



SAHF IBF WG IMPLEMENTATION PLAN PROJECT

REGIONAL WORKSHOP ON IMPACT-BASED FORECASTING (IBF)

Heat Season Review & Cold Season Planning

29 September - 01 October 2026 | Bangkok, Thailand

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Institute of Himalayan Risk Reduction

PRESENTATION FLOW

- 01 Why heat and cold extremes need IBF
- 02 Monitoring approach and evidence base
- 03 Observed cold wave patterns and sectoral impacts
- 04 Monitoring and bulletins
- 05 Local practice and Learnings

A Recurrent but Under-Recognized Hazard

Floods and landslides dominate Nepal's DRR frameworks. Meanwhile, temperature-related hazards, particularly heatwaves and cold waves, remain overlooked despite their recurring impacts across the Terai and Inner Terai.



Daily Recurring Disruption

Driven by dense fog, delayed sunlight, and low temperatures — repeating each morning rather than a single event.



Health, Education & Livelihoods Hit Hardest

Respiratory illness, reduced school attendance and learning, and lost income and farm productivity.



Vulnerable Groups Disproportionately Affected

Children, the elderly, daily wage workers, and low-income households bear the greatest burden.



Indoor Spaces Offer Limited Protection

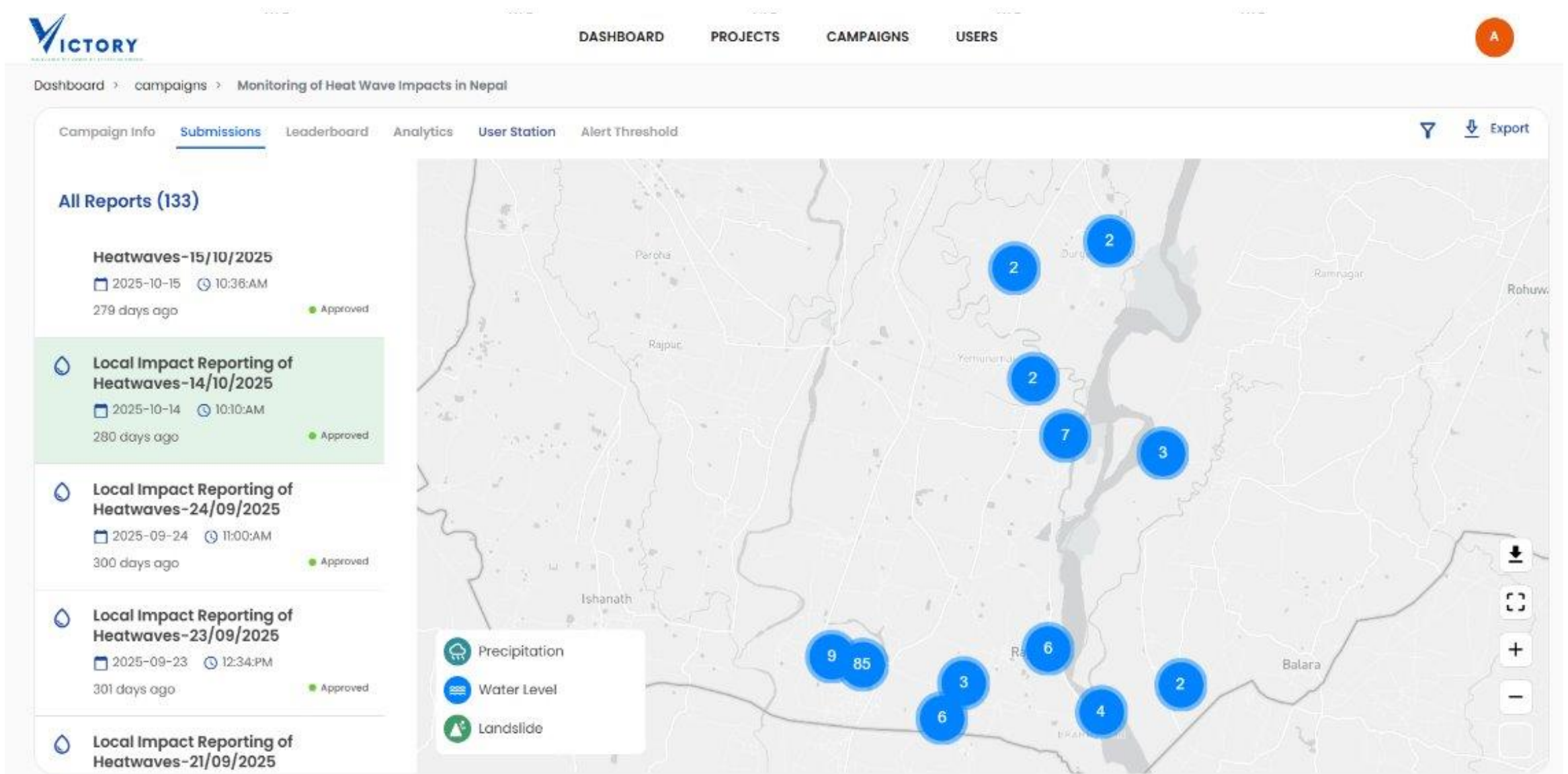
Poor insulation means prolonged cold exposure continues even indoors.



Early Warning Not Actionable

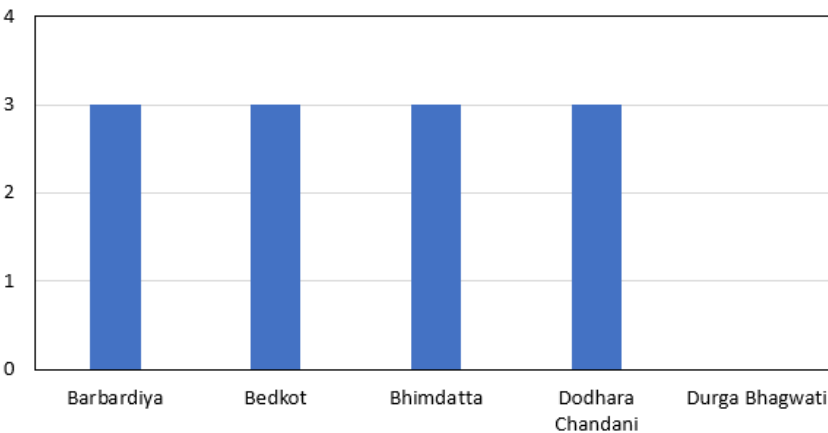
Warning information exists but rarely translates into sector-specific response.

IBF Piloting Areas for Heat Waves



Heat wave bulletins issued in recent years

Issued IBF Bulletin



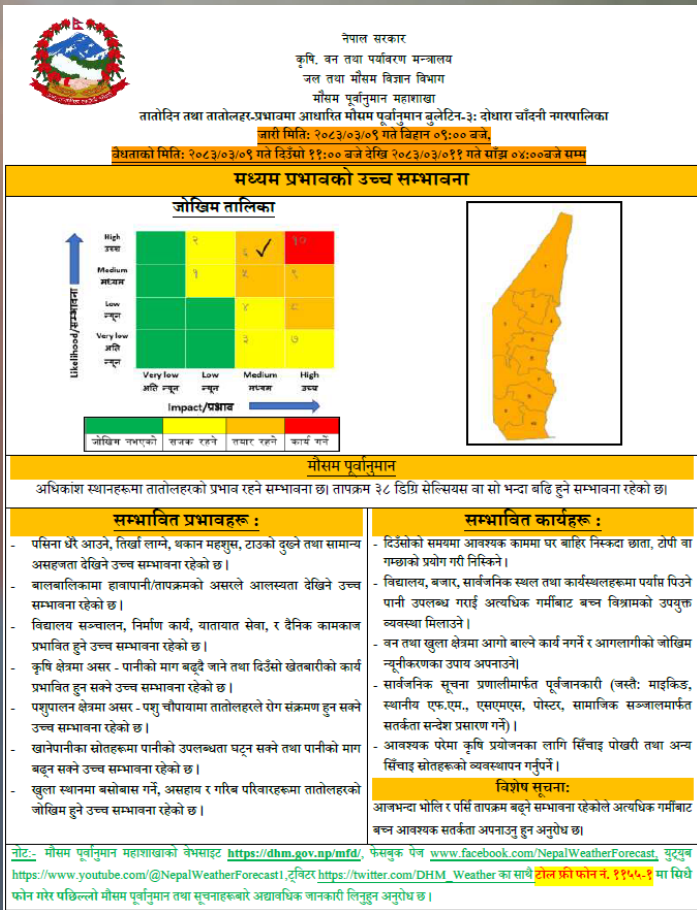
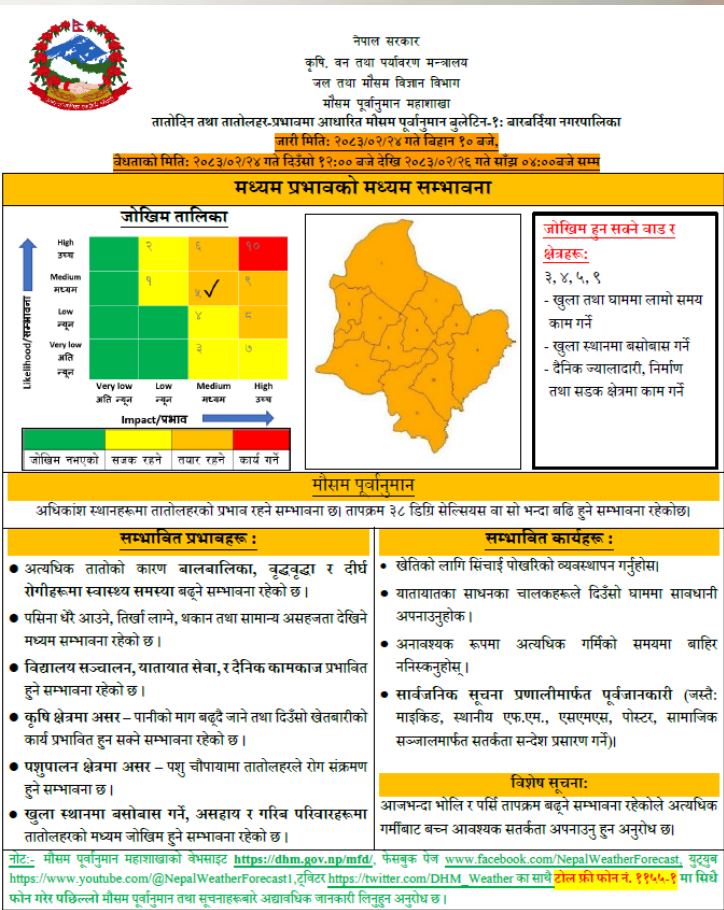
How bulletins can support IBF

Translate threshold information into clear risk messages.

State expected impacts by sector and vulnerable group.

Link forecast levels for early actions.

Maintain consistent local dissemination channels.



Why cold wave monitoring is more complex than heat wave monitoring

Heat wave monitoring usually starts with:

Maximum temperature
Percentile or absolute thresholds
Duration and spatial coverage
Clear daily exceedance logic



Cold wave monitoring must combine:

Minimum temperature

how cold it becomes

Fog and visibility

how people move

Delayed sunlight

how long cold persists

Cold wind / chill

felt exposure

Indoor temperature

shelter quality

Duration + recurrence

cumulative pressure

Sectoral impact signals

when to act

Monitoring target: not only “how cold?” but “who is affected, when, and what decision should be triggered?”

Monitoring Cold Days and Cold Waves in Nepal



Forecast & Observation

Forecast List

- Nowcasting
- 24 Hour Forecast
- City Forecast
- Weather Warning
- Daily Weather Bulletin
- Weekly Weather Forecast
- Special Weather Forecast
- Mountaineering
- Cold Wave Monitoring and Outlook
- Heat Wave Monitoring and Outlook
- Monsoon Monitoring
- Impact Based Forecasting
- Tourism Forecast

Warning Map for Day 1 Saturday (28 February 2026)

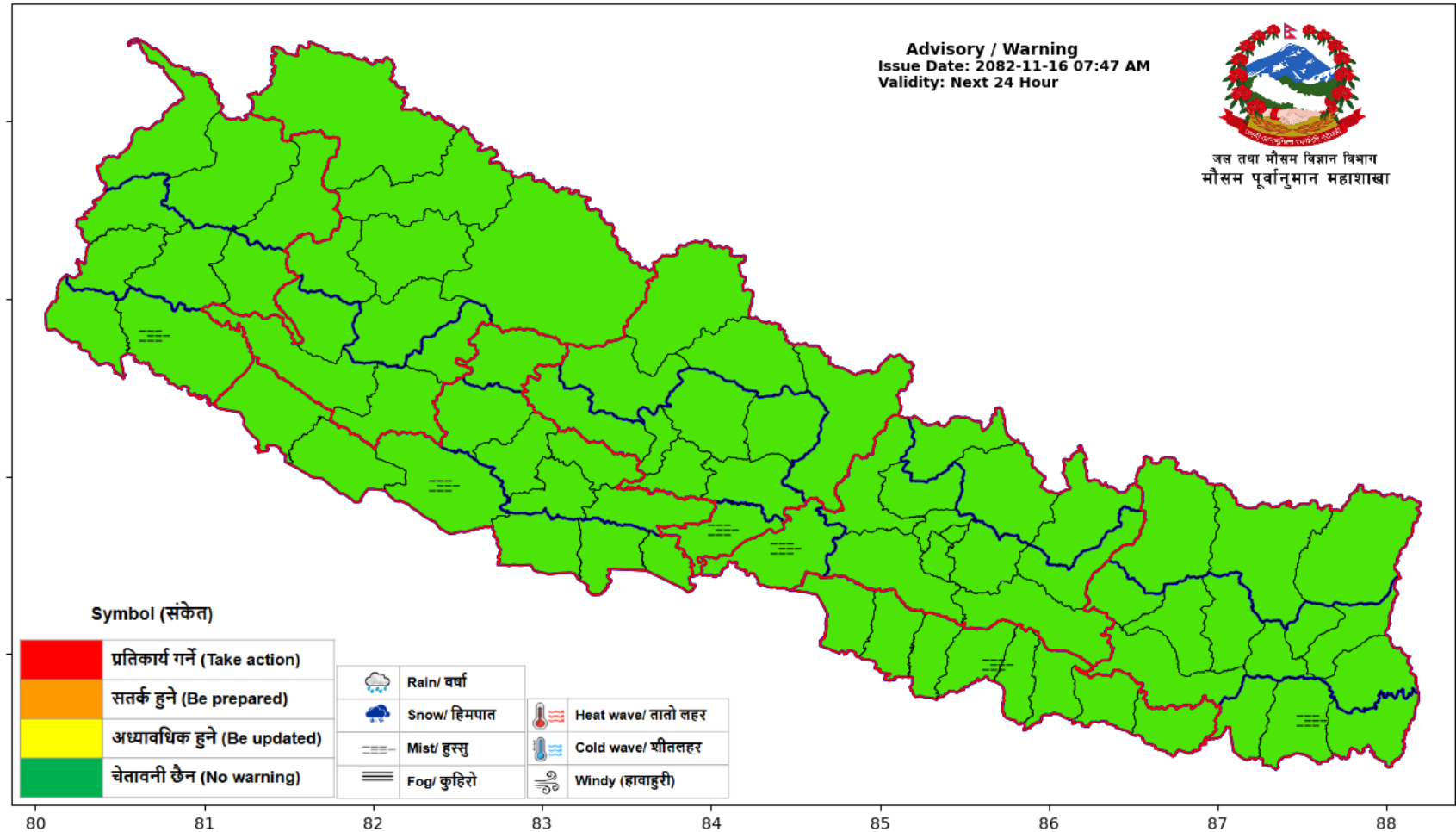
Advisory / Warning
Issue Date: 2082-11-16 07:47 AM
Validity: Next 24 Hour



जल तथा मौसम विज्ञान विभाग
मौसम पूर्वानुमान महाशाखा

तराई

तराई



नेपाल सरकार
ऊर्जा, जलस्रोत तथा सिंचाइ मन्त्रालय
जल तथा मौसम विज्ञान विभाग
मौसम पूर्वानुमान महाशाखा
शीतलहर सम्बन्धी विज्ञापन
(जारी मिति: २०८१-१०-११)

हालको अवस्था:

विगत दुई दिन (०९ र १० गते) देखि कोशी, मधेश, बागमती प्रदेशको पूर्वी भू-भाग (सप्तरी) तथा पश्चिमी भू-भाग (लुम्बिनी) Coldwave को अवस्था रहेको छ।

आगामी दुई दिनको लागि शीतलहरको पूर्वानुमान:

मधेश प्रदेशको पूर्वी भू-भाग तथा कोशी प्रदेशको तराई देखिएको छ। मधेश प्रदेशको पश्चिमी भू-भाग तथा बागमती प्रदेशको पश्चिमी भू-भाग क्रमिक रूपमा सुधार हुने संभावना छ।



	Cold wave (शीतलहर)
	Take action (प्रतिकार्य गर्ने)
	Be prepared (सतर्क रहने)
	Be updated(अध्यावधिक हुने)
	No warning (चेतावनी छैन)

नोट: हस्त/कुहिराको थप जानकारीको लागि हरेक दिन बुलेटिन अनिवार्य हेर्नुहोला। मौसम पूर्वानुमान महाशाखा र आवश्यकता अनुसार थप विशेष बुलेटिन समेत जारी गर्नेछ।

सम्भावित असर तथा सुझावहरू:

शीतलहरका कारण स्वास्थ्य, यातायात, शिक्षा, कृषि तथा अन्य क्षेत्रमा असर पर्न सक्नेछ।

मौसम सम्बन्धी थप जानकारीका लागि सम्पर्क राख्नुहोला।
मौसम पूर्वानुमान महाशाखा, जल तथा मौसम विज्ञान विभाग,
विभुवन अन्तरराष्ट्रिय विमानस्थल (TIA), गौघर, काठमाडौं
फोन : ११५५,
Facebook: www.facebook.com/dhmweather
Twitter: www.x.com/dhm_weather

शीतलहर सम्बन्धी विशेष बुलेटिन - १ (शीतलहर चेतावनी नक्सा)
जारी मिति २०८१-१०-११ अपरान्ह ०४:०० बजे
वैधताको अवधि: २०८१-१०-११ गते अपरान्ह देखि २०८१-१०-१३ गते सम्म



	Cold wave (शीतलहर)
	Take action (प्रतिकार्य गर्ने)
	Be prepared (सतर्क रहने)
	Be updated(अध्यावधिक हुने)
	No warning (चेतावनी छैन)

From monitoring evidence to IBF action

Evidence generation should move from observation to threshold refinement and local early action.

1

Collect

Daily monitoring, indoor temperature, visibility, sunlight exposure and geo-tagged records.

2

Validate

FGDs and KIIs confirm how conditions affect health, education, livelihoods and mobility.

3

Analyse

Compare time, place, sector and vulnerable group patterns to identify impact thresholds.

4

Act

Translate evidence into bulletins, trigger levels, early actions and local communication channels.

Cold days and cold wave characteristics

Dense fog, reduced visibility and delayed sunlight were the most consistent features.

Visibility dropped to around 40–200 metres in several locations during peak morning hours. Outdoor movement and daily mobility were delayed, affecting markets, workplaces, schools and health facilities.

Productive working hours reduced for daily wage labourers and agriculture-based workers.

Households depended on coping measures such as firewood, layered clothing and restricted movement.

Implication for IBF

Cold wave needs daily, time-specific triggers because the highest disruption often occurs during early morning hours.



Reduced visibility and foggy morning conditions

Observed pattern from 2025

Severity concentrated between late January and early February, with impacts strongest in the morning.



Fig1: Fire Incident at Rajapur



Fig3: Morning @8am at Rajapur

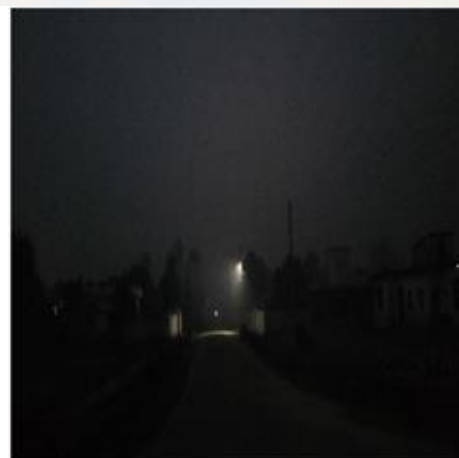


Fig2: Morning @6:30am at Rajapur



Fig4: People lighting fire at Rajapur

OBSERVED PATTERN

- Peak severity was concentrated between late January and early February.
- Impacts were strongest in early morning: dense fog, low visibility and delayed sunlight.
- Several locations reported visibility as low as 40–200 meters during peak morning hours.
- Daily recurrence created cumulative pressure on mobility, livelihoods, education and health.

Field observations and location-wise cold wave impacts

LOCATIONS TO HIGHLIGHT

High impact

Rajapur: prolonged fog, very limited sunlight, all-day disruption on several days.

Moderate to high

Gaur, Dhangadhi and Lahan saw disrupted mobility, health pressure, agriculture stress and school challenges.

Cold day visual evidence

Photographic evidence was used to document visibility, fog and local coping practices.



Visibility at 8 AM at Gaur



Visibility at 8 AM at Lahan



Visibility at 8 AM at Kailali



Visibility at 8 AM at Nepalgunj



Coping Mechanisms



Health impacts of cold wave

Respiratory illness, fever, asthma and joint pain increased, especially among children and elderly people.

Most reported conditions

Acute respiratory infections (ARI), pneumonia, asthma and seasonal flu

Fever, cough and general respiratory discomfort

Joint pain and body aches, particularly among elderly populations

Families often relied on home-based care and traditional remedies, delaying visits to health facilities

FCHV observation

FCHVs reported a noticeable rise in common cold-related illnesses among children and elderly individuals.



OPD pressure and secondary health risks

Health facility flow increased during cold wave periods, while indoor heating introduced additional risks.

180 → 220

daily OPD cases, Primary Health Centre
Rajapur Bardiya

60 → 80

daily OPD visits, CP Hospital, Dhangadhi

Highest risk groups

Children under five and newborns
Pregnant women
Elderly people and people with respiratory conditions

Secondary risk

Firewood and indoor heating may cause indoor air pollution, respiratory irritation and suffocation risk.

Dhangadhi Municipality experienced frequent foggy mornings that affected road transport, and daily wage labor. Health impacts such as cough and respiratory discomfort were common among elderly and children. Agricultural stress including vegetable fungus and potato blight was also reported. Community response was strongest in Dhangadhi, with warmers, fire camps, and community support operating during extreme cold days. Conditions improved gradually after early February, and by mid-February daily routines had normalized.



Fig9: Road condition @8am at Kailali



Fig10: Coping of community people at Kailali

5 Banke District – Nepalgunj Sub-Metropolitan City (Ganeshpur Ward 04)

Ganeshpur Ward 04 of Nepalgunj experienced recurrent cold mornings with fog and reduced visibility during the monitoring period, mainly affecting early-day movement and outdoor work. The impact was strongest in late January and early February, when dense fog delayed sunrise. People stayed indoors longer. Households commonly used warm clothing, blankets, wood or gas/electric heaters, while indoor smoke remained low. Daily wage workers, elderly people, and children were more affected by the cold, with reports of cough and body aches. Although no serious health incidents occurred, temporary disruption to road and air transport was observed.

Field evidence on cold-related health and coping practices

Education impacts

Cold wave disrupted attendance, learning continuity and classroom comfort.

Attendance

Late arrival and absenteeism from extreme cold and unsafe commuting
Illness-linked absence: cough, fever and respiratory infection
Exams and classes occasionally postponed or disrupted

Learning outcomes

Reduced concentration, energy and classroom engagement
Reading/writing difficult in poorly insulated classrooms
Missed exams and fewer study hours at home

Infrastructure & equity

Most schools have poor insulation and no heating system
Tin roofs and open ventilation allow cold air and moisture
Low-income students face higher illness rates and absenteeism

Livelihood and Agriculture impacts

Cold wave acted as a risk multiplier for smallholder farmers and low-income households.

20–40%

crop production loss in extreme cold
years

2–4 hrs

working hours lost per day

1–2 wks

delay in planting schedules

Crops and livestock

Sensitive crops: potato, mustard,
tomato, cauliflower and wheat
Leaf yellowing, flower drop, stunted
growth, fungal rot and smaller produce
Livestock: diarrhoea, respiratory
infection and reduced milk/egg yield

Labour and coping

Fog interrupts pesticide spraying and
irrigation pump operation
Coping relies on plastic sheeting, straw
mulching and adjusted planting schedules



Transport signal: Aviation disruption

Dense fog and low visibility also affected transport systems, including airport operations.

Aircraft	Operator	Sector	Departure			Delayed Time	Flight No.	Flight Type	Remarks
Type		Dep. To.	Date	Scheduled Time	ActualTime				
DH8D		KTM	13-Jan-26	7:00	8:51	1:51		Scheduled	Delayed due weather
ATR72		KTM	13-Jan-26	9:35	11:27	1:52		Scheduled	Delayed due weather
ATR72		KTM	13-Jan-26	16:05	17:43	1:38		Scheduled	
CRJ200		KTM	13-Jan-26	9:45	11:40	1:55		Scheduled	Delayed due weather
DH8D		KTM	13-Jan-26	12:35	16:08	3:33		Scheduled	
DH8D		KTM	13-Jan-26	15:30	17:17	1:47		Scheduled	
CRJ200		KTM	13-Jan-26	17:00	18:05	1:05		Scheduled	
DH8D		KTM	14-Jan-26	7:00	12:31	5:31		Scheduled	Delayed due weather
DH8D		KTM	14-Jan-26	9:45				Scheduled	Cancelled due weather
ATR72		KTM	14-Jan-26	9:35	14:50	5:15		Scheduled	Delayed due weather

Aviation records used as an additional signal of impact

Impact-based weather forecast:

IBF System:

Sensitization Workshop
Field work,
Risk Matrix
Development,
Communication Tree
Impact collection
Two Way
Communication



Community structures for anticipatory action

Community Disaster Management Committees and EWS task teams form the local delivery mechanism.

Women-led CDMCs and
early warning task teams
formed at Durga
Bhagwati & Rajdevi

Role in the system

These groups support
local monitoring,
preparedness and last-
mile dissemination
through community
networks.



Future Considerations for Cold Wave IBF in Nepal

Thresholds

Develop multi-variable thresholds: temperature + fog/visibility + delayed sunlight + duration + local impacts.

Data systems

Link DHM forecasts with citizen observations, health OPD data, school attendance, and transport disruption.

Sector protocols

Pre-agreed actions for schools, health facilities, ward offices, and livelihood protection.

Safer coping

Promote safe heating, ventilation, and fire-risk reduction, especially in low-income households.

Equity focus

Prioritize children, elderly people, pregnant women, outdoor workers, and poorly insulated homes.

Learning loop

Document actions, impacts, and lessons after each cold wave season.

Key takeaways for regional learning

01 Impacts are time-sensitive

Cold wave disruption is concentrated in early morning hours, so triggers should reflect timing, not only daily averages.

02 Sectoral pathways matter

Health, education, livelihoods, agriculture and transport require tailored thresholds and actions.

03 Local institutions make IBF actionable

CDMCs, EWS task teams, LEOC/DEOC coordination and smart warning systems help move from forecast to response.

04 Women-led systems strengthen last-mile reach

Preparedness actions become more inclusive when women's voices and leadership are built into monitoring and dissemination.



THANK YOU

FOR YOUR ATTENTION