



COLD WAVES AND ITS IMPACTS - GS I AND III MAINS

Q. Cold waves impact all facets of human well-being. Discuss the factors contributing to cold waves in Indian conditions and trace the impacts on it. (10 marks, 150 words)

News: *Navigating the physical and mental toll of cold waves on community well-being*

What's in the news?

- As winter tightens its grip on various regions, an unspoken yet pervasive menace emerges — cold waves that not only lead to bone-chilling temperatures but also cast a profound shadow on community well-being.
- From the physical strain that plummeting temperatures cause to the subtle yet grievous blows to mental resilience, cold waves impact all facets of human well-being.

Cold wave:

- Cold waves are characterized by a rapid and marked fall of temperature. The term 'cold' describes an **unusual fall in temperature that is triggered by the transport of cold air masses into a specific area.**
- The IMD marks a cold wave in terms of minimum temperatures - when the **minimum temperature in the plains is 4 degrees or less** or when the minimum temperature is less than 10 degrees and 4.5 to 6.4 degrees below the normal.

Factors contributing to Cold waves:

- 1. Large scale fog cover:** It lasts for longer durations, preventing sunlight from reaching the surface and affecting the radiation balance.
- 2. Light winds and high moisture near the land surface** have been contributing to the formation of a blanket of fog over large swathes of the Indo-Gangetic plains in the morning.
- 3. Cold westerly and north westerly winds** of around 5 to 10 kmph in the afternoon above the surface causing a dip in temperature.

01

Ridge formation: Build up of a ridge (an extended area of relatively high atmospheric pressure) in the jet stream over northwest Asia.

02

Surface high-pressure: Formation of surface high-pressure over north and central India during winters.

03

Upper atmospheric winds: Movement of cold air masses in response to steering by upper-level winds.

04

Western disturbances: They cause "dry, cold north-westerly winds" to blow into north and central India, causing minimum temperatures to plummet over these areas.

05

La Niña: It is responsible for bringing cold air from Siberia and South China to the Indian subcontinent.

06

Snow cover: Extensive snow covers over Northwest Himalayas during winters.



4. Western disturbances, which are storms from the Mediterranean region, are associated with a change in wind direction, bringing easterly winds to northwest India. Western Disturbance can be defined as a low pressure area or a trough over surface or the upper-air in the westerly winds regime, north of 20°N, causing changes in pressure, wind pattern and temperature fields. It is accompanied by cloudiness, with or without precipitation.”

5. Climate Change: The unusually cold December this year could just be another instance of extreme climates. Across the world, the frequency and intensity of both heatwaves and cold waves have increased in the last few years.

6. Low Clouds: This extended cold spell has been triggered due to low stratus clouds that are blanketed over a large geographical area between Pakistan, cutting across India and running up to Bangladesh.

7. Snowfall in the upper Himalayas are responsible for the wind chill factors.

8. La-Nina Effect in the Pacific: La Nina is the abnormal cooler sea surface temperatures reported along the equatorial Pacific Ocean and it is known to favour cold waves.

Impacts of Cold waves in India:

1. Agriculture: It affects the productivity of rabi and cash crops (Coffee, Tea).

2. Health: The cold wave is extremely fatal to human health, it could affect vulnerable people (infants, pregnant women, elderly, people) with chronic diseases. Likelihood of illnesses like flu, due to prolonged exposure to the cold.

3. Impact visibility: The cold wave can affect the visibility and which can be more prone to accidents, loss of life due to accidents.

4. Livestock: During a cold wave, the animals require a higher intake of nutrition.

5. Energy sector: The impact on the energy sector is well marked with a rise in the demand for fuels and electricity during cold wave conditions.

Measures:

- Considering the importance of cold wave, the Government of India notified ‘cold wave’ as a disaster and the Ministry of Agriculture as the nodal Ministry for cold wave/ frost.
- Accordingly, the Ministry of Home Affairs included cold wave/ frost as an eligible natural calamity in the guidelines for relief assistance under the SDRF / NDRF, and the financial assistance is limited to the agriculture sector only.
- **Cold Wave Action Plan (CWAP)** is prepared by the National Disaster Management Authority (NDMA).

WAY FORWARD:

NDMA Guidelines:

- Provision of adequate winter clothing.
- Staying in indoors as much as possible.
- Weather forecast and early warning systems.
- Taking care of vulnerable such as elderly people and children.
- Providing ways for seamless provisions of emergency supplies.