Heatwaves in India

Why in news?

The Indian Meteorological Department (IMD) issued a red alert for heatwaves in Delhi, Punjab, Haryana, and most parts of Western Rajasthan.

What is a heatwave?

- **About-** According to IMD, heatwave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the summer season in the North-Western parts of India.
- **Occurrence-**Heatwaves typically occur between March and June, and in some rare cases even extend till July.
- **Impact-**The extreme temperatures and resultant atmospheric conditions adversely affect people living in these regions as they cause physiological stress, sometimes resulting in death.
- **Qualitatively**- Heat wave is a condition of air temperature which becomes fatal to human body when exposed.
- **Quantitatively-** Heatwave is defined based on the temperature thresholds over a region in terms of actual temperature or its departure from normal.

Region	Temperature range to declare as a heatwave
Plains	Maximum temperature of at least 40°C or more
Hilly regions	Maximum temperature of at least 30°C or more.
Coastal region	Maximum temperature departure of 37°C or more from normal.
For a heatwave to be declared, these conditions must be met in at least two weather stations in a meteorological sub-division for at least two consecutive days. The heatwave is officially declared on the second day.	

- **Heatwave-** If the prevalent temperature is 4.5°C to 6.4°C more than normal, it is classified as a heatwave.
- **Severe heatwave-**A rise of more than 6.4°C is considered a severe heatwave. May is the peak month for heatwaves in India.
- **For coastal areas** - When maximum temperature departure is 4.5 °C or more from normal, heat wave may be described provided actual maximum temperature is 37°C or more.
- **Vulnerable**- The States frequently affected include Punjab, Haryana, Delhi, Uttar Pradesh and Bihar.
- **Red alert**- A red alert refers to an extreme heat warning. It means that a severe heatwave has persisted for more than 2 days or the total number of heat/severe heatwave days has been more than 6 days.

Colour Code	Alert	Warning	Impact	Suggested Actions
Green (No action)	Normal Day	Maximum temperatures are near normal	Comfortable temperature. No cautionary action required.	Nil
Yellow Alert (Be updated)	Heat Alert	Heat wave conditions at isolated pockets persists on 2 days	Moderate temperature. Heat is tolerable for general public but moderate health concern for vulnerable people e.g. infants, elderly, people with chronic diseases	(a) Avoid heat exposure. (b) Wear lightweight, light-coloured, loose, cotton clothes. (c) Cover your head: Use a cloth, hat or umbrella
Orange Alert (Be prepared)	Severe Heat Alert for the day	(i) Severe heat wave conditions persists for 2 days (ii) Through not severe, but heat wave persists for 4 days or more	High temperature. Increased likelihood of heat illness symptoms in people who are either exposed to sun for a prolonged period or doing heavy work. High health concern for vulnerable people e.g. infants, elderly, people with chronic diseases.	(b) Avoid heat exposure– keep cool. Avoid dehydration. (b) Drink sufficient water- even if not thirsty. (c) Use ORS, homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. to keep yourself hydrated
Red Alert (Take Action)	Extreme Heat Alert for the day	(i) Severe heat wave persists for more than 2 days. (ii) Total number of heat/severe heat wave days exceeding 6 days.	Very high likelihood of developing heat illness and heat stroke in all ages.	Extreme care needed for vulnerable people.

What are the factors contribute to heatwaves?

- **Climate change**- As GHG emissions increase, the Earth's atmosphere retains more heat, causing overall temperature rise. This in turn leads to extreme weather events, including heatwaves which become more common and severe.
- **El Nino**- It is a climatic phenomenon characterized by the abnormal warming of surface waters in the equatorial Pacific Ocean. El Nino years often experience
    - **Extreme temperatures**- Increased likelihood of breaking temperature records.
    - **Extended heatwave spells**- More frequent and prolonged heatwaves.
    - **Reduced pre-monsoon rainfall**- Less precipitation before the monsoon season, exacerbating the heat condition.

World Meteorological Organization (WMO) states that El Niño greatly increases the likelihood of extreme heat events both on land and in the oceans.

- **Heat dome**- It occurs when an area of high pressure traps warm air over a region for an extended period, acting like lid on a pot. Prolonged heat domes can result in deadly heatwaves due to persistent and intense heat.

- **Anticyclone**- It is a high-pressure system, involves descending air that increases in temperature as it is compressed. This results in hot, dry weather conditions.
- **Urban heat island effect**- Urban areas experience higher temperatures than rural surroundings due to the urban heat island effect. The concentration of buildings, concrete, and asphalt absorbs and retains heat, elevating temperatures during heatwaves.
- **Loss of evapotranspiration**- Due to deforestation and changing land use pattern there is loss of trees and vegetation, it leads to less cooling through evapotranspiration, leading to higher local temperatures.

What are the impacts of heatwaves?

- **Heat exhaustion**- It is characterized by heavy sweating, weakness, dizziness, nausea, and fainting which occurs when the body loses excessive amounts of water and salt.
- **Heat stroke**- A severe, life-threatening condition where the body fails to regulate its temperature, leading to dry, warm skin, confusion, unconsciousness, and potential organ failure. Immediate medical intervention is critical.]
- **Health impact**- Heatwaves increase the incidence of heat-related illness such as heatstroke, dehydration, heat exhaustion and heat cramps.
- **Drought-** Prolonged heatwaves can exacerbate drought conditions by increasing evaporation rates and reducing soil moisture.
- **Water scarcity**- Reduced water availability affects both human populations and natural ecosystems.
- **Ecosystem stress**- Wildfires can destroy habitats, reduce biodiversity, and disrupt ecological balances.
- **Economic impact**-Farmers and the food industry face significant economic losses due to reduced productivity and increased costs for irrigation and livestock care.
- **Food security**- Reduced agricultural output can lead to food shortages and increased food prices, affecting food security for populations.
- **Infrastructural damages**-Prolonged heat can damage infrastructure such as roads, railways, and power lines, further compounding the challenges during heatwave.

What are the precautions that should be taken for heatwaves?

- **NDMA-** National Disaster Management Authority (NDMA) has prescribed the following measures can be taken to minimise heatwave impact.
- **Avoid sun exposure**- Stay indoors during the hottest part of the day, especially between noon and 3 pm. If you need to be outside, use protective gear like a hat or an umbrella.
- **Stay hydrated**- Drink plenty of water, even if you don’t feel thirsty. Staying hydrated is essential to prevent heat-related illnesses.
- **Appropriate clothing**- Wear lightweight, light-coloured, loose-fitting, and breathable cotton clothes. Protect your eyes with goggles, and use an umbrella or hat to shield yourself from direct sunlight.
- **Avoid dehydrating beverages**- Limit alcohol, tea, coffee, and carbonated soft drinks, as they can dehydrate your body. Instead, opt for oral rehydration solutions (ORS) or homemade drinks like lassi, torani (rice water), lemon water, or buttermilk.

- **Treatment of heatstroke**- Immediate action is to lay the person in a cool place, wipe with a wet cloth and pour normal temperature water on head. Hydrate the person with ORS and other liquids finally the person must be taken to the nearest health centre or hospital promptly.

References

1. Indian Express- IMD heat wave red alert meaning
2. WHO- Impact of heatwaves