

## HEATWAVES: GEOGRAPHY

**NEWS:** How do heatwaves impact India's labour productivity?

### WHAT'S IN THE NEWS?

Recent reports by the ILO and World Bank highlight that heatwaves are causing \$100 billion annual labour productivity losses in India, affecting 75% of the workforce, especially informal and outdoor workers. Rising temperatures, urban heat effects, and inadequate protective mechanisms are worsening economic and health impacts.

#### Context

- Recent reports by the International Labour Organization (ILO) and the World Bank reveal that heatwaves are causing labour productivity losses in India estimated at **\$100 billion annually**.
- About **75% of India's workforce**, largely composed of informal and outdoor workers, is highly vulnerable to extreme heat.
- The problem is worsening due to rising temperatures and the **urban heat island effect**.

### Heatwaves and Their Implications for India's Labour Force and Economic Stability

#### Characterisation and Scope of Heatwaves in India

- **Definition and Seasonal Prevalence**
  - Heatwaves occur typically from **March to June**.
- **Regional Vulnerability**
  - Most vulnerable regions include:
    - **Central India**
    - **Northwest India**
    - **Eastern India**
    - **Peninsular India**
- **Rising Frequency and Intensity**
  - The past four decades have seen increasing frequency and severity of heatwaves.
  - Notable heatwaves occurred in **2013, 2016, 2019, 2022, and 2024**.
- **Urban Heat Island Effect**
  - Aggravated by rapid urbanisation, especially in **Tier-II and Tier-III cities**.
  - Urban areas retain more heat due to concrete surfaces and lack of vegetation.

## Exposure to Heat Stress and its Impact on Labour Productivity

- **Workforce Exposure**
  - Approximately **75% of India's workforce (380 million workers)** are engaged in heat-exposed occupations.
- **Vulnerable Sectors**
  - Informal workers such as:
    - **Construction labourers**
    - **Farmers**
    - **Street vendors**
    - **Small-scale businesses**
- **Quantified Productivity Losses**
  - Informal workers experience up to **40% reduction in earnings** during heatwaves.
  - Manufacturing output declines by about **2% for each 1°C rise** in temperature.
- **Consequences of Heat Stress**
  - Increased absenteeism.
  - Reduced working hours.
  - Deteriorating worker health (heatstroke, dehydration, fatigue).

## Consequences for Agriculture and Rural Livelihoods

- **Crop Yield Reduction**
  - Wheat yields decrease by **5.2% per 1°C temperature increase**.
  - Similar impacts on other crops during extreme heat periods.
- **Disruption of Rural Activities**
  - Heatwaves adversely affect both farming and non-farming rural activities.
  - Peak summer months become particularly challenging.
- **Impact on Livestock**
  - Livestock suffer from combined heat and humidity stress, reducing productivity and health.
- **Compound Effects**

- When heatwaves coincide with droughts or food shortages, impacts worsen.
- Threatens food security and rural incomes.

## Governmental and Institutional Responses

- **NDMA Guidelines**
  - Issued guidelines for workforce protection during heatwaves.
  - Measures include education, work scheduling, hydration provision, and protective equipment.
- **Heat Action Plans**
  - State and municipal governments implement **localized heat action plans**.
  - Measures include:
    - Provision of **public water points**
    - Establishment of **cooling shelters**
    - Promotion of **urban greening initiatives**
- **Urban Planning Example**
  - **Chennai** has integrated urban heat island data into its city master plan to mitigate heat impacts.
- **Urban–Rural Gap**
  - Current focus is largely urban.
  - **Rural areas face infrastructural deficits** and lack adequate heat protection measures.

## Challenges

- Inadequate **cooling mechanisms** and **protective infrastructure** for informal and outdoor workers.
- Weak enforcement of labour protections in **rural agricultural** and **livestock sectors**.
- Difficulties in operationalising **compensation** and **insurance schemes** for heat-related work disruptions.

## Way Forward

- **Strengthen Heat Action Plans**
  - Expand focus to **rural outreach** and highly vulnerable populations.

- **Promote Awareness and Training**
  - Educate workers and employers about **heat risk mitigation** practices.
- **Enforce Labour Protections**
  - Mandate **adequate rest, hydration, and protective clothing** during heatwaves.
- **Develop Insurance and Compensation Schemes**
  - Ensure viable insurance products and enforce compensation for **heat-induced work stoppages**.
- **Invest in Urban Planning**
  - Reduce urban heat island effects through:
    - **Urban greening**
    - **Water body augmentation**
- **Advance Climate-Resilient Agriculture**
  - Promote **research** and **adoption** of climate-resilient agricultural technologies and practices.

## Heat Waves in India

### Definition and Role of IMD

- The **Indian Meteorological Department (IMD)** is the official agency for forecasting heat-waves and other severe weather events.
- IMD communicates forecasts and warnings to the public and disaster management authorities to facilitate preparedness and mitigation.

### Criteria for Declaring Heat Waves (IMD)

- **Plains:** Declared if max temperature exceeds **40°C**.
- **Hilly Regions:** Declared if max temperature exceeds **30°C**.
- When normal max temperature  $\leq 40^{\circ}\text{C}$ :
  - Heatwave if actual temperature exceeds normal max by **5°C or more**.
- When normal max temperature  $> 40^{\circ}\text{C}$ :
  - Heatwave if actual temperature exceeds normal max by **4°C or more**.
- **Extreme Heatwave Condition**

- Automatically declared if actual max temperature reaches or exceeds **45°C**, regardless of normal max.

### **Conditions Favorable for Heat Wave Formation**

- Presence of **hot and dry air** transported over a region.
- Lack of **moisture** in the upper atmosphere, reducing cloud formation and rainfall.
- **Clear skies** allow strong solar radiation and heat accumulation.
- Presence of **anticyclonic flow (high-pressure system)** causing sinking and heating of air, suppressing convection and sustaining heatwaves.

### **Heat Index**

- Developed by IMD to quantify **human discomfort** due to heat and humidity combined.
- Expresses the "**feel-like**" **temperature** perceived by the human body.
- Helps guide **health advisories** and **precautionary measures** during heatwaves.

**Source:** <https://www.thehindu.com/business/how-do-heatwaves-impact-indias-labour-productivity/article69648624.ece>