



## Early Cancer Detection in India and CRC Tumour Breakthroughs

**For Prelims:** [Ayushman Bharat Health and Wellness Centres](#), [NITI Aayog](#), [Non-communicable Diseases](#), [Hypertension](#), [National Cancer Grid](#), Colorectal Cancer

**For Mains:** Gaps in cancer screening, India's public health system, Government Policies & Interventions

**Source:** TH

### Why in News?

Recently, a [NITI Aayog \(National Institution for Transforming India\)](#) report highlighted critical gaps in [cancer detection](#) in India, posing public health risks.

- Meanwhile, researchers in the United States discovered a **distinct subtype of *Fusobacterium nucleatum* in colorectal cancer (CRC) tumours**, potentially improving early detection and targeted treatment.

### What are the Key Highlights of the NITI Aayog Report on Early Cancer Detection in India?

- The report found a "huge gap" in cancer screening at the [Ayushman Bharat Health and Wellness Centres \(HWCs\)](#), which were meant to offer annual screening for **oral, breast, and cervical cancer** for those aged 30 and above.
  - Less than **10% of the visited HWCs had completed even a single round of screening for non-communicable diseases**, including cancer.
- While **screening for breast cancer was being done through self-examination**, the provision for **screening for cervical cancer was yet to be operationalised** and screening for **oral cancer was performed on a case-by-case basis**, depending on visible symptoms.
- The report found that the infrastructure and availability of basic devices, medicines, and diagnostic tests at the visited HWCs were by the operational guidelines.
- The report attributed the gaps in cancer screening to **"low levels of awareness" and "lack of capacities"** among the HWC staff.
  - The report noted that the required intensive training and careful monitoring of [Auxiliary Nurses and Midwives \(ANMs\)](#) on the three screening methods (oral visual examination, visual inspection with acetic acid, and clinical breast examination) had not happened to the desired extent.
  - The HWC staff **also had limited or no knowledge about the need for annual screening for hypertension and diabetes.**

### What is an Early Cancer Detection?

- **Cancer is a disease** in which some of the **body's cells grow uncontrollably** and spread to other parts of the body. **Cancer is the second leading cause of death globally**, accounting for **1 in 6 deaths, in 2018**.
- Early cancer detection has two components: **screening and early diagnosis**.

- **Screening:**
  - Refers to testing healthy individuals to **identify those with cancers before any symptoms appear.**
  - **Examples:** mammography or **clinical breast exam for breast cancer.**
- **Early Diagnosis:**
  - Early diagnosis programs focus on **detecting symptomatic patients** as early as possible.
    - This involves increasing awareness of first signs of cancer among healthcare providers and the general public, improving accessibility, affordability, and quality of diagnosis and treatment services are crucial.
  - **Difference Between Early Diagnosis and Screening:** Early diagnosis is relevant for all types of cancer and focuses on symptomatic patients.
  - Screening is relevant only for a subset of cancers (cervical, breast, colorectal) and targets asymptomatic individuals.
- **Challenges and Limitations:**
  - Screening can have **undesirable effects like false-positive results, false-negative reassurance,** and overdiagnosis/overtreatment.
  - The [World Health Organization \(WHO\)](#) does not recommend **mammography screening for women under 50** and systematic prostate-specific antigen (PSA) screening for prostate cancer due to **high harm/benefit ratio.**

## What are India's Initiatives Related to Cancer?

- [National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke](#)
- [National Cancer Grid](#)
- [National Cancer Awareness Day](#)
- [HPV Vaccine](#)
- [Ayushman Bharat- Health & Wellness Centres \(AB-HWCs\)](#)

## What are the Key Highlights of the Study Regarding Colorectal Cancer?

- Researchers isolated *Fusobacterium nucleatum* bacteria from 130 human CRC tumours and mapped their genetic composition.
  - They found that the **subspecies *Fusobacterium nucleatum animalis (Fna)*** was significantly associated with CRC tumors.
  - Fna is composed of two distinct evolutionary lineages or clades, named **Fna C1 and Fna C2.**
    - The Fna C2 clade was significantly associated with CRC tumours and possessed **additional genetic factors that facilitate cancer association.**
- Physically, Fna C2 bacteria are longer and thinner than Fna C1, which may **aid in evading the immune system and colonising host tissues.**
  - Genetically, Fna C2 has genes that allow it to metabolise compounds like ethanolamine and 1,2-propanediol present in the **human gut.**
  - Fna C2 can survive in more acidic conditions, enabling it to descend from the mouth to the gut, which is unusual for bacteria.
    - This challenges the previous belief that *Fusobacterium* reaches the gut only through bloodstream infections.
- The findings could lead to **early CRC diagnostic tests.** Targeted treatments may be developed from Fna C2 characteristics.
- Selectively targeting Fna C2 without affecting other gut bacteria is a significant challenge.

## Colorectal Cancer (CRC)

- **Global Burden:** Colorectal cancer, also known as **colon cancer, rectal cancer,** or bowel cancer, is a common type of cancer that affects the colon or rectum.
  - Colorectal cancer is the **third most common cancer worldwide,** accounting for

approximately 10% of all cancer cases.

- It is the **second leading cause of cancer-related deaths globally.**

- By 2040, the burden of colorectal cancer is projected to increase by 63% in new cases and 73% in deaths.

- **CRC and India:** CRC is the **seventh most common type of cancer in India**, where the number of cases rose by **20% from 2004 to 2014.**
- **Risk Factors and Prevention:** Risk factors include family history, personal history of colorectal cancer or polyps, and lifestyle factors like an unhealthy diet, lack of physical activity, obesity, smoking, and excessive alcohol consumption.
  - Adopting a healthy lifestyle and regular screening can help prevent colorectal cancer.
- **Symptoms:** Colorectal cancer often has no symptoms in the early stages, highlighting the importance of regular screening.
  - Common symptoms include bowel habit changes, rectal bleeding, abdominal pain and anaemia.
- **Treatment:** Options include **surgery, radiotherapy, chemotherapy, targeted therapy,** and immunotherapy.
  - Treatment plans are tailored based on the specific type and stage of cancer, as well as the patient's medical background.

### **Drishti Mains Question:**

Q. Discuss the significance of early detection and screening in cancer control strategies and evaluate the effectiveness of India's current cancer control policies in addressing the growing burden of the disease.

## **UPSC Civil Services Examination, Previous Year Questions (PYQs)**

### **Prelims**

**Q. With reference to the treatment of cancerous tumours, a tool called cyberknife has been making the news. In this context, which one of the following statements is not correct? (2010)**

- (a) It is a robotic image guided system
- (b) It delivers an extremely precise dose of radiation
- (c) It has the capability of achieving sub-millimetre accuracy
- (d) It can map the spread of tumour in the body

**Ans: (d)**

**Q. 'RNA interference (RNAi)' technology has gained popularity in the last few years. Why? (2019)**

1. It is used in developing gene-silencing therapies.
2. It can be used in developing therapies for the treatment of cancer.
3. It can be used to develop hormone replacement therapies.
4. It can be used to produce crop plants that are resistant to viral pathogens.

**Select the correct answer using the code given below.**

- (a) 1, 2 and 4
- (b) 2 and 3
- (c) 1 and 3

(d) 1 and 4 only

Ans: (a)

### **Mains:**

**Q.1** What are the research and developmental achievements in applied biotechnology? How will these achievements help to uplift the poorer sections of the society? **(2021)**

**Q.2** What do you understand by nanotechnology and how is it helping in the health sector? **(2020)**

## **Harnessing Biomass Cultivation on Degraded Land**

**For Prelims:** Principal Scientific Adviser, [National Green Hydrogen Mission](#), National Biomass Atlas, [Bhuvan portal](#), [Indian Space Research Organisation](#)

**For Mains:** Significance of biomass cultivation, Bioenergy generation, Government initiatives for Renewable Energy

**Source:** [PIB](#)

### **Why in News?**

The **Principal Scientific Adviser (PSA)** to the Government of India recently convened the first meeting to discuss **biomass cultivation on degraded land for green biohydrogen production and bioenergy generation**.

- This significant meeting gathered key stakeholders, and research institutes, to explore the potential of utilising degraded, barren, and uncultivated lands for biomass cultivation.

### **Note**

The Government of India established the **Office of the Principal Scientific Adviser (PSA)** in November 1999.

- The PSA's office aims **to provide pragmatic and objective advice to the Prime Minister** and the cabinet in matters of Science and Technology.
- The Office of **PSA was placed under the Cabinet Secretariat** in August 2018.

### **What are the Key Highlights of the Meeting?**

- **Biomass Cultivation Prospects:**
  - **Seaweed Cultivation:** Highlighted prospects for [seaweed cultivation](#) as biomass for bioenergy production and fostering a marine biomanufacturing start-up ecosystem.
  - **Plant-Based Biomass:** Discussed biomass production using various plants, including **algae, molasses, and sugarcane**.

#### ▪ **Government Programs and Data Utilisation:**

- Highlighted one of the objectives of the [National Green Hydrogen Mission](#) is to initiate focused pilots for biomass-based green biohydrogen production.
- The **Ministry of New & Renewable Energy (MNRE)** highlighted the various programs at the Ministry for Bioenergy and also talked about the **National Biomass Atlas for agri-residue surplus data**.

#### ▪ **Economic and Strategic Frameworks:**

- **Data on Biomass:** The [National Remote Sensing Centre \(NRSC\)](#), and [Indian Space Research Organisation \(ISRO\)](#), presented the [Bhuvan portal](#) for biomass availability from agri-residue and degraded Land Mapping and emphasised the need for data on the characterisation of biomass for understanding the potential of biomass.

### **Note:**

- The **National Biomass Atlas of India** is a tool that helps people understand the **country's biomass availability**.
  - The Biomass and Energy Management Division of the Sardar Swaran Singh National Institute of Bio-Energy (SSS-NIBE) under the Ministry of New and Renewable Energy (MNRE) developed the atlas.
- The atlas shows **state-wise and crop-wise fractions** of different residues available per crop, as well as images of different crops and their crop residue ratios.

### **What is Biomass Cultivation on Degraded Land?**

- **About:** Biomass cultivation on degraded land refers to the **practice of growing organic matter**, such as crops or trees, on land that has been rendered unsuitable for conventional agriculture due to factors like [soil erosion](#), [salinisation](#), or [deforestation](#).
  - **Biomass is renewable organic material** that comes from plants and animals. Biomass contains stored chemical energy from the sun that is produced by plants through photosynthesis.
- **Benefits:**
  - **Soil Restoration and Erosion Prevention:**
    - The cultivation of energy crops helps rebuild the soil on degraded land and helps improve soil quality, fertility, and structure.
    - It **prevents soil erosion** and creates a habitat for native plant species.
    - This restoration process **improves overall biodiversity** and provides additional carbon sinks, aiding in the fight against climate change.
  - **Carbon Sequestration:** Biomass plants absorb carbon dioxide from the atmosphere during photosynthesis, contributing to [climate change](#) mitigation.
  - **Sustainable Biohydrogen Production:** Biomass can be used as a **feedstock for green biohydrogen production** through a process called **thermochemical or biochemical conversion**.
    - Green biohydrogen is a clean-burning fuel that produces water vapour as its only emission.
  - **Bioenergy Generation:** By growing specific bioenergy crops on previously degraded or barren land, we can harness their biomass for energy production.
    - These crops include **fast-growing trees, grasses**, and other plants that have high energy content.
    - The biomass can be converted into various forms of energy, such as **biofuels, biogas, or solid biomass**.
  - **Enhancing Food Security:** By focusing biomass cultivation on degraded or marginal lands, it avoids using fertile agricultural land, which is better suited for food crops.
    - This approach helps prevent the diversion of food grains and improves **food security while also promoting agri-export**.

### **India Biomass Energy Potential**

- India has a **strong agricultural and allied sector** that contributes significantly to the country's **Gross Domestic Product (GDP)** (~20%) and is also the largest source of livelihood (>50% of the population).
  - This presents a large and **widespread biomass availability to the country.**
- Biomass offers several benefits as it is **renewable, carbon-neutral and has the potential to provide significant livelihood generation opportunities.**
- A recent study by the Ministry of New and Renewable Energy (MNRE), indicated estimated **surplus biomass** availability of about **230 million metric tonnes per annum** (2017-18) from agricultural residues and a **biomass power potential of about 28 GW for the country.**
- **Biomass Production Potential:** India is a tropical country and thus offers an ideal environment for Biomass production.
  - Further, the vast agricultural potential, also makes available huge **agro-residues to meet the energy needs.**
    - With an estimated production of about **460 million tonnes of agricultural waste every year, Biomass is capable of supplementing the coal to the tune of about 260 million tonnes.**
  - This can result in a saving of about Rs 250 billion, every year.

## What are the Challenges in Biomass Cultivation on Degraded Land?

- **Soil Quality:** Degraded land often **lacks essential nutrients and organic matter.** Rehabilitating soil quality is crucial for successful biomass cultivation.
- **Species Selection and Adaptation:** Selecting appropriate biomass crops that can thrive in harsh conditions is challenging. Research is needed to identify resilient species and improve their adaptability.
  - Degraded land may experience extreme temperatures, [droughts](#), or [floods](#).
- **Water Availability and Management:** Degraded land often lacks **adequate water resources.** Developing efficient irrigation methods for biomass crops is essential.
  - Exploring [rainwater harvesting](#) techniques can enhance water availability.
- **Economic Viability and Market Demand:** Initial investments in land preparation, seedlings, and infrastructure can be high.
  - **Biomass crops must align with market demand for bioenergy** or other products.
  - Governments can encourage farmers through financial incentives. Ensuring economic viability while rehabilitating land is complex.
- **Biodiversity and Ecological Impact:** Introducing biomass crops may affect local ecosystems and biodiversity. Some biomass **crops may become invasive** and disrupt native flora and fauna.
  - Implementing cultivation methods that minimise ecological impact is essential.

## Way Forward

- **Cultivation Techniques:** Implement strategies to improve degraded soil fertility. This could involve **incorporating organic matter** like compost, and biochar, or using techniques like **biofloculation (harnessing microbial processes)** to improve soil health.
- **Biomass Cultivation with Agroforestry:** Implement a multi-tiered cropping system on degraded land, integrating fast-growing tree species with native grasses and legumes.
  - Trees like ***Pongamia pinnata (Karanj)*** can fix nitrogen in the soil, improving fertility for companion crops like drought-resistant grasses **suitable for biofuel production.**
  - This strategy not only helps in biofuel production but also creates a habitat for native fauna, promoting biodiversity.
- **Drones for Degraded Land Diagnostics:** Use drones with multispectral sensors to quickly assess large areas of degraded land, map soil composition, identify potential biomass cultivation areas, and evaluate existing biodiversity.
- **Market Development:** Develop markets for biomass and its by-products to ensure economic viability and create a value chain that supports rural livelihoods.

**Drishti Mains Question:**

Q. Assess the biomass energy potential of India and the opportunities it presents for the country's transition towards a sustainable energy mix. Discuss the policy frameworks required to harness this potential effectively.

## UPSC Civil Services Examination, Previous Year Question

### Prelims

Q. With reference to the usefulness of the by-products of sugar industry, which of the following statements is/are correct? (2013)

1. Bagasse can be used as biomass fuel for the generation of energy.
2. Molasses can be used as one of the feedstocks for the production of synthetic chemical fertilizers.
3. Molasses can be used for the production of ethanol.

Select the correct answer using the codes given below:

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (c)

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## Inter-Services Organisations Act

**For Prelims:** [Inter-Services Organisations \(ISOs\) \(Command, Control, and Discipline\) Act](#), [Army Act of 1950](#), [Chief of Defence Staff \(CDS\)](#)

**For Mains:** Key features of the Inter-Services Organisations (ISOs) Act, Significance of Integration of Armed Forces

**Source:** [TH](#)

### Why in News?

Recently, the Government has notified the [Inter-Services Organisations \(ISOs\) \(Command, Control, and Discipline\) Act](#) empowering the **Commander-in-Chief or Officer-in-Command of Inter-services Organisations** to manage personnel from all branches of the military, streamlining operations and fostering collaboration.

### What are the Key Features of the Inter-Services Organisations (ISOs) Act?

- **Background:**

- Currently, the [Armed Forces](#) operate **under distinct Service Acts like the [Army Act of 1950](#), the [Navy Act of 1957](#), and the [Air Force Act of 1950](#).**
  - However, the **diverse nature** of these acts has sometimes posed **challenges in**

**maintaining** uniform discipline, coordination, and expeditious proceedings across the inter-service establishments.

- The **ISO Act** does not propose any alteration to the existing service acts, rules, or regulations.

▪ **Features of the Act:**

◦ **Empowering ISO Leadership:**

- The Act grants Commanders-in-Chief and Officers-in-Command of ISOs the authority to **exercise disciplinary and administrative control** over service personnel under their command, regardless of their specific branch (Army, Navy, Air Force).
- This [simplifies command structure](#) and ensures efficient decision-making within ISOs.

◦ **Constituting and Classifying ISOs:**

- Existing ISOs like the [Andaman and Nicobar Command](#), [Defence Space Agency](#) and the **National Defence Academy** will be formally recognised under the Act.
- The central government may constitute an **Inter-services Organisation** which has personnel belonging to **at least two of the three services**: the army, the navy, and the air force.
  - ISO will be placed under the command of an **Officer-in-Command**.
- A **Joint Services Command (tri-service)** can also be formed, which will be placed under the command of a **Commander-in-Chief**.

◦ **Applicability and Qualifications:**

- It can be **extended to other centrally controlled forces** beyond the Army, Navy, and Air Force.
- It outlines the **eligibility criteria** for **Commanders-in-Chief** and **Officers-in-Command**, specifying high-ranking officers from each service.

◦ **Control and Commanding Officer:**

- The **central government retains ultimate authority over ISOs** and can issue directives related to national security, administration, and public interest.
- It establishes the [Commanding Officer position](#), responsible for a specific unit, ship, or establishment within an ISO.
  - They will carry out duties assigned by the higher leadership and have the authority to initiate disciplinary or administrative actions concerning personnel under their command.

**Note:**

- **Joint command** in [Andaman and Nicobar Islands](#) is the **first Tri-Service theatre command** of the Indian Armed Forces, based at Port Blair in Andaman and Nicobar Islands of India.
  - The Indian armed forces **currently have 17 commands**. There are **7 commands** each of the Army and the Air Force. The **Navy has 3 commands**.
  - Each command is **headed by a 4-star rank military officer**.
- **Theaterisation of Armed Forces:**
  - It is the **integration of the army, air force, and navy** under a single unified command structure for a **specific geographical area**.
  - Under it **all the assets and resources** of the three services in that area are placed **under a single commander** responsible for planning and executing all military operations.

## What is the Significance of Integration of Armed Forces?

▪ **Enhanced Operational Effectiveness:**

- Joint planning and training foster better coordination and understanding between services, crucial for modern warfare.
  - **For example:** [Inter-Services Organisations \(ISOs\) Act](#), 2024 empowers the leadership of ISOs to execute a unified command.

▪ **Faster Decision-Making:**



- Streamlined command structures within integrated units allow for quicker decision-making on the battlefield.
  - Established in 2019, the [Chief of Defence Staff \(CDS\)](#) is a **single-point military advisor** to the government, facilitating **better coordination in defence planning and procurement**.
- **Optimum Resource Utilisation:**
  - Integration **reduces duplication of efforts** and optimises resource allocation across all services.
  - The creation of integrated theatre commands aims to [streamline planning, logistics, and operations](#).

## Government Initiatives Regarding Integration of Armed Forces:

- [Inter-Services Organisations \(ISOs\) Act, 2024](#)
- [Chief of Defence Staff \(CDS\)](#)
- Idea of [Integrated Theatre Commands](#)

## Conclusion

The process of integration of Indian armed forces has been a long-term vision and past steps seem to be in the right direction. Also, the inclusion of modern warfare systems similar to **China's information support force, cyberspace force**, or the **USA's space forces**, can enhance India's defence-related capabilities to match modern warfare needs and challenges.

### Drishti Mains Question:

Q. Discuss key features of the Inter-Services Organisations (ISOs) Act. What are significance and challenges related to integration of armed forces?

## UPSC Civil Services Examination Previous Year Question (PYQ)

### Prelims:

**Q. In the Constitution of India, the promotion of international peace and security is included in the (2014)**

- (a) Preamble to the Constitution
- (b) Directive Principles of State Policy
- (c) Fundamental Duties
- (d) Ninth Schedule

**Ans: (b)**

### Mains :

**Q.** "The diverse nature of India as a multi-religious and multi-ethnic society is not immune to the impact of radicalism which is seen in her neighborhood." Discuss along with strategies to be adopted to counter this environment. **[2014]**

# Self-Help Groups

**For Prelims:** [Kudumbashree mission](#), [Self Help Groups \(SHGs\)](#), [NABARD \(National Bank for Agriculture and Rural Development\)](#), [National Rural Livelihoods Mission \(NRLM\)](#), [Deen Dayal Antyodaya Yojana-National Rural Livelihoods Mission \(DAY-NRLM\)](#), [SHG-Bank Linkage Programme \(SBLP\)](#), [Mission for Financial Inclusion \(MFI\)](#), **E-Shakti project**

**For Mains:** [Financial inclusion](#), [Women's empowerment](#), [Microfinance](#), [Community development](#), [Poverty alleviation](#), [Self Help Groups](#)

**Source:** TH

## Why in News?

Recently, the 26<sup>th</sup> anniversary of the [Kudumbashree mission](#), a SHG, was celebrated in Kerala.

- Established in 1998, Kudumbashree currently comprises 46.16 lakh members across three lakh neighbourhood groups, originally focused on **women's enterprises** but now offering legal aid, counselling, loans, cultural engagements, and participating in [disaster relief efforts](#).

## What are Self Help Groups (SHGs)?

### ▪ About:

- A Self Help Group is a **self-governed, peer-controlled information group of people** with **similar socio-economic backgrounds** and a desire to collectively perform common purpose.
- An SHG normally **consists of not less than five persons** (with a maximum of twenty) of similar economic outlook and social status.

### ▪ Origins of Self-Help Groups in India:

- Early Efforts (Pre-1970s):** There were **scattered instances** of informal SHGs, particularly among women, for collective action and mutual support.
- SEWA (1972):** The [Self-Employed Women's Association \(SEWA\)](#), established by Ela Bhatt, is often considered a defining moment.
  - It organised poor and self-employed women workers, providing a platform for income generation and advocacy.
- MYRADA and Pilot Programs (Mid-1980s):** In the mid-1980s, Mysore Resettlement and Area Development Agencies (MYRADA) pioneered SHGs as a microfinance strategy to provide credit to the poor, especially women in rural areas.
- NABARD and SHG-Bank Linkage (1992):** The [National Bank for Agriculture and Rural Development \(NABARD\)](#) launched the [SHG-Bank Linkage Programme](#) in 1992.
  - This initiative connected SHGs with **formal banking institutions**, enabling access to credit and financial services for various groups.
- Government Recognition (1990s-Present):** Since the 1990s, the Government has actively supported SHGs through various schemes like **Swarn Jayanti Gram Swarozgar Yojana (SGSY)** and the [National Rural Livelihoods Mission \(NRLM\)](#).
  - These initiatives have significantly expanded the reach and impact of the SHG movement in India.

### ▪ Government Initiatives and Policies Supporting SHGs:

- [Deen Dayal Antyodaya Yojana - National Rural Livelihoods Mission \(DAY-NRLM\)](#)
- [SHG-Bank Linkage Programme \(SBLP\)](#)
- [Mission for Financial Inclusion \(MFI\)](#)

## What has been the Impact of SHG on Women?

- **Economic Empowerment:**
  - SHGs have significantly improved women's access to [microfinance and credit](#).
  - SHGs have facilitated **income generation activities and entrepreneurship** among women and **increased income and economic stability** for many women and their families.
  - SHGs have played a **vital role in poverty alleviation** and financial inclusion by providing **access to affordable financial services, reduce reliance on high-cost informal loans**.
- **Women's Agency and Empowerment:**
  - SHGs offer **leadership and assertiveness training**, empowering women to challenge traditional gender norms and assume leadership roles in their communities.
- **Impact on Family and Society:**
  - SHGs have empowered women with **greater respect and decision-making power**, fostering more equitable family relationships.
    - SHGs also increased women's **representation and leadership roles** in local governance.
  - SHGs have mitigated social issues like **domestic violence** by economically empowering women and providing a supportive network.

## What are the Challenges and Limitations Faced by the SHGs?

- **Sustainability of SHG Initiatives Beyond Initial Support:** The long-term viability of SHGs depends on continued external support and effective internal management which requires **strong leadership, community support**, and the ability to generate sufficient revenue to cover operational costs.
- **Issues of Dependency and Overreliance on External Aid:** SHGs face significant challenges due to their dependency on external aid, which can hinder their self-sustainability and long-term viability, especially in disaster-affected areas.
- **Addressing Intersectional Challenges:** SHGs often encounter caste, class, and regional challenges, impacting their effectiveness and inclusivity, with marginalised groups typically receiving fewer benefits.
- **Agricultural Activities:** Most SHGs operate at the local level, primarily engaged in agricultural activities. SHGs in rural areas should be introduced to non-agricultural businesses and provided with state-of-the-art machinery.
- **Lack of Technology:** Many SHGs use rudimentary or no technology in their operations.
- **Market Access:** Goods produced by SHGs often lack access to larger marketplaces.
- **Poor Infrastructure:** SHGs are typically located in rural and remote areas with poor connectivity via roads or railways and limited access to electricity.
- **Politicisation:** Political affiliation and interference are significant issues for SHGs, often leading to group conflicts.

## Way Forward:

- **Leveraging Technology for Scale and Efficiency:** Technology can greatly enhance SHGs by improving efficiency and scalability, with digital platforms aiding in record-keeping, financial transactions, and communication, as seen in initiatives like NABARD's E-Shakti project.
- **Strengthening Linkages with Formal Financial Institutions:** Linking SHGs with formal financial institutions through programs like SBLP enhances their sustainability, reduces reliance on informal lenders, and promotes financial inclusion.
- **Integrating Environmental Sustainability into SHG Activities:** SHGs' integration of environmental sustainability enhances resilience and promotes broader sustainable development goals.
- **Awareness For Inclusivity:** Encourage SHGs to adopt an inclusive approach, considering members' socio-economic backgrounds, for equitable participation and benefit-sharing, addressing discrimination concerns.

### **Drishti Mains Question:**

Q. Discuss the challenges faced by Self-Help Groups (SHGs) in India in fostering socio-economic empowerment and suggest measures to overcome these hurdles.

## **UPSC Civil Services Examination, Previous Year Question (PYQ)**

### **Mains**

Q. The legitimacy and accountability of Self Help Groups(SHG) and their patrons, the micro-finance outfits, need systematic assessment and scrutiny for the sustained success of the concept. Discuss. (2013)

## **X Chromosome**

**Source: TH**

### **Why in News?**

Recent genomic studies have uncovered the significant role of the X chromosome in various biological processes and diseases, particularly **autoimmune diseases** and [Alzheimer's disease](#).

### **What is the X Chromosome?**

- **About:** The X chromosome is **one of the two sex chromosomes** found in humans and many other organisms. It plays a crucial role in sex determination and carries genes essential for various bodily functions.
- **Sex Determination:** Females typically have **two X chromosomes (XX)**, while males have one **X and one Y chromosome (XY)**.
  - The presence or absence of the Y chromosome determines biological sex.
- **Genes and Functions:** The X chromosome encodes approximately 800 genes that code for proteins involved in diverse biological functions.
  - Loss of function of these genes can lead to a variety of genetic diseases, which can be broadly classified into three categories:
    - X-linked genetic diseases.
    - Diseases influenced by X-chromosome inactivation (XCI) escape.
    - Diseases linked to X-chromosome aneuploidies.
- **X-Linked Genetic Diseases:** It results from **mutations in genes on the X chromosome**.
  - **Males, having only one X chromosome, are more likely to express the mutations and develop the disease.**
  - Females, with two X chromosomes, have a **better chance of having a healthy copy of the gene to offset a mutated one**, reducing their risk of developing the full disease.
  - **Examples: Red-green colorblindness** (affecting around 8% of males).
    - **Duchenne muscular dystrophy** (1 in every 3,500-5,000 boys born in India) and **Agammaglobulinemia** (1 in 200,000 live births).
- **X-Chromosome Aneuploidies:** Numerical aneuploidies of the X chromosome can cause certain diseases.
  - Aneuploidy is a genetic condition where an organism has an **abnormal number of chromosomes in its cells**.
    - Human cells typically have 46 chromosomes, 23 from each parent. In aneuploidy, a cell may have an extra copy of a chromosome (trisomy) or a missing copy

(monosomy).

- **Examples:**

- **Klinefelter syndrome** (characterised by an extra X chromosome, XXY).

- **Turner syndrome** (loss of one X chromosome in females, X instead of XX).

- **X-chromosome inactivation (XCI) Escape:** In females with two X chromosomes, one X chromosome is randomly inactivated in each cell (except for egg cells) to prevent an imbalance of X-linked genes. **This process is called X-inactivation or lyonization.**

- Issues like incomplete inactivation (escape) or skewed inactivation can lead to abnormal gene expression, contributing to **X-linked disorders, certain cancers, and autoimmune conditions.**

- The molecular mechanisms behind XCI were discovered in the 1990s, involving two **non-coding RNAs called Xist and Tsix.**

- Xist coats and inactivates one of the X chromosomes, while Tsix (reverse of Xist) regulates this process.

- Recent research has shown that up to a quarter of genes on the X chromosome can escape inactivation and be expressed, even after the XCI process.

## How is XCI Linked to Autoimmune Diseases?

- Autoimmune diseases, such as systemic [lupus erythematosus](#), [rheumatoid arthritis](#), and **Sjögren's syndrome**, are more common in females than males.

- A recent study found that **changing the activity of a gene Xist reactivated other inactive genes on the X chromosome.**

- This **caused immune system changes** that led to lupus-like symptoms, such as increased autoantibodies and inflammation.

- The findings suggest a link between these gene changes and autoimmune diseases, offering hope for new treatments.

## Note

Autoimmune diseases occur when the **body's immune system mistakenly attacks healthy cells** as if they were foreign organisms.

## How is the X Chromosome Linked to Alzheimer's Disease?

- Alzheimer's disease exhibits a sex bias, with **women having a higher risk compared to men.**

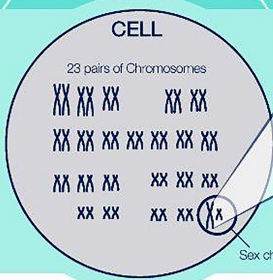
- A study suggests that the **gene USP11**, involved in protein modification, escapes X inactivation and is expressed more in females.

- Increased expression of USP11 encourages the accumulation of tau protein in the brain, contributing to the **development of Alzheimer's disease.**

- This opens new avenues for developing targeted treatments for Alzheimer's disease.

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# X Chromosome



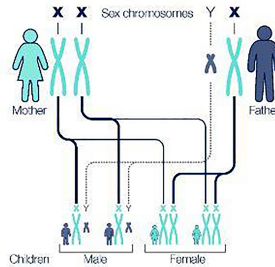
**1** In the nucleus of each cell, DNA is packaged in thread-like structures called **chromosomes**.

**X Chromosome**

**2** Most human cells contain 23 pairs of chromosomes. One set of chromosomes comes from the mother, while the other comes from the father. The twenty-third pair is the **sex chromosomes**, while the rest of the 22 pairs are called **autosomes**.

**3** Typically, biologically female individuals have two X chromosomes (**XX**), while those who are biologically male have one X and one Y chromosome (**XY**). However, there are exceptions to this rule.

**4** Biologically female people inherit an X chromosome from their father, and the other X chromosome from their mother. Biologically male people always inherit their X chromosome from their mother.



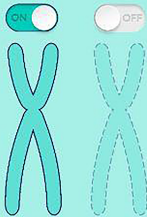
**5** The X chromosome is about three times larger than the Y chromosome, containing about 900 genes, while the Y chromosome has about 55 genes.

X Chromosome

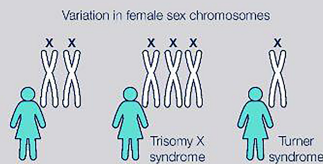
Y Chromosome

**6** Female mammals have two X chromosomes in every cell. However, one of the X chromosomes is **inactivated**. Such inactivation stops transcription from occurring, hence making sure a potentially toxic double dose of X-linked genes does not occur.

**7** An inactivated X chromosome gets condensed into a small, dense structure in the nucleus, and is called a Barr body. Barr bodies are commonly used to determine sex.



**8** Changes in the structure or number of X chromosomes can lead to a number of diseases. For example, **trisomy X syndrome** is caused by the presence of three X chromosomes instead of two. **Turner syndrome** occurs when women inherit only one copy of the X chromosome.



**9** Some women have a rare super color vision trait called **tetrachromacy**, which is linked to the X chromosome. These women can see up to **100 million shades of color** because they have four types of cone cells in their eye instead of the usual three.

**10** Contrary to popular belief, **calico** is not a breed of cats, but rather a **distinctive coat color pattern** linked to the X chromosome. Over 95% of calico cats are female. The patches of fur on a calico cat are orange and black, and the color depends on which X chromosome is inactivated within each patch of color.



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## Sariska Tiger Reserve

[Source: TH](#)

### Why in News?

Recently, the Supreme Court of India clarified that protected areas include not only **national parks and wildlife sanctuaries** but also critical tiger habitats, i.e., tiger reserves.

- This is in the context of its earlier 2023 order that mining within a **national park, wildlife sanctuary**, and within an **area of 1 km** from their boundary shall not be permissible.
- The case in question pertains to the **buffer zone** created to protect the **Sariska Wildlife Sanctuary** in Rajasthan.

### What are the Key Facts About the Sariska Tiger Reserve?

- **About:**
  - Sariska Tiger Reserve is located in **Aravali hills** and forms a part of the Alwar District of Rajasthan.
  - It was declared a wildlife sanctuary in 1955 and was declared a **tiger reserve** later in 1978, making it a part of India's **Project Tiger**.
  - It encompasses ruined temples, forts, pavilions and a palace.
    - **Kankarwadi Fort** is located in the centre of the reserve. It is said that **Mughal emperor Aurangzeb** had **imprisoned his brother Dara Shikoh** at this fort in the struggle for succession to the throne.
    - It also houses a famous **temple of lord Hanuman at Pandupole** related to Pandavas.
- **Flora and Fauna:**
  - It is characterised by **rocky landscapes, arid scrub-thorn forests, grasslands**, cliffs, and **semi-deciduous forests**.
  - It is dominated by **dhok trees**, salar, kadaya, gol, ber, banyan, gugal, bamboo, kair, etc.
  - It also supports a **diverse array of other animals** such as Royal Bengal Tiger, leopards, sambhar, chital, nilgai, four-horned antelope, wild boar, hyenas, and jungle cats.

### What are the other Protected Areas of Rajasthan?

- **Desert National Park**, Jaisalmer
- **Keoladeo National Park, Bharatpur**
- **Ranthambore National Park**
- **Sajjargarh Wildlife Sanctuary**, Udaipur
- **National Chambal Sanctuary** (on the tri-junction of Rajasthan, Madhya Pradesh and Uttar Pradesh).
- **Ramgarh Vishdhari Wildlife Sanctuary** (4th Tiger reserve of Rajasthan).



## What are Eco-Sensitive Zones (ESZs)?

### ▪ About:

- The [National Wildlife Action Plan \(2002-2016\)](#) stipulated that state governments should declare land falling **within 10 km of the boundaries of national parks and wildlife sanctuaries** as eco-fragile zones or Eco-Sensitive Zones (ESZs) under the [Environmental \(Protection\) Act, 1986](#).

### ▪ Activities Around ESZs:

- **Prohibited Activities:** Commercial mining, sawmills, industries causing pollution, major [hydroelectric projects \(HEP\)](#), commercial use of wood.
- **Regulated Activities:** Cutting of trees, the establishment of resorts, commercial use of natural water, erection of electrical cables, drastic change of agriculture system, widening of roads.
- **Permitted Activities:** Ongoing agricultural or horticultural practices, rainwater harvesting, organic farming, use of renewable energy sources.

### ▪ Significance of ESZs:

- ESZs **act as buffer zones** around protected areas. They **regulate activities** around these **core areas**, minimising the negative impacts of development and human intervention.
- ESZs **help in in-situ conservation**. Example, the conservation of the [One-horned Rhino](#) of [Kaziranga National Park](#), Assam.
- ESZs help to **maintain wildlife corridors** and reduce instances of [man-animal conflict](#), where wild animals enter human settlements in search of food and water.
- Many ESZs encompass fragile ecosystems like [wetlands](#), [mangroves](#), and [reefs](#) which are



vital for maintaining biodiversity. By regulating activities around these areas, ESZs help to preserve their health and ecological functions.

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### **Prelims:**

**Q. Consider the following pairs: (2014)**

1. Dampa Tiger Reserve : Mizoram
2. Gumti Wildlife Sanctuary: Sikkim
3. Saramati Peak : Nagaland

**Which of the above pairs is/are correctly matched?**

- (a) 1 only  
(b) 2 and 3 only  
(c) 1 and 3 only  
(d) 1, 2 and 3

**Ans: (c)**

**Q. In which one of the following States is Pakhui Wildlife Sanctuary located? (2018)**

- (a) Arunachal Pradesh  
(b) Manipur  
(c) Meghalaya  
(d) Nagaland

**Ans: (a)**

### **Mains**

**Q.** "The most significant achievement of modern law in India is the constitutionalization of environmental problems by the Supreme Court." Discuss this statement with the help of relevant case laws. **(2022)**

## **Humboldt Glacier**

[Source: IE](#)

**Recently,** Venezuela has become the first country to likely lose all its glaciers due to climate change.

- The **last remaining glacier**, [Humboldt](#), has shrunk significantly and is now classified as an ice field.
- **Venezuela** used to be **home to six glaciers** (5 of them vanished by 2011), located about 5,000

metres above sea level in the [Andes mountains](#).

- The **Andes mountains**, have experienced significant temperature increases, accelerating glacier melt.
  - These are the **mountain systems of South America** with an **average height of 8,900 kilometres**.
  - It ranges from the **southern tip of South America** to the continent's northernmost coast on the Caribbean covering parts of **Argentina, Bolivia, Chile, Colombia, Ecuador, Peru, and Venezuela**.
- The [2023 El Nino event](#) further intensified melting in the Humboldt Glacier.
- Similar to Venezuela, many glaciers worldwide are disappearing faster than expected, with **two-thirds of total glaciers projected to vanish by 2100**, according to a 2023 study.
  - [Hindukush Himalayan glaciers](#) also face a major threat, potentially losing **80% of their volume by 2100** if [greenhouse gas emissions](#) remain high.



[Read more...](#)

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## SC to Revisit 1995 Order of Consumer Court

[Source: IE](#)

The recent [Supreme Court](#) ruling on [lawyers' liability](#) under the **Consumer Protection Act** has prompted a reconsideration of the **1995 decision** regarding [medical professionals](#).

- The recent Supreme Court decision recently ruled that **lawyers are not liable** under the [Consumer Protection Act](#), contradicts a 1995 verdict regarding medical professionals.
- In the 1995 case of **Indian Medical Association vs V P Shantha**, the Supreme Court ruled that **medical professionals provide a "service"** as defined in the Consumer Protection Act and **can be sued** in consumer court for providing faulty service.

- The 1995 ruling has now been **referred to a larger bench** for **reconsideration** in light of the recent judgement on lawyers.
- The [Consumer Protection Act of 2019](#), replaced the earlier 1986 Act. It establishes the **Central Consumer Protection Authority (CCPA)** to actively promote, safeguard, and enforce consumer protections.

CONSUMER PROTECTION ACT 1986	PROVISIONS	CONSUMER PROTECTION ACT 2019
No separate regulator	<b>Regulator</b>	Central Consumer Protection Authority (CCPA) to be formed
Complaint could be filed in a consumer court where the seller's (defendant) office is located	<b>Consumer court</b>	Complaint can be filed in a consumer court where the complainant resides or works
No provision. Consumer could approach a civil court but not consumer court	<b>Product liability</b>	Consumer can seek compensation for harm caused by a product or service
District: up to ₹20 lakh State: ₹20 lakh to ₹1 cr National: above ₹1 cr	<b>Pecuniary jurisdiction</b>	District: up to ₹1 cr State: ₹1 cr to ₹10 cr National: Above ₹10 cr
No provision	<b>E-commerce</b>	All rules of direct selling extended to e-commerce
No legal provision	<b>Mediation cells</b>	Court can refer settlement through mediation

[Read more...](#)

## Manipuri Pony

[Source: DTE](#)

Recognising the urgent need to save the **Manipuri Pony, also known as the Meitei Sagol**, the Government of Manipur has joined hands with various organisations and associations to take a host of decisions aimed at preventing it from vanishing into history.

- The **Meitei Sagol is one of the seven recognised horse and pony breeds of India.**
  - The others include the Marwari Horse, the Kathiawari Horse, the Zanskari Pony, the Spiti Pony, the Bhutia Pony and the Kachhi-Sindhi Horse.
- It is regarded as the **original polo pony**, as the traditional **Sagol Kangjei sport** of Manipur gave rise to **modern polo.**
- The **Manipuri Pony Conservation and Development Policy (MPCDP)** was framed in 2016 to conserve the breed.
  - The population of the Manipuri Pony has been rapidly declining, from 1,898 animals in 2003 to only 1,089 in 2019, leading to the breed being declared **endangered by the Manipur**

### **government in 2013.**

- The Manipuri Pony is known for its unique characteristics, such as **stamina, agility, intelligence, speed, manoeuvrability, and adaptability** to harsh climatic conditions.
  - The ponies are deeply embedded in the Manipuri way of life, being used in traditional events, and sports, and even serving as mounts for the Manipur Kingdom's cavalry in the past.



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## **Manipur Thangjing Hills Dispute**

[Source: TH](#)

The Manipur police have registered a [zero First Information Report \(FIR\)](#) based on a complaint from the **Land Resources Department of the Manipur government**, alleging that the name of the hills was changed from "**Thangjing Ching**" to "**Thangting**" without government approval.

- The Thangjing Hill is of historical importance and has been declared a **protected site by the Government of Manipur**. It is located in the buffer zone between Churachandpur and Bishnupur districts and is contested by **Kukis and Meiteis for religious and cultural significance**.
  - The Kuki-Zo people have always called it Thangting Hills and the Meitei people have always referred to it as Thangjing Ching or Thangjing Hills.
  - The conflict over the right to pray and worship on the hill range has escalated since the ethnic conflict between the [Kuki-Zo and Meitei communities](#) **began in 2023**.

[Read more...](#)

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## International Day of Biodiversity

**Source:** [IE](#)

The [International Day for Biological Diversity \(IDB\)](#), celebrated on **22nd May 2024**, raises awareness about the importance of biodiversity for sustaining life on Earth.

- **"Be Part of the Plan,"** the **theme** for 2024, highlights the importance of a united effort to combat biodiversity loss and implement the [Kunming-Montreal Global Biodiversity Framework](#).
- **International Day for Biodiversity (IDB):**
  - **In 2000**, the [United Nations General Assembly \(UNGA\)](#) officially proclaimed **22<sup>nd</sup> May** as IDB.
  - **On 22<sup>nd</sup> May 1992**, the initial text of the United Nations Convention on Biological Diversity (UNCBD) was adopted.
    - **UNCBD is a legally binding treaty** to conserve biodiversity.
    - **India is a party to the convention** and enacted the [Biological Diversity Act, 2002](#).
  - **Biodiversity** as a concept, first coined by **Walter G. Rosen in 1985**, encompasses the **diversity of all life forms**, including plants, bacteria, animals, and humans.
  - The UNGA designated the years **2011-2020** as the [United Nations Decade on Biodiversity](#), aiming to advance the implementation of a strategic plan for biodiversity.

**Read more:** [Global Biodiversity Framework Fund](#), [Convention on Biological Diversity](#)

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## International Booker Prize 2024

**Source:** [TH](#)

Recently, the International Booker Prize 2024 was awarded to "Kairos" written by **Jenny Erpenbeck**, and translated by **Michael Hofmann**.

- The International Booker Prize, formerly known as the **Man Booker International Prize**, established in 2005, is awarded annually for a single book translated into English and published in the **United Kingdom or Ireland**.
  - The **prize aims to promote global fiction** and celebrates the work of translators.
- **Prize Money:** The award comes with 50,000 pounds (USD 64,000), shared equally between the author and the translator.
  - The shortlisted authors and translators each receive 2,500 pounds.
- **Indian International Booker Prize Laureate:**

Year	Author	Work
1971	V.S. Naipaul	In a Free State
1981	Salman Rushdie	Midnight's Children
1997	Arundhati Roy	The God of Small Things
2006	Kiran Desai	The Inheritance of Loss
2008	Aravind Adiga	The White Tiger
2022	Geetanjali Shree	Tomb of Sand

**Read more:** [Tomb of Sand' won International Booker Prize](#)

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