads to a sharp drop in yields for grains like wheat, chickpeas, and mustard seeds. Last year's (2022) heat brought wheat production down by roughly 10 percent or almost 11 million metric tons. This year has already seen not just issues with wheat production, but also with chickpeas and mustard seeds — crucial Indian crops.

Low rainfall: A lack of moisture in the winds restricts the amount of winter rain and snow in certain Himalayan cities, resulting in record-breaking temperatures.

Economic consequences: Employees are less productive during hot weather, even if they work inside, while children struggle to learn in extreme heat, resulting in lower lifetime earnings which in turn hurts future economic growth. A 2018 study found that the economies of US states tend to grow at a slower pace during hot summers. "The data shows that annual growth falls 0.15 to 0.25 percentage points for every 1 degree Fahrenheit that a state's average summer temperature was above normal."

Energy crisis: Moreover, a coal shortage last year (2021-2022) led to a fuel crisis in India's thermal power plants, as electricity demand for air conditioners and fans shot up alongside a recovering post-pandemic economy. One study anticipates that by 2100, greater use of air conditioning could increase residential energy consumption by 83% globally.

Health impacts: That health can suffer greatly without spring during the transition from winter to summer. The heat index, a combination of heat and humidity, is often used to convey this danger by indicating what the temperature will feel like to most people. The high humidity also reduces the amount of cooling at night. Warm nights can leave people without air conditioners unable to cool off, which increases the risk of heat illnesses and deaths. With global warming, temperatures are already higher.

Equity and justice: Not everyone experiences heat waves in the same ways and the ill effects of heat impact most heavily those in already-**disadvantaged groups**.

What are the strategies to deal with heat waves?

Global

- The United Farm Workers are doing everything they can to get a new national heat regulating measure passed.
- Climate activists are continuing their campaigns for the requirements of a Green New Deal, including the need that public housing be environmentally friendly, and are also continuing their efforts to halt the development of fossil fuel

India

Prior to 2015

- Prior to 2015, there was no comprehensive national strategy to combat heat waves.
- According to the NDMA, before 2015, it was mostly up to the state governments to deal with disaster risk
- Heat waves have been declared a local disaster in Chhattisgarh, Odisha, Kerala, Rajasthan, Andhra Pradesh, Maharashtra, and
- Under the rules for disaster relief in place at the national level, heat waves were not considered to be a disaster. But, state governments were authorized to spend up to 10 percent of funds under certain heads for the heat wave

After 2015

- After 2015, the natural disaster started figuring in the priority list of topmost officials in the country including the Prime Minister as chairman of the
- Following this in 2016, the NDMA drew up the first national guidelines for heat waves titled '**Preparation of Action Plan-Prevention and Management of Heat Wave**'.
- The guidelines were twice revised, first in 2017 and then in 2019. They were enriched with recommendations for more specific actions, based on scientific inputs derived from various research papers, reports, and best practices in heat wave assessment and mapping
- Ward-level Heat Action Plans have improved cities' and states' capacity to manage heat stress and respond to heat wave-related
- The revisions in 2019 included a new section, 'Built Environment'; the revisions focused on short-term, medium-term, and long-term measures for heat wave risk
- Fixing responsibility: The National Guidelines on Heat Wave spell out in a matrix format the roles and responsibilities of central and state government agencies, district administrations, local self-governments, NGOs, civil society organizations, and other stakeholders.

What should be done going ahead?

Over the years, the NDMA has also taken a host of measures that include **rescheduling of working hours** for outdoor workers, the creation of drinking water kiosks, the supply of water through tankers, the erection of special shelter homes, an increase in health facilities, the stocking of ORS packets at health centers and the nearest anganwadi centers, the placement of

cooling systems, and construction of gaushalas with fodder banks, etc. However, there are more steps that can be take:

1. States need to compare mortality numbers to previous years to ascertain heat-related deaths, a data set that is underdeveloped in the country.
2. Awareness should be created of the symptoms of heat stroke and its consequences as also the precautions that should be taken.
3. The Medical and Health department should keep stock of ORS, IV fluids, glucose, Pot Chlor (Potassium Chloride), derma allergic creams, and other essentials in adequate quantities while it should ensure uninterrupted telephone link to all its facilities (institutions) so that people in distress could make emergency contact with them.
4. The village secretaries and other officials concerned should conduct gram sabhas and publicize the do's and don'ts besides ensuring dependable water
5. Persons hailing from the weaker sections who suffer heat strokes should be given free treatment at government hospitals while effort should be made to rope in NGOs and other voluntary bodies to run water and butter milk supply centres.
6. The Labour department on its part should sensitise and encourage employers to shift outdoor workers' schedules away from peak afternoon hours during heat alert.
7. Effort should be made to ensure all amenities to children appearing for examinations in addition to prioritising maintenance of power to all critical facilities like hospitals and drinking water supply
8. District collectors should prepare their district specific heat wave action
9. Fast-tracking the switch to clean energy sources is vital to dealing with the issue of the heat wave.
10. There is a need to adapt their buildings, infrastructure, and working hours to higher temperatures.
11. There are also benefits to so-called 'urban greening', where more trees and other vegetation can help to cool down cities and towns.

The Issue of Menstrual Leaves – Explained, pointwise

Introduction

Recently, the issue of menstrual leave came to highlight when Spain became the first European Union country to introduce paid menstrual leaves. In India, a student filed a petition in the Supreme Court, seeking direction for the government for the implementation of the menstrual leaves policy. However, the SC declined to consider the petition, stating that the issue falls within the purview of executive policy.

As per a few sources, menstruating women were given leave from paid labour in Soviet Russia in the 1920s. A historian even claims that a school in Kerala granted period leave as early as 1912.

What is the meaning of Menstrual Leaves?

Menstrual leave or period leave refers to all policies that allow female employees or students to take time off when they are experiencing menstrual pain or discomfort. This mechanism not only increases women's performance after menstruation, but also comforts their overall well-being, which is a double win for everyone involved. In the context of the workplace, it refers to policies that allow for both paid or unpaid leave, or time for rest during the menstruating period.

What is the need for implementing a Menstrual Leaves system?

- **Mental and physical impacts:** Menstrual pain hinders the day-to-day working of a woman. It affects not only their physical health but their mental health as well, reducing their capacity to perform during that period.
- **Increasing Women's representation in the labour force:** Historically, the struggle for women was concentrated on the taboos associated with menstruation; now, as women's involvement in the labour force grows, the landscape has switched to menstruation.
- **Increase in productivity:** Providing proper rest to women during menstruation is likely to increase their productivity post-menstruation.
- **Special Provisions for Women:** Article 14 of the Constitution provides for the protective discrimination principle. Furthermore, Article 15(3) specifically states that nothing in Article 15 shall prevent the state from making special provisions for women and children.
- **Overcoming the Stigma:** Official recognition of the menstrual leaves will remove the stigma around the discussion on this key element of women's health. Historically, the discussion around menstruation has been stigmatised; which made it difficult for women to communicate about their experiences and needs.
- **Maternity Benefit Act of 1961:** There are provisions in the Act to care for women during difficult stages of their maternity. However, the inclusion of the menstrual period within the purview of the act has been largely ignored by society and the legislature.
- **Reducing female Drop-outs:** This will also help reduce the drop-out rates of female students from government schools in rural India caused by the lack of clean toilets, running water, sanitary pads, etc.

What are the challenges of implementing the Menstrual Leaves system?

- **Glass ceiling:** It is believed that promoting menstrual leave will **strengthen gender stereotypes** about 'weakness' of females. It will strengthen the glass ceiling around women's promotion prospects across the board due to potential beliefs that women will end up becoming liabilities to the organization.
- **Lack of legislative will:** The petition in the SC also highlighted that in 2018, an MP had introduced the **Women's Sexual, Reproductive, and Menstrual Rights Bill** which proposed that sanitary pads should be made freely available for women by public authorities on their premises. Similarly, Menstruation Benefits Bill, 2017 was presented in 2022 in the Arunachal Pradesh Legislative Assembly (Private Member's Bill, an MP from Arunachal Pradesh had first presented it in the Lok Sabha in 2017). But the Legislative Assembly disregarded it as it was an 'unclean' topic. As per the petition, this portrays a lack of legislative will to move forward with the concept of menstrual pain leave.
- **Employment for women:** If one compels employers to provide paid menstrual leave to women employees, it may impact their business or serve as a disincentive for employing females. Therefore, Employers might avoid taking in a large number of women employees.

What are the Global practices on Menstrual Leaves?

- **Spain** became the first European country to grant paid menstrual leave to workers, among a host of other sexual health rights. Workers now have the right to three days of menstrual leave—expandable to five days—a month.
- **Japan** introduced menstrual leave as part of labour law in 1947, after the idea became popular with labour unions in the 1920s.
- **Indonesia** introduced a policy in 1948, amended in 2003, saying that workers experiencing menstrual pain are not obliged to work on the first two days of their cycle.

- In the **Philippines**, workers are permitted two days of menstrual leave a month.
- **South Korea** takes a slightly different route, allowing for monthly physiologic leave under their labour law, allowing all female workers to get a day off every month.
- **Vietnam's** labour law stipulates a 30-minute break for women every day of their period cycle. However, in 2020, a three-day leave per month was added, and those who didn't take the leave needed to be paid extra.
- Among the **African nations**, Zambia introduced one day of leave a month without needing a reason or a medical certificate, calling it Mother's Day.
- Companies across nations, such as **Nike and Coexist**, have introduced menstrual leave as an internal policy.

What are the initiatives taken in India on Menstrual Leaves?

- The **Bihar government** introduced its menstrual leave policy in 1992, allowing employees two days of paid menstrual leave every month.
- In January 2023, the **Kerala government** issued an order granting menstrual leave for students in all State-run higher education institutions.
- In 2017, two Mumbai-based companies – Gozoop and Culture Machine – became the first private companies to introduce period leave in India.
- In 2020, Zomato introduced menstrual leave for up to ten days a year for its women and transgender employees. Since then, other private companies like Swiggy and Byju's have also introduced similar policies.

What should be done going ahead?

- There are additional issues that need to be addressed, such as the lack of sanitary facilities in schools and workplaces, particularly in the informal sector.
- Till a policy framework is devised, employers should take a more **women-centric approach** by allowing employees to work from home on those days, providing menstrual hygiene products in office spaces, and not treating the subject of menstruation as taboo.
- It is also necessary for **period education** to be delivered throughout organisations and **awareness** to be spread among the masses regarding the incidence and effects of menstruation, and for all to understand that menstruation is neither too insignificant to be completely ignored, nor too unique to become a source of discrimination.
- Such change must begin at the grassroots level of society, with men, children, and coworkers demonstrating a willingness to be engaged in the dialogue in a both personal and professional capacity.
- Men must first normalize this extremely common occurrence of menstruation and recognize it in a personal capacity-after all, policy improvements and pro-leave legislation, while useful in their own right, can only do so much to combat discrimination and insensitivity towards menstruation.