5. Occurrence of Thunderstorms in India

Regional Variations

Different regions of India experience thunderstorms with local names reflecting their characteristics and timing -

Uttar Pradesh & North India - Called Andhi, these are dust-laden thunderstorms occurring during pre-monsoon months.

West Bengal & Assam - Known as Kalbaisakhi (black storm of Baisakha month) or Nor 'wester, these are violent thunderstorms with heavy rain.

Karnataka - Called Mango Showers as they occur during mango ripening season.

Kerala - Known as Blossom Showers coinciding with coffee blossom season.

Impacts of Severe Thunderstorms

Loss of Human Life

1. Recent storms caused over 100 deaths mainly due to falling trees crushing people and vehicles, wall collapses burying victims, lightning strikes causing electrocution, and flying debris from damaged structures.
2. Casualties highest in rural areas with weak housing and limited warning dissemination.

Damage to Infrastructure

1. High-speed winds uprooted trees blocking roads and falling on buildings.
2. Damaged electricity poles and transmission lines causing widespread power outages.
3. Destroyed houses and weak structures particularly kuccha houses and temporary shelters.
4. Toppled hoardings and billboards creating hazards in urban areas.

Agricultural Losses

1. Thunderstorms and hailstorms damage standing crops affecting wheat harvest, vegetables ready for market, and mango orchards during flowering and fruiting.
2. Impacts farmer incomes and rural livelihoods creating economic distress in agricultural communities.
3. Crop insurance coverage often inadequate to compensate losses.

Disruption of Public Services

1. Power outages affecting homes, businesses, hospitals, and essential services.
2. Communication disruption with mobile towers and landlines damaged.
3. Transport interruptions due to fallen trees, flooding, and damaged roads.

Increased Disaster Vulnerability

1. Rapid urbanization with unplanned development increases exposure to thunderstorm impacts.
2. Weak housing structures particularly in slums and informal settlements lack storm resistance.
3. Inadequate awareness about thunderstorm safety measures increases vulnerability.

Challenges in Forecasting

Evacuation is difficult because thunderstorms are dispersed and unpredictable in movement unlike cyclones which have defined tracks.

Localized Nature - Thunderstorms are highly localized and evolve rapidly making precise location prediction challenging.

Rapid Intensification - Wind speeds can intensify within minutes giving little warning time.

Multiple Storm Cells - Several storms can occur simultaneously across different districts complicating warning dissemination.

6.Government Measures and Policy Support

IMD's Early Warning Systems

1. India Meteorological Department regularly issues weather bulletins, thunderstorm alerts, and nowcasts which are short-term forecasts for next 3-6 hours.

2. IMD has strengthened observation infrastructure in Uttar Pradesh with nearly 2,400 weather stations for real-time monitoring.
3. Key initiatives include Doppler Weather Radars detecting precipitation intensity and storm movement, mobile weather alerts sent via SMS and mobile apps, and nowcast services providing localized short-term warnings.

National Disaster Management Authority (NDMA)

NDMA has issued guidelines for lightning safety, thunderstorm preparedness, and public awareness campaigns.

Sachet Portal (National Disaster Alerts) - NDMA has envisioned Common Alerting Protocol based Integrated Alert System on Pan India basis involving near real-time dissemination of early warning through multiple means of technology using geo-intelligence.

Suggested measures include avoid open fields during lightning, stay indoors during storms, secure loose objects and structures, and strengthen local disaster response systems.

Lightning Resilient India Campaign

1. Multi-stakeholder initiative aimed at reducing lightning deaths through community awareness, scientific forecasting, and protective infrastructure.

State Disaster Response Measures

1. State governments undertake compensation for victims providing financial assistance to families of deceased and injured.
2. Emergency restoration of power supply mobilizing repair crews.
3. Relief and rehabilitation assistance including temporary shelter and food.

Limitations

Thunderstorms and lightning are not currently among 12 nationally notified disasters eligible for automatic financial compensation under State Disaster Response Fund or National Disaster Response Fund.

However, states have flexibility to utilize up to 10% of their SDRF allocation for local disasters such as lightning and thunderstorms.

Nationally Notified Disasters In India - Cyclone, Drought, Earthquake, Fire, Flood, Tsunami, Hailstorm, Landslide, Avalanche, Cloudburst, Pest attack, Frost and cold wave.

7.Way Forward

Improve Forecast Accuracy

1. Develop better high-resolution weather models capable of predicting localized thunderstorm formation and movement with greater precision.
2. Expand radar networks increasing coverage and detection capabilities particularly in vulnerable regions.
3. Deploy AI-based forecasting systems using machine learning to identify patterns and improve prediction lead times.

Strengthen Public Awareness

1. Community-level preparedness can reduce casualties significantly through education about thunderstorm safety measures.
2. Conduct awareness campaigns in schools, colleges, and community centers.
3. Disseminate safety guidelines through multiple channels including TV, radio, social media, and mobile apps.
4. Train community volunteers as first responders during emergencies.

Climate-Resilient Infrastructure

1. Promote stronger housing structures with storm-resistant design particularly in vulnerable rural and urban informal settlements.
2. Install underground power lines where feasible reducing vulnerability to wind damage.

3. Implement disaster-resilient urban planning including building codes, land use planning, and infrastructure standards.
4. Secure hoardings and billboards with proper engineering and regular inspections.

Integration with Disaster Management

1. Thunderstorms should receive greater attention under local disaster management plans similar to floods and cyclones.
2. Include thunderstorms among nationally notified disasters enabling automatic SDRF/NDRF allocation.
3. Develop standard operating procedures for thunderstorm emergency response.
4. Conduct regular mock drills and capacity building for disaster response teams.

Early Warning Dissemination

1. Improve last-mile connectivity of warning systems reaching all vulnerable populations.
2. Use multiple dissemination channels including sirens, mobile alerts, community radio, and local announcements.
3. Ensure warnings are in local languages and contain actionable safety instructions.

Conclusion

More than 100 people lost their lives due to severe thunderstorms and dust storms striking Uttar Pradesh during pre-monsoon season highlighting devastating impact and need for improved preparedness. Thunderstorms are weather phenomena associated with lightning, thunder, strong winds, heavy rainfall and sometimes hailstorms, common during April and May with key features including sudden development, strong gusty winds, short duration but high intensity, and dust storms in dry regions. Formation conditions include intense surface heating with northern India experiencing temperatures above 45°C, availability of moisture from Bay of Bengal through southeasterly winds, cool and dry upper air from Western Disturbances, and convection process with warm air rising rapidly condensing into cumulonimbus clouds.

Source - https -//indianexpress.com/article/explained/explained-climate/uttar-pradesh-storm-deaths-reasons-temprature-air-10691535/lite/