

CLIMATE CHANGE

Climate change and infectious disease

Context: The Intergovernmental Panel on Climate Change (IPCC) issues a severe warning in its latest report, due out in March 2023: climate change increases the global risk of infectious diseases. Every year, the strong association between climate and disease is shown. For example, the occurrence of mosquito-borne disease outbreaks no longer follows predictable patterns.

About

- Dengue fever appears in two or three peaks during the year. Temperature, precipitation, and humidity variations disturb disease transmission cycles. These also affect the distribution of the parasite's vectors and animal reservoirs. Heat has been shown to disrupt pathogen genetic structure, altering infectivity and pathogenicity.
- The direct health damage costs (excluding expenses in health-determining areas like agriculture and water and sanitation) are anticipated to reach between USD 2-4 billion per year by 2030.

What is the relationship between climate change and disease occurrence?

- **Zoonotic Diseases and Habitat Loss:** As climate change modifies ecosystems, habitat loss becomes increasingly common. As a result, disease-carrying animals are forced to trespass on human areas in quest of acceptable habitats and supplies. This greater interaction between humans and wildlife increases the risk of zoonotic diseases, which occur when infections spread from animals to humans.
- The Nipah virus, for example, has generated outbreaks in Kerala as a result of similar spillover episodes.
- **Temperature and Disease Transmission:** Rising temperatures can have an impact on the distribution and behavior of disease vectors like mosquitos and ticks. These vectors are critical in the transmission of diseases such as malaria, dengue fever, and Lyme disease.
- Warmer temperatures can expand the geographic range of these vectors, allowing them to thrive in previously inhospitable environments.
- **Changing Precipitation Patterns:** Climate change can affect precipitation patterns, resulting in more intense and protracted rainfall in certain areas and droughts in others. These modifications may provide favorable breeding habitats for disease vectors.
- Flooding can contaminate water supplies with waste and bacteria, resulting in outbreaks of waterborne diseases such as cholera and dysentery.
- Heavy rains can cause stagnant water pools, which are perfect breeding grounds for mosquitos that spread diseases such as malaria and the Zika virus.
- **Changes in Vector Behavior:** Climate change can have an impact on disease vector behavior.
- Warmer temperatures can hasten the development of pathogens within vectors, allowing for a shorter incubation time and faster disease transmission.
- **Food Security:** Climate change can disrupt agricultural systems, leading to changes in food production and distribution. These disruptions can contribute to malnutrition and weaken immune systems, making populations more susceptible to diseases.
- **Extreme Weather Events:** Climate change is associated with an increase in the frequency and intensity of extreme weather events, such as cyclones, heatwaves, and wildfires. These events can lead to injuries, displacement, and disruptions in healthcare systems, creating conditions conducive to disease outbreaks.
- **Changing Disease Landscape:** Climate change has broadened the spectrum of infectious agents threatening humans. Over half of all known infectious diseases that affect humans worsen with changing climate patterns.
- These diseases often discover new transmission routes, including environmental sources, medical tourism, and contaminated food and water.

What steps should be taken to remedy this problem?

Mitigating Climate Change:

- Reducing greenhouse gas emissions from various sources, such as fossil fuels, agriculture, industry, and waste, by using cleaner and more efficient technologies, switching to renewable energy sources, improving energy efficiency, and promoting low-carbon lifestyles.
- **National Biofuel Policy, Vehicle Scrappage Policy, E20 Fuel Policy, National Green Hydrogen Mission** are the some steps taken by the government in this regard.
- Enhancing the sinks of greenhouse gases, such as forests, soils, and oceans, by protecting and restoring natural ecosystems, increasing carbon sequestration and storage, and avoiding land degradation and deforestation.
- **National Afforestation Programme (NAP), The Compensatory Afforestation Fund Management and Planning Authority (CAMPA Funds), The National Action Programme to Combat Desertification** are some steps taken by the government.

Improving Disease Surveillance Systems:

- **Improve Surveillance Technology:** Invest in modern monitoring technology and systems that can track new disease outbreaks in real time. Encourage the usage of web-enabled illness reporting tools.

- **IHIP (Integrated Health Information Platform):** In 2018, seven states implemented IHIP. IHIP was created as a web-enabled, near-real-time electronic information system capable of reporting on a wide variety of disease conditions and giving disaggregated data.
- **One Health Approach:** Adopt a One Health approach that incorporates monitoring of human, animal, plant, and environmental health. This method understands the interdependence of these factors and is critical in averting outbreaks, particularly those caused by animals.
- **Capacity Building and Resource Allocation:**
- Invest in training and capacity building for healthcare workers, environmental scientists, and other relevant professionals to effectively monitor and respond to disease outbreaks.
- Allocate adequate resources, including funding and personnel, to support disease surveillance and response efforts.
- **Public Awareness and Education:**
- Educate the public about the risks associated with climate change-induced diseases and the importance of early reporting of symptoms. Encourage communities to participate in disease surveillance efforts.
- Awareness programs like Delhi government's anti-dengue campaign need to be intensified.
- **International Collaboration:**
- The Office of the Principal Scientific Adviser to the Prime Minister has played a leading role in this initiative. However, with new funding sources like the World Bank, there is a need for greater coordination and management to ensure the success of One Health and infectious disease control programs.
- **Program Evaluation and Adaptation:**
- Regularly evaluate the effectiveness of disease surveillance and control programs and adapt strategies based on evolving disease patterns and climate change impacts.

Conclusion

- Climate change does not only affect infectious diseases. It also worsens injuries and deaths caused by extreme weather, respiratory and cardiovascular disorders, and mental health problems.
- The re-emergence of Nipah in Kerala serves as a wake-up call that a purely biological response to sickness is insufficient. Protecting ecosystems, promoting teamwork, and embracing the One Health paradigm are our strongest defenses against a changing climate and the increased threat of infectious illnesses.
- The road ahead will necessitate concerted efforts not only to adapt, but also to proactively protect our planet and its inhabitants.

INTERNATIONAL RELATIONSHIP

Building BRICS for the future

Context: recently in 2023, six new members were inducted into the BRICS grouping, in South Africa.

About 2023 BRICS Summit

- 15th BRICS summit held in Johannesburg, 2023, led to the expansion of BRICS, making it BRICS-Plus. 6 new countries have been added to the grouping, i.e., Argentina, Egypt, Ethiopia, Saudi Arabia, Iran and UAE.
- Other outcomes of the 15th BRICS Summit:
- Adoption of Johannesburg II Declaration on matters of global economic, and political importance.
- The first ever in person engagement with leaders of BRICS with the members of BRICS Women's Business Alliance.
- BRICS Finance Ministers or central bank Governors to consider the issue of local currencies, payment instruments and platforms etc.

BRICS Expansion:

- While many believe that this summit was ineffective, we must look at BRICS in terms of how it has evolved rather than the outcomes of a single meeting.

Economic importance:

- To begin, it is necessary to remember that the BRICS developed as a result of economic necessity. It does not give military or security assistance to foreign countries, does not participate in nation-policing, and does not provide peacekeepers.
- BRICS GDP is already 36% of global GDP, and its members' population will reach 47% of global population by 2050. As a result, it is critical to consider the long-term potential presented by this group.
- More members could be admitted, implying that BRICS could represent a major challenge to the G7's dominance of Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

Demographic Importance:

- Second, two BRICS members are China and India, which together account for one-third of the global population. The two countries have the world's fastest growing economies and are predicted to be among the top three by 2030.
- Both countries recognize that, worldwide, bilateral ties have changed as a result of the establishment of economic blocs such as the European Union or ASEAN, as such blocs have accelerated trade and investment.

- While India and China have faced bilateral hurdles on the political and diplomatic levels since their stalemate at Doklam in 2017, bilateral trade has grown tremendously.

Look for an alternative.

- Third, there is some polarization between the United States and the rest of the world. Many countries are concerned about the United States' posture toward China: the United States is eager to implement tariffs and other barriers to limit China's expansion in trade and investment. China has made advances in areas such as communication infrastructure and electric mobility, which the US would like to limit.
- This is only going to get worse. As a result, countries desire to be a part of a group that includes China. China is not a major member in the BRICS grouping; democratic countries such as India, South Africa, and Brazil serve as a counterweight.

The refugee crisis, trade, and investment:

- Similarly, the treatment of refugees in Europe does not provide a pleasant picture of a world that is becoming increasingly globalized. Countries such as the United States have broken World Trade Organization (WTO) rules without being penalized. This means that governments must seek alternative agreements.
- As BRICS expands, many trade, commercial, and investment protocols will be developed, similar to what we see in various free trade agreements or economic blocs.

De-dollarisation and global currency:

- Fourth, the US dollar has always been the leading global currency. Digital currency is obviously the future, with digital platforms making inroads into many countries. Both India and China have made significant progress in this area, and they are well ahead of the United States and Europe. Both India and China are seeking for increased trade, investment, and commerce in their respective currencies, and by working together through BRICS, they can position their respective currencies as alternatives to the US dollar. The absence of the US dollar is a major reason for the convergence of India and China's interests.

Africa: the continent of the future Africa

- Finally, Africa is the continent that offers economic growth this century. The manner in which France intervened in Niger, as well as the treatment of migrants in Europe, give Africans an unfavorable view of Europe. Visa limitations have driven Africans to travel to China to see its progress more closely than to Europe or the United States. This gives people hope for China's future.

Conclusion:

- African countries continue to discuss the necessity for flexibility in selecting partners for investment or trade. At the G20 conference in New Delhi, India offered full membership for the African Union. It is attempting to expand its reach within Africa. BRICS will be absent from the news till the next summit. However, each summit develops a spark that serves as the foundation for other networks of people in the future. This is a long-term organization.

PRELIM FACTS

1. Commercial Spyware

Context: Cytrox's Predator spyware was transmitted via SMS and WhatsApp links to a former Egyptian politician.

What is Spyware?

- Spyware is informally described as malicious software that enters a device, collects sensitive data, and sends it to a third party without the user's knowledge.
- While some spyware is used for commercial goals, such as advertising, malevolent spyware is designed to benefit from data stolen from a victim's device.

Spyware is roughly classified as follows:

- Spyware trojan,
- Adware,
- Tracking cookie
- System monitors.
- While all types of spyware collect data for the author, system monitors and adware are more dangerous since they can modify a device's software and expose it to further risks.

What is commercial spyware?

- Commercial spyware was developed as a result of opportunities for governments and law enforcement agencies to deploy malware as part of legal investigations.
- Commercial spyware is mostly aimed at mobile platforms and can be used legally against criminals and terrorists.
- However, because to a lack of global restrictions for corporations manufacturing spyware, authoritarian governments have used it to eavesdrop on political opponents.
- Commercial spyware, such as the NSO group's Pegasus spyware, can purportedly not only collect data from mobile devices but also activate the camera and microphone without the owner's knowledge, effectively converting handsets into surveillance machines.

2. Project Udbhav

Context: The Indian Army has started an initiative, named Project Udbhav.

Details

- The research began with the goal of rediscovering the vast Indic tradition of statecraft and strategic ideas derived from ancient Indian books on statecraft, warfare, diplomacy, and grand strategy.
- The United Service Institution of India (USI), a defense think tank, is collaborating on this initiative.

Aim:

- The goal of Project Udbhav is to build an indigenous strategic lexicon that is deeply anchored in India's rich philosophical and cultural tapestry, as well as to rediscover these tales.
- The overarching goal is to combine ancient wisdom with modern military pedagogy.
- Project Udbhav began in 2021 and has already produced a book including seventy-five aphorisms drawn from ancient books that provide important insights into India's strategic history.

3. Nobel Prize in Medicine

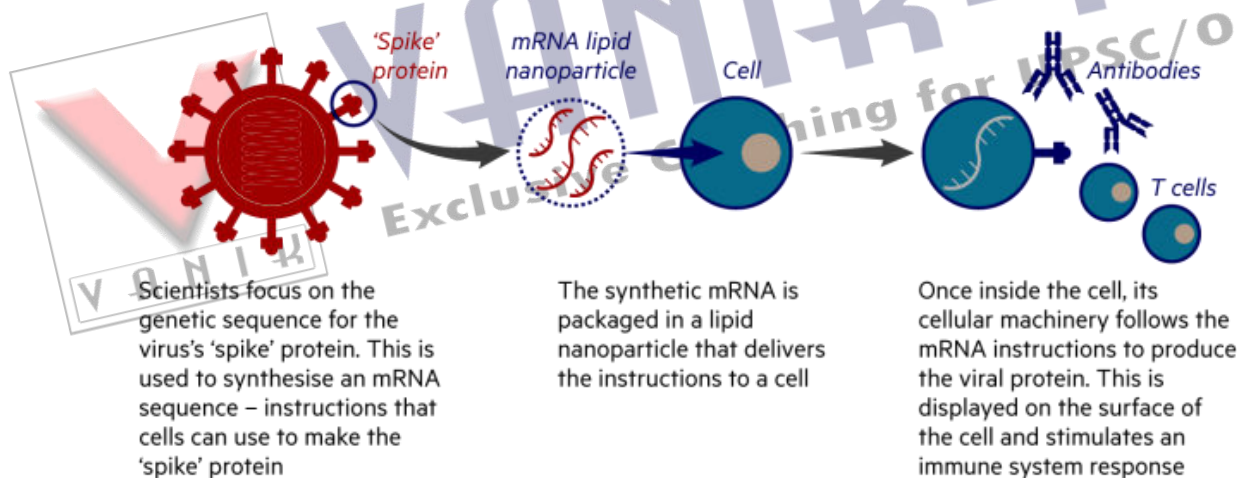
Context: The 2023 Nobel Prize in Physiology or Medicine has gone to scientists Katalin Kariko and Drew Weissman, whose work enabled the development of mRNA vaccines against Covid-19.

What is mRNA?

- After the invention of a widely usable in vitro transfection technique in 1989, RNA as a therapy was initially advocated.
- A few years later, mRNA was proposed as a vaccine platform.
- Once in the body, the mRNA guides cells that take up the vaccine to make proteins that, when present in intact viruses or tumor cells, may elicit an immune response against these identical proteins.
- When a patient's cells are injected, they operate as a manufacturing plant, making exact copies of the mutations for the immune system to recognize and destroy.
- The body learns to fight against infection after being exposed to the alterations without the virus.

How mRNA vaccines work

Genetic instructions are given to the immune system to recognise the virus



Source: Pfizer

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Contribution of Kariko and Weissman

- Karikó and Weissman realised that the problem with lab-grown genetically engineered mRNA is that the body's dendritic cells recognise them as a foreign substance, and release inflammatory signaling molecules against them.
- The dendritic cells have important functions in immune surveillance and the activation of vaccine-induced immune response
- Karikó and Weissman knew that bases in RNA from mammalian cells are frequently chemically modified, while in vitro transcribed [or lab-created] mRNA is not.
- They wondered if the absence of altered bases in the in vitro transcribed RNA could explain the unwanted inflammatory reaction.
- To investigate this, they produced different variants of mRNA, each with unique chemical alterations in their bases, which they delivered to dendritic cells.
- The inflammatory response was almost abolished when base modifications were included in the mRNA.

4. Macrophages

Context: In a new Cancer Cell study, researchers discovered senescent macrophages in the lung that not only persisted but also aided tumor growth.

About:

- Macrophages are a type of white blood cell that is essential to the human immune system.
- They aid in the identification, phagocytosis, and elimination of bacteria and other pathogens.
- The term macrophage is derived from the Greek words "makro" meaning "large" and "phagein" meaning "to eat."
- They are required for host tissue upkeep and defense by recognizing and swallowing particulate particles and, when necessary, producing a pro-inflammatory response.
- They may alter themselves to develop diverse structures in order to combat various germs and intruders. In this approach, macrophages serve as the host's initial line of defense against infection.
- They also play a role in the formation of non-specific or innate immunity.
- Macrophages create cytokines, which are signaling molecules that communicate with other immune system cells. Cytokines are proteins that have a role in inflammation, tissue healing, and adaptive immune response.
- They travel to and circulate within nearly every tissue, searching for infections and removing dead cells.
- Macrophages have several names depending on where they work in the body. For example, macrophages in the brain are known as microglia, whereas those in the liver sinusoids are known as Kupffer cells.

What is cellular senescence?

- It is a durable cell cycle arrest condition in which proliferating cells become resistant to growth-promoting stimuli, generally as a result of DNA damage.
- The cell experiences several phenotypic and metabolic changes throughout this period.
- Senescent cells grow with age and have been linked to the development of a number of age-related illnesses.
- Cellular senescence can impair tissue repair and regeneration, contributing to aging.
- The removal of senescent cells can reduce age-related tissue malfunction and increase life expectancy.
- Senescence can also serve as an effective anti-tumor mechanism by inhibiting the multiplication of possibly malignant cells.

ANSWER WRITING

Q. "The Indian constitution was designed not for people how they are but how they ought to be". Comment (150 words)

Introduction

The constitution makers were aware of the realities and the challenges of Indian society, which was marked by poverty, illiteracy, inequality, etc. They did not want to create a constitution that would merely reflect the existing conditions, but one that would aspire to change them for the better. They wanted to create a constitution that would enable the people to realize their potential and to participate in the nation building process.

The constitution, therefore, laid down the goals and the values that the people of India should strive for, such as:

Rights and Equality: The Constitution guarantees fundamental rights to all citizens, irrespective of their current conditions, aiming to protect individuals from discrimination, oppression, and injustice. These rights are meant to create a society where individuals have the freedom to pursue their own aspirations and are not bound by their existing circumstances.

Economic Justice: The Constitution's directive principles of state policy also reflect an aspiration for economic justice. While recognizing the economic disparities prevalent in society, the Constitution directs the state to work towards reducing these disparities by promoting economic and social justice.

Social Transformation: The framers of the Indian Constitution envisioned a society where the caste system, gender discrimination, and other forms of inequality would be eradicated. Therefore, the Constitution includes provisions like affirmative action (reservation) for historically disadvantaged groups and the promotion of social justice.

Secularism: The Indian Constitution also emphasizes secularism, recognizing that the country is religiously diverse. It envisions a society where all religions are treated equally and where the state does not favour any particular religion. This is in contrast to the prevailing religious hierarchies that existed at the time of independence.

Democratic Values: The Constitution promotes democratic values, such as equality before the law and universal suffrage, with the aim of fostering a participatory and inclusive democracy. It envisions a society where the voices of all citizens, regardless of their socio-economic background, are heard and respected.

Conclusion

The Indian constitution, therefore, is not a static or a rigid document, but a dynamic and a flexible one, that can adapt to the changing needs and aspirations of the people. The constitution is also not a final or a perfect document, but a progressive and a visionary one that can inspire the people to work towards the realization of its goals and values.

MCQs

1. Consider the following statements about the Badis genus:
1. It is a type of freshwater fish found in Nagaland.
2. It is known as a Chameleon fish because of its ability to change color quickly during reproducing.
Which of the above statements is/are correct?

- a) 1 only
b) 2 only
c) **Both 1 and 2**
d) Neither 1 nor 2
2. Consider the following statements regarding Macrophages:
1. They are a type of white blood cell that is essential to the human immune system.
2. They may change themselves to develop diverse structures in order to combat various germs and invaders.
Which of the above statements is/are correct?
a) 1 only
b) 2 only
c) **Both 1 and 2**
d) Neither 1 nor 2
3. He was born into a family of progressive freedom fighters. He was a voracious reader and prolific writer who preferred a pen over a pistol in his hand. In the 1920s, he was writing for both Urdu and Punjabi newspapers in Amritsar. He was hanged for murdering British police officer John Saunders in 1931, at the age of only 23.
The above mentioned lines refer to:
a) Chandrashekhar Azad
b) **Bhagat Singh**
c) Ram Prasad Bismil
d) Rajguru
4. With reference to a latest Lancet Commission report on gender inequity in cancer care, consider the following statements:
1. The report highlighted that even though men are at a higher risk of cancers that affect both genders, cancer incidence and mortality in women remains high.
2. Except in metropolitan cities and higher income group families, women are more likely than men to lack the knowledge and power to make informed decisions, the report said.
Which of the above statement/s is/are correct?
a) **Only 1**
b) Only 2
c) Both 1 and 2
d) Neither 1 nor 2
5. 'Sycamore Gap' was recently seen in news. It is located in:
a) Canada
b) **UK**
c) Russia
d) Brazil
6. A staunch Gandhian from Tamluk, Bengal, she fell to British bullets on September 29, 1942, while leading a Quit India Movement march. Earlier, at the age of 61, she was arrested for taking part in the Civil Disobedience Movement in 1930. In September 1942, at the age of 73, she led a large procession of around 6,000 protesters, mostly women. The procession marched with the aim to take over the Tamluk police station from British authorities. In 1977, the first statue in the Kolkata Maidan dedicated to a woman revolutionary was that of her.
The above mentioned lines refer to:
a) Bhikaji Cama
b) **Matangini Hazra**
c) Begum Rokeya Sakhawat Hossain
d) Bela Mitra
7. What is the significance of the R21/Matrix-M vaccine?
a) It is the first vaccine for tuberculosis.
b) **It is the second malaria vaccine approved by the WHO.**
c) It is recommended by the WHO for COVID-19 prevention.
d) It is a vaccine for dengue fever.
8. Consider the following statements about the Kaimur Wildlife Sanctuary:
1. It is situated in the Vindhayachal mountain ranges.
2. It is linked to Uttar Pradesh's Chandraprabha Wildlife Sanctuary.
3. It is densely forested with mosaic prairie and tropical dry deciduous forests.
How many of the above statements are correct?
a) Only one
b) Only two
c) **All three**
d) None
9. Consider the following statements regarding National Service Scheme:
1. It enables students to participate in numerous community service initiatives organized by the government.
2. It's a Central Sector Scheme run by the Ministry of Youth Affairs and Sports.
Which of the above statements is/are correct?
a) 1 only
b) 2 only
c) **Both 1 and 2**
d) Neither 1 nor 2
10. Consider the following statements regarding Green Ammonia:
1. It is created by combining hydrogen from water electrolysis and nitrogen extracted from the atmosphere.
2. It can be used as a fuel in engines like locomotives and ships.
Which of the statements given above is/are correct?
a) 1 only
b) 2 only
c) **Both 1 and 2**
d) Neither 1 nor 2