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HAVANA SYNDROME

This article covers "Daily Current Affairs" and the topic details "Havana Syndrome ". The topic "Havana Syndrome " has relevance in the "Science and Technology" section of the UPSC CSE exam.

For Prelims:

What is Havana Syndrome?

For Mains:

GS3: Science and Technology

Why in the news?

The Karnataka High Court was informed by the Central government that it will investigate the issue of 'Havana Syndrome' in India following a petition from a resident of Bengaluru.

Havana Syndrome

Havana Syndrome refers to a collection of mental health symptoms reportedly encountered by U.S. intelligence and embassy personnel in different countries.

- The term 'syndrome' denotes a group of symptoms and doesn't indicate a distinct medical condition. It signifies a cluster of symptoms commonly experienced together, often with challenging origins.

Havana Syndrome Symptoms:

- Hearing certain sounds even in the absence of external noise.
- Nausea, dizziness, and headaches.
- Memory loss and issues with balance.

Origin and Cuba Connection:

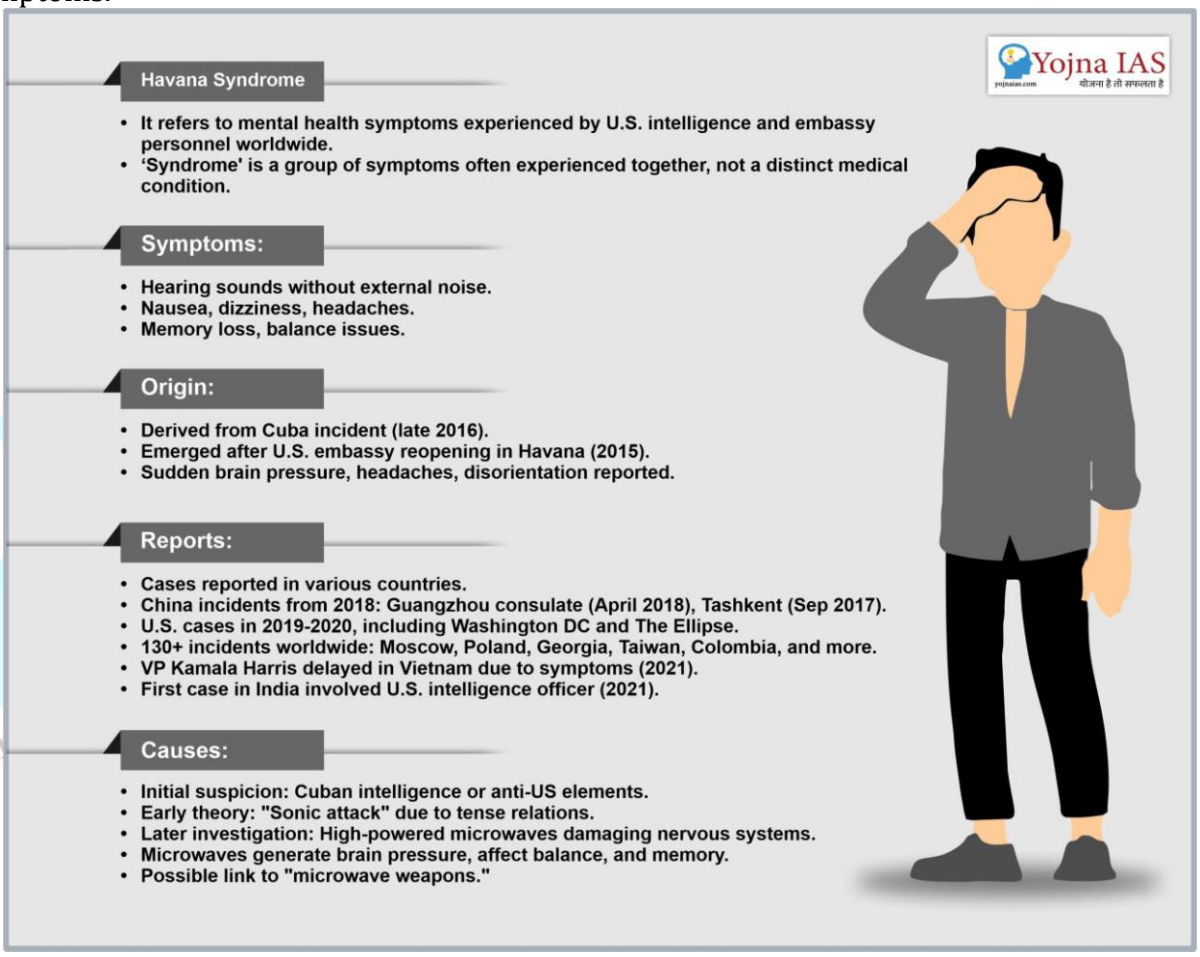
- The name "Havana Syndrome" is derived from its beginnings in Cuba around late 2016.
- The phenomenon emerged roughly a year after the U.S. reestablished its embassy in Havana, following the normalization of relations in 2015.
- Some U.S. embassy staff and intelligence officials reported sudden brain pressure episodes followed by persistent headaches, disorientation, and insomnia.

Havana Syndrome Reports Worldwide:

Following the Cuban incident, American intelligence and foreign affairs officials stationed in multiple countries have documented symptoms related to the syndrome.

- From early 2018, similar allegations emerged from U.S. diplomats in China.
- The initial report came from the Guangzhou consulate in April 2018, with an employee citing symptoms since late 2017.

- Another instance was previously disclosed in September 2017 by a USAID staff member at the US Embassy in Tashkent, Uzbekistan.
- In 2019 and 2020, occurrences of the syndrome were reported within the United States, notably in Washington DC.
- An incident was even documented at The Ellipse, an expanse of grass adjacent to the White House.
- U.S. officials have documented over 130 instances worldwide, spanning locations such as Moscow in Russia, Poland, Georgia, Taiwan, Colombia, Kyrgyzstan, Uzbekistan, and Austria.
- In 2021, a New York Times report indicated that U.S. Vice-President Kamala Harris experienced a three-hour delay before her flight to Hanoi, Vietnam, due to a U.S. official in Vietnam reporting symptoms.
- In India, the first known case occurred in the same year, involving a U.S. intelligence officer traveling to New Delhi with CIA director William Burns, who reported Havana Syndrome symptoms.



Causes of Havana Syndrome:

- Initially, during the Cuban incidents, suspicion fell on Cuban intelligence or elements opposing normalised US-Cuba relations.
- Early theories suggested a “sonic attack” due to the long-standing hostility between the countries.

- Later investigation pointed to high-powered microwaves damaging or interfering with victims' nervous systems.
- Some suspected these microwaves were emitted via a "microwave weapon."

Microwave Weapon Theory

- Both Russia and the US have explored microwave use as a counter-intelligence tactic since the Cold War.
- Reports date back to the 1970s of US embassy officials in Moscow facing mental health issues from suspected microwave exposure.
- Despite years of study, experiments, and medical evaluations, conclusive evidence for the "microwave weapon" remains absent.
- The mechanism and targeting specificity of this supposed weapon are still unknown.
- Certain US medical experts challenge the theory, attributing the syndrome to psychological factors amplified by fear.
  Despite research, uncertainty persists, and the syndrome's origin and mechanism remain unclear.

About Microwave Weapon:

- "Microwave weapons" fall under direct energy weaponry.
- They concentrate energy like sonic, laser, or microwaves onto a target.
- High-frequency electromagnetic radiation is used in these weapons to heat water in a target's skin, causing discomfort.

Countries with Microwave Weapons:

- Several countries possess these weapons for targeting humans and electronic systems.
- China exhibited the "Poly WB-1" microwave weapon in 2014.
- The U.S. developed the "Active Denial System," a non-lethal directed-energy weapon with an extended range.
- The U.S. "Active Denial System" is a prototype microwave-style weapon.
- It's recognized as the first non-lethal, directed-energy, counter-personnel system with a greater range than existing non-lethal weapons.
- The Defense Research and Development Organization (DRDO) of India announced plans in 2020 to develop directed energy weapons (DEWs) that will employ high-energy lasers and microwaves.

Sources:

Centre to look into 'Havana Syndrome': What it means and the term's history | Explained News – The Indian Express

Q1. With reference Havana Syndrome, consider the following statements:

1. The origin of the term "Havana Syndrome" is linked to the incidents that occurred in Cuba after the reestablishment of the U.S. embassy in Havana in 2015.
2. Havana Syndrome is a well-defined medical condition with clear diagnostic criteria and treatment options.

3. The Havana Syndrome is exclusively characterized by memory loss and balance issues, without any other associated symptoms.

Which of the statements given above is/are NOT correct?

(a) 1 and 2 only
(b) 2 and 3 only
(c) 3 only
(d) None

Answer: (b)

Q2. Consider the following countries:

1. United States
2. Bahamas
3. Mexico
4. Dominican Republic
5. Canada
6. Brazil

How many of the above mentioned countries are neighbours of Cuba ?

(a) Only Two
(b) Only Three
(c) Only Four
(d) Only Five

Answer: (c)

Q3. Analyse the phenomenon known as "Havana Syndrome," and its global implications on geopolitical relations.

Gaurav Nikumbh

SMALL MODULAR REACTORS (SMRS)

This article covers "Daily Current Affairs" and the topic details "Small Modular Reactors (SMRs)". The topic "Small Modular Reactors (SMRs)" has relevance in the "Science and Technology" section of the UPSC CSE exam.

For Prelims:

What are Small Modular Reactors (SMRs)?

For Mains:

GS3: Science and Technology: Developments and applications

Why in the news?

Recently, there has been a debate among the various stakeholders i.e , can Small Modular Reactors (SMRs) help India in achieving sustainable energy production

Small Modular Reactors (SMRs)

- Small Modular Reactors (SMRs) are nuclear reactors designed for electricity generation that have a capacity generally under 300 MWe, with modular technology utilizing module factory fabrication.
- They aim to achieve economies of series production and shorter construction times compared to larger conventional nuclear power plants.
- The International Atomic Energy Agency (IAEA) considers reactors under 300 MWe as "small" and up to about 700 MWe as "medium." These reactors collectively fall under the category of SMRs
- However, in common usage, "SMR" often stands for "small modular reactor," which is designed for serial construction and to constitute a larger nuclear power plant.
- A category of smaller reactors known as vSMRs, which stands for very small modular reactors, is being considered for deployment in units with capacities of around 15 MWe. These vSMRs are particularly well-suited for remote communities.

The Need for Small Modular Reactors (SMRs) in Decarbonization

- **Decarbonization Challenge:** UN Sustainable Development Goal 7 prioritizes making affordable, dependable, and sustainable energy accessible to everyone.Despite progress, 82% of global energy still comes from fossil fuels. Electrification will increase 80%-150% by 2050, making reliable low-carbon electricity crucial.
- **Reliability in Power Generation:** Recent coal consumption growth in Europe highlights the need for consistent 24/7 low-carbon power, ensuring stable grids and energy security alongside deep decarbonization efforts.
- **Limitations of Solar and Wind:** Relying solely on solar and wind energy poses challenges for consistent power supply. Additional firm power generation technologies are necessary to enhance grid stability and reduce costs in decarbonized energy systems.
- **Critical Mineral Demand:** Clean energy technologies require critical minerals like lithium, nickel, cobalt, and rare earth elements. Their demand could triple by 2030, leading to concerns about capital investments, environmental impacts, and geopolitical risks related to mineral extraction and processing.
- **Role of Nuclear Power:** Nuclear power supplies 10% of global electricity, contributing to reduced natural gas demand and CO2 emissions. Its role is vital in achieving net-zero goals, offering continuous power generation and various co-benefits like high-skill jobs.
- **Advantages of SMRs:** While conventional nuclear power plants face challenges like time and cost overruns, SMRs offer a solution. With a capacity of up to 300 MW, SMRs can complement existing NPPs and be located in repurposed thermal power plant sites, avoiding land acquisition and displacement issues. This is particularly relevant for India's energy needs.

Advantages of SMRs:

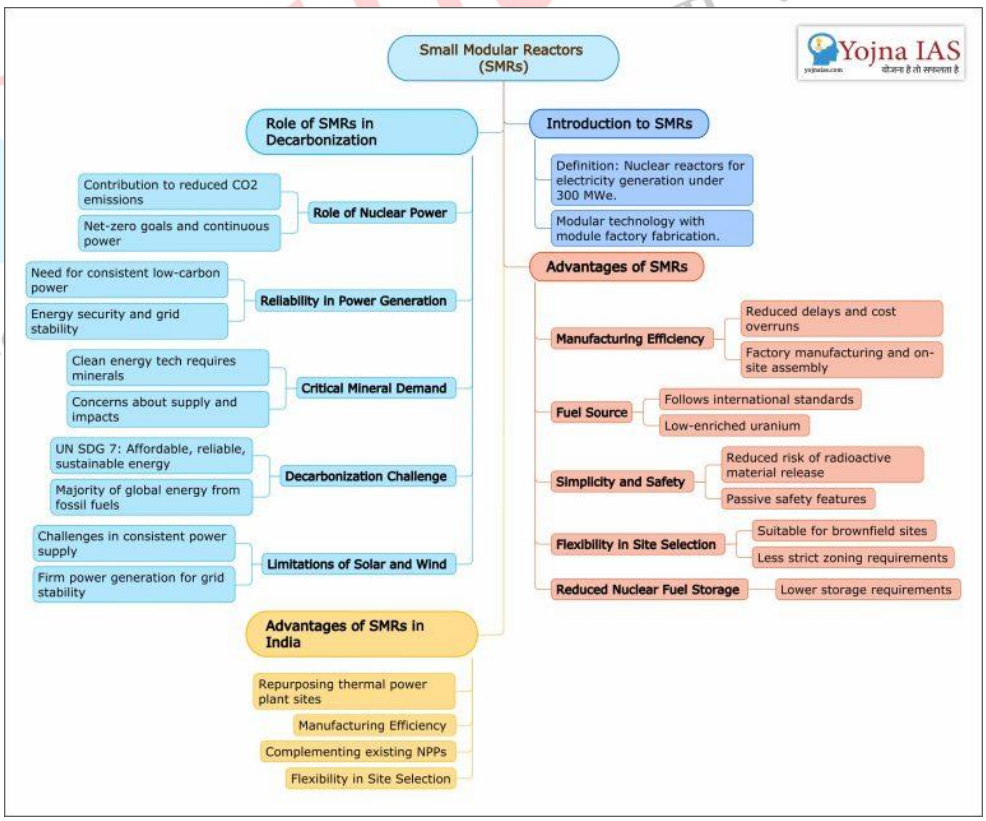
- **Simplicity and Safety:** SMR designs are simpler and include passive safety features, reducing the risk of uncontrolled radioactive material release.
- **Reduced Nuclear Fuel Storage:** SMRs store less spent nuclear fuel compared to conventional NPPs.
- **Flexibility in Site Selection:** They can be installed at brownfield sites with less strict zoning requirements.

- **Fuel Source:** Most land-based SMRs use low-enriched uranium, which is widely available from uranium-mining countries following international standards.
- **Manufacturing Efficiency:** SMRs are manufactured in factories and assembled on-site, leading to lower potential for delays and cost overruns.

Required Legal and Regulatory Adjustments

- To enable private sector participation in SMRs, amendments to the Atomic Energy Act are essential.
- While empowering the private sector, control over nuclear fuel and waste management should remain with the government.
- Establishing an independent regulatory body with expertise to oversee the entire nuclear power generation process is necessary.
- While government control over SMR security should persist, privately-owned SMRs can be managed by the Nuclear Power Corporation during the initial stages.
- The Department of Atomic Energy must enhance public confidence in nuclear power by effectively sharing comprehensive environmental and public health data related to civilian reactors operating under international safeguards in India.

As India seeks to expand its nuclear power capacity, SMRs present a strategic opportunity. By aligning regulatory adjustments, public engagement, and technological advancements, India can enhance its energy security, accelerate the transition to clean energy, and pave the way for a more sustainable and resilient energy future.



Sources:

Can small modular nuclear reactors help India achieve net-zero? – The Hindu

Q1. With reference to Small Modular Reactors (SMRs), consider the following statements:

1. SMRs are nuclear reactors designed for electricity generation with a capacity generally under 500 MW
2. Nuclear power contributes around 10% of global electricity.

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

Answer: C

Q2. Consider the following statements regarding

1. SMRs are exclusively designed for remote communities.
2. SMRs are always more complex in design compared to conventional nuclear power plants.

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

Answer: D

Q3.Discuss the role of nuclear energy in the context of environmental sustainability and the challenges associated with its integration into a clean energy transition.

Rishabh