

Nepal

Heat early warning system: Current status and recommendations

October 2026



Introduction and objectives

This case study examines the current state of the heat early warning system (HEWS) in Nepal, including how heat risk is understood and monitored, and how warnings are issued, communicated, and acted upon across institutions. It forms part of a series of case studies conducted across eight countries of the Zurich Climate Resilience Alliance, which applies a common analytical framework to assess HEWSs across key pillars and identify good practices, gaps, and enabling conditions for people-centred, impact-based early warning for extreme heat.

Key messages

- **Heat risk is increasingly recognized, but national risk knowledge remains fragmented.** Evidence of impacts on health, livelihoods, and vulnerable populations is growing, particularly in the Terai region, but Nepal still lacks comprehensive national heat-risk and vulnerability mapping and systematic impact data to identify where and for whom risks are greatest.
- **The Department of Hydrology and Meteorology (DHM) has established heat monitoring and forecasting, using** location-specific maximum-temperature percentiles to classify heatwaves and to issue Hot Day and Heatwave Bulletins up to three days ahead. However, short lead times and limited integration of humidity and impact data constrain more impact-based warning. Humanitarian initiatives are helping address these gaps through Heat Index (HI) research and locally tailored anticipatory-action thresholds and tools.
- **Heat warnings use multiple communication channels, but do not yet reach everyone with timely, actionable information.** DHM information is amplified through government, media and local networks, with FM radio and humanitarian organizations supporting local-language and last-mile communication. Digital and literacy barriers, limited impact-based guidance, and weak feedback mechanisms may limit warning effectiveness.
- **Heat preparedness and response are expanding with increasing government engagement, but are unevenly institutionalized and are often reliant on humanitarian and development partners.** Local governments, the Red Cross, and Non-Governmental Organizations (NGOs) have advanced municipal Heat Action Plans (HAPs), beginning with Nepalgunj in 2023, a simplified Early Action Protocol (EAP) for multiple cities in 2025, and additional cross-sectoral HAPs now under development. However, national heat-specific protocols and Standard Operating Procedures (SOPs), clearly defined roles and responsibilities, and sustainable mechanisms for sustaining and scaling these initiatives remain limited.
- **Government engagement on extreme heat is increasing, creating an important opportunity to further institutionalize heat risk management.** The National Disaster Risk Reduction Strategic Plan of Action 2018-2030 recognizes heatwaves within Nepal's multi-hazard risk landscape, while more recent developments indicate growing government attention to heat preparedness and early warning. Building on this growing government engagement will be important to establish a more coherent and sustainable heat early warning system.



Methodology

This case-study is based on a combination of semi-structured interviews and a targeted review of peer-reviewed literature and grey documentation related to extreme heat and the HEWs in Nepal. Five interviews were conducted between October 2025 and January 2026 with stakeholders across meteorology and humanitarian response (see list of organizations below). Evidence was synthesized using the four pillars of early warning systems, (1) disaster risk knowledge; 2) observations, monitoring, analysis, and forecasting; 3) warning dissemination and communication; and 4) preparedness and response capabilities alongside enabling components for effective systems.

Interviews were conducted with:

- Practical Action Nepal
- Prosper Global
- Start Network Nepal
- Ministry of Health
- Department of Hydrology and Meteorology of Nepal (DHM)

List of acronyms used

DDMC	- District Disaster Management Committee
DHM	- Department of Hydrology and Meteorology
DRM	- Disaster Risk Management
DRR	- Disaster Risk Reduction
EAP	- Early Action Protocol
EWS	- Early Warning System
GESI	- Gender Equality and Social Inclusion
GFS	- Global Forecast System
HAP	- Heat Action Plan
HEWS	- Heat Early Warning System
HI	- Heat Index
IEC	- Information, Education and Communication
IFRC	- International Federation of Red Cross and Red Crescent Societies
LEOC	- Local Emergency Operations Centre
NDRRMA	- National Disaster Risk Reduction and Management Authority
NGO	- Non-Governmental Organization
NRCS	- Nepal Red Cross Society
sEAP	- Simplified Early Action Protocol
SMS	- Short Message Service
SOP	- Standard Operating Procedure
T_{max}	- Maximum Temperature
UNDRR	- United Nations Office for Disaster Risk Reduction
WMO	- World Meteorological Organization
WRF	- Weather Research and Forecasting



Early Warning Systems

Early Warning Systems (EWS) are one of the best-proven and effective measures for saving lives and minimizing losses and harm caused by disasters. They help those at risk of floods, heatwaves, wildfires, and other climate hazards to take risk-informed, timely, meaningful, and impactful early action to keep themselves and their assets safe. The Alliance works across all eight components of EWS so that they deliver essential services for the most vulnerable women, men, and children, supporting communities to be resilient to climate hazards, enabling them to thrive.



Disaster risk knowledge

Extreme heat is an increasingly recognized hazard in Nepal, particularly in the Terai region, which extends from Jhapa in the east to Kanchanpur in the west. Temperatures regularly exceed 40°C, reaching up to 45°C, while high humidity further intensifies heat stress (IFRC, 2025; Bhandari et al., 2025; Khan et al., 2025b; People in Need, 2025). Climate projections indicate that the number of extremely hot days could increase from around 36 days annually to 60-68 days, with Madhesh and Sudurpaschim provinces expected to experience a further 5-8 per cent increase under moderate warming scenarios (Government of Nepal, 2019; Bhandari et al., 2025). Although heat exposure varies across Nepal's diverse topography, interviewees described heat as an emerging hazard whose impacts have become increasingly visible since 2023, despite historically receiving limited attention.

A growing body of literature documents the impacts of extreme heat on health, livelihoods, and well-being across Nepal. Evidence from the Terai indicates increasing heat-related morbidity and mortality (Kandel and Shyangtan, 2023). Hospital admissions for water-borne and vector-borne diseases increase by approximately 3-9 per cent and 2-12 per cent, respectively, for every 10°C increase in temperature (Shrestha, 2018). Heat-related risks are unevenly distributed across the population. Among pregnant women in heat-prone Chitwan district, dehydration, sunburn and other heat-related symptoms were commonly reported, with perceived vulnerability differing by wealth and rural-urban residence (Rhomborg et al., 2024; KC et al., 2024). Women in Madhesh Province, particularly those from marginalized communities, experience elevated indoor heat exposure associated with biomass cooking (Ghimire et al., 2025), while women in Dhangadhi report increased expenditure on medicines and difficulties remaining indoors during periods of extreme heat (Subedi, Khan and Grünholz, 2025). Schoolchildren are significantly affected in poorly equipped public schools, with more than 90 per cent of sampled schools in Madhesh Province reporting worsened health outcomes for children and teachers during extreme heat (Prosper Global Nepal, 2025). Outdoor workers face substantial occupational impacts, with auto (three-wheeler taxi) drivers in Nepalgunj reporting income losses of 20-23 per cent during a six-day heatwave exceeding 38°C (Subedi et al., n.d.). Farmers likewise identify heatwaves, alongside floods and cold waves, as among the most significant threats to agricultural production (Budhathoki et al., 2020).

There is also a growing body of research on public understanding of heat, which suggests awareness is increasing while knowledge remains uneven. Perception studies show that communities in Dhangadhi of Kailali district perceive extreme heat as their second-highest stressor, attributing rising temperatures to deforestation, rapid urbanization, overcrowding, and climate change (Khan et al., 2025a). At the same time, only 43 per cent of outdoor workers surveyed across eight districts had previously heard the term heatwave (Sharma et al., 2025). Institutional assessments likewise conclude that government officials require stronger understanding of emerging climate hazards and improved collaboration with academic institutions to strengthen risk assessment and future projections (Dhungana, Stoddard and Bollettino, 2023).

Furthermore, interviewees suggested that public understanding of heat forecasts remains limited, partly because operational heatwave monitoring by the Department of Hydrology and Meteorology (DHM) only began in recent years. At the same time, they noted that media coverage of heatwaves has increased substantially, often compensating for the limited availability of official impact data. They also highlighted efforts in education and awareness across communities, which is touched upon in further detail in the section “Preparedness and response capabilities”.

Despite growing recognition of heat risk in Nepal, important evidence gaps remain. Interviewees noted that sectoral documentation is limited, particularly regarding impacts on agriculture, water



resources, and medicinal and aromatic plants, where prolonged heat has reduced crop quality and caused economic losses. Across interviewees there was consensus that substantially more research is needed, with one participant noting that *‘the number of studies that has to take place... is still an area of investment for all of us’*. Vulnerability mapping has not yet been established nationally, and Nepal lacks comprehensive data on populations exposed or vulnerable to extreme heat. Existing risk and vulnerability assessments remain fragmented and geographically limited. Assessments by Prosper Global, the International Federation of Red Cross and Red Crescent Societies (IFRC), the American Red Cross and the Nepal Red Cross Society (NRCS) cover Nepalgunj, Dhangadhi, and selected municipalities but do not provide national coverage. Interviewees noted substantial evidence gaps are likely to remain for several years.

Observations, monitoring, analysis, and forecasting

National heatwave monitoring and forecasting

Nepal's heat monitoring and forecasting is led by the Department of Hydrology and Meteorology (DHM), the national authority responsible for hydrometeorological observations, forecasting, and early warning services. DHM operates a national observation network of over 400 meteorological stations, including 103 climatological stations, and coordinates regional and international data exchange through World Meteorological Organization (WMO)-linked mechanisms and South Asian cooperation platforms (Bhetuwal et al., 2016). Forecast production draws on multiple numerical weather prediction products. DHM has operationalized the Weather Research and Forecasting (WRF) model since 2020; the system runs four times daily, uses Global Forecast System (GFS) boundary conditions at 0.25° resolution, and provides forecasts up to three days ahead, with a highest spatial resolution of 3 km (DHM, n.d.-c).

DHM has introduced dedicated heatwave monitoring and bulletins in recent years. Its heatwave classification is based on location-specific percentiles of daily maximum temperature. A Hot Day, Very Hot Day, and Extreme Hot Day are defined when the maximum temperature exceeds the local 90th, 95th, and 99th percentile, respectively, calculated from April-September maximum temperatures over the 1981-2020 reference period (DHM, 2023). A mild, moderate, or extreme heatwave occurs when these thresholds (90th, 95th, and 99th) are exceeded for three or more consecutive days (DHM, 2023; IFRC, 2025). While this published classification is percentile-based, interviewees reported that operational monitoring considers both absolute and percentile-based temperature thresholds.

DHM communicates observed and forecasted heat conditions through dedicated Hot Days and Heat Wave Bulletins (DHM, n.d.-a). For example, its June 2023 bulletin identified locations experiencing mild, moderate, and extreme heatwaves and highlighted areas where maximum temperatures had exceeded 40°C or 42°C (DHM, 2023; Figure 1). Recent heat bulletins have also used colour-coded maps, described by interviewees as a red, amber, and green traffic-light format, to visualize the spatial distribution of heat conditions across Nepal. DHM interviewees described internal discussions when forecasts indicate that a heatwave could develop within the next one or two days; such cautionary information may be shared informally with relevant agencies, although advance public alerts are not routinely issued several days ahead. Interviewees described DHM's three-day heat forecasts as useful but relatively short for anticipatory planning.



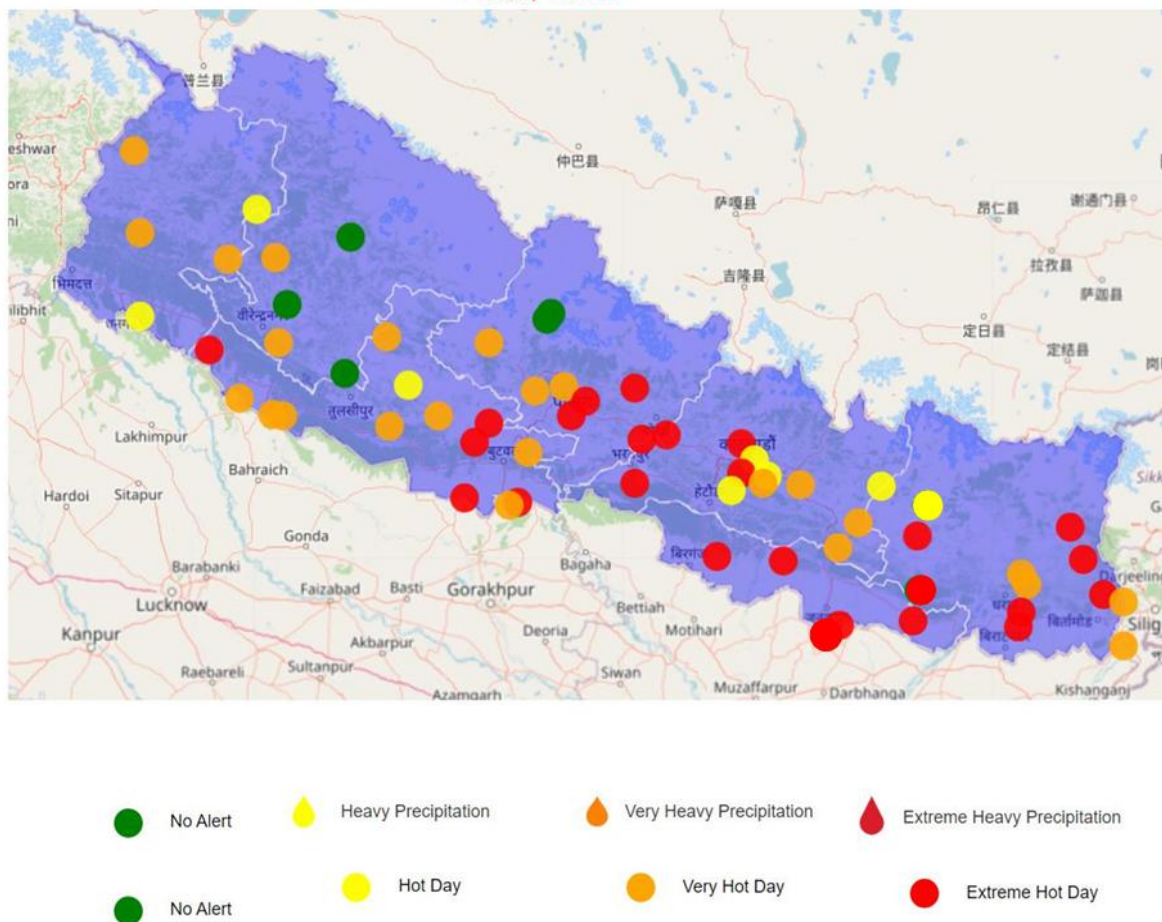


Figure 1 DHM's heat bulletin warning map for Hot, Very Hot, and Extreme Hot days based on maximum temperatures on 8 June 2023. Source: DHM, 2023

Heat monitoring has also been strengthened through collaboration between DHM and humanitarian organizations. With support from a Start Network Anticipation Tool Grant, CARE Nepal developed a heat- and cold-wave anticipation tool that combined national meteorological observations with global and regional forecasting information. The initiative supported collaboration between CARE Nepal and DHM on defining and standardizing heat- and cold-wave thresholds and was subsequently formalized through a Memorandum of Understanding, enabling integration of the tool into DHM systems (Howson, 2026). DHM's online Heat and Cold Wave Monitoring platform¹ now displays station-level observations alongside percentile-based thresholds and allows exceedances and trends to be tracked over time (DHM, n.d.-b). Interviewees reported that the platform covers approximately 50-70 stations. However, the length and quality of station records vary substantially: some stations have more than 30 years of observations, while others are relatively new, constraining the development of spatially consistent percentile thresholds and homogenized regional products. The platform notes that the tool will in future compute additional heat-stress indices, including the Heat Index (HI) and Wet-Bulb Globe Temperature, and explore relationships between weather conditions and reported impacts to support the development of local empirical relationships.

¹ <https://hwcw.naxa.com.np/>

Anticipatory action thresholds and the inclusion of humidity

Work to incorporate humidity and heat impacts into heat monitoring and thresholds has developed particularly through humanitarian initiatives. In Nepalgunj, research by the Red Cross Red Crescent Climate Centre identified locally relevant heat thresholds and heat hotspots to help the municipality, the NRCS, and other emergency service providers determine when and where action may be needed during extreme heat (Subedi et al., 2022). The study identified a HI of approximately 47°C as an important local impact threshold, associated with an approximately 20 per cent reduction in income among vulnerable outdoor workers such as rickshaw and auto-rickshaw drivers.

In 2025, NRCS, in partnership with municipal authorities and communities, developed a simplified Early Action Protocol (sEAP) for urban heatwaves in Nepalgunj, Dhangadhi, Siddharthanagar, and Biratnagar (IFRC, 2025). The protocol uses a two-stage trigger based on observed and forecast conditions, providing up to three days of lead time. First, observed maximum temperature (Tmax) must exceed the city-specific threshold (Box 1), together with relative humidity of at least 45 per cent. Once these observed conditions are met, at least one of two forecast criteria must also be satisfied: either DHM issues a red-alert heatwave bulletin indicating “take action” for the following three days, or DHM's numerical weather prediction forecasts maximum temperature above the local 99th-percentile threshold for three consecutive days (IFRC, 2025).

The inclusion of humidity is intended to ensure that activation reflects potentially dangerous conditions for human heat stress rather than temperature alone. The sEAP notes that the combination of its observed temperature thresholds and relative humidity of at least 45 per cent corresponds to HI conditions in the Danger category across the target cities, potentially reaching Extreme Danger in Nepalgunj. However, HI itself is not yet used as a forecast trigger. The protocol explicitly identifies the development of HI-based forecast triggers as a future priority, particularly in locations where high humidity strongly influences experienced heat.



Box 1: Localized thresholds for anticipatory action

The NRCS, in partnership with municipal authorities and communities, developed a sEAP for urban heatwaves in Biratnagar, Nepalgunj, Siddharthanagar, and Dhangadhi. The sEAP uses a two-stage trigger combining **observed** and **forecast** conditions. Observed TMax must reach the city-specific threshold shown below and relative humidity must be at least 45 per cent. In addition, forecast conditions must indicate continued extreme heat.

City	Observed Tmax trigger*	90th percentile	95th percentile	99th percentile
Nepalgunj	41°C	38.0°C	39.8°C	42.6°C
Dhangadhi	40.5°C	37.7°C	39.4°C	41.7°C
Siddharthanagar	40.5°C	37.0°C	38.6°C	41.6°C
Biratnagar	37.5°C	35.0°C	36.0°C	38.2°C

*Observed trigger: city-specific Tmax and RH $\geq$ 45 per cent.

Forecast trigger: At least one of the following must also be met: (1) DHM issues a red-alert heatwave bulletin indicating “take action” for the following three days, or (2) DHM’s numerical weather prediction forecasts Tmax above the local 99th percentile for three consecutive days.

Source: IFRC, 2025

Humanitarian actors also supplement DHM’s short-range products with longer-range global model information. A Start Network interviewee reported using GFS and WRF outputs to assess possible conditions over the following couple of weeks, before shifting to DHM’s official three-day products as a potential event approaches. This provides humanitarian actors with a longer window for preparedness and anticipatory planning, while DHM’s official operational products are used closer to the event.

At the local level, organizations are also supporting the development of more tailored HEWSs and anticipatory action. Practical Action is working with local governments to develop site-specific heat thresholds, local HEWSs, SOPs, and HAPs. More broadly, NGOs and development partners are supporting municipalities to develop locally appropriate thresholds and strengthen local and provincial heat forecasting workflows (People in Need, 2025).

Data, capacity, and forecasting gaps

Several gaps constrain the development of more impact-based heat forecasting and warning in Nepal. A major limitation identified in interviews is the lack of systematic data linking meteorological conditions to observed heat impacts. This makes it difficult to validate meteorological thresholds against impacts and to develop impact-based warning thresholds. DHM mentioned that they are ‘*struggling to identify whether the heat wave is having the health impact directly*’.

A second challenge is ensuring that heat indices and thresholds reflect local climatic conditions and experienced heat risk. DHM’s formal heatwave classification remains based primarily on maximum

temperature, while interviewees emphasized the importance of humidity, particularly in the hot and humid southern Terai. Although humanitarian initiatives are beginning to incorporate humidity and the HI, these are not yet part of DHM's formal heat(wave) classification. Spatial refinement is also needed given Nepal's climatic diversity, from the lowland Terai, through hill regions and valleys with strong local microclimates, to the much cooler high mountains. Interviewees reported that DHM is exploring the development of a limited number of physiographic zones with comparable thresholds to better account for these differences.

Forecast lead time and capacity present further constraints. Although DHM provides forecasts up to approximately three days ahead, interviewees reported that public extreme heat information can sometimes be communicated only 12-24 hours before expected severe conditions, while stakeholders expressed a preference for around seven days of advance information to support preparedness and early action. Limited technical capacity to translate forecasts into actionable information was reported at national, provincial, and local levels.

Forecast accuracy and model skill are an additional constraint. Nepal's complex topography, strong local microclimates, and exposure to multiple interacting weather systems make temperature forecasting particularly challenging in some parts of the country. Interviewees reported that forecast models do not always adequately capture local conditions, and that the location and magnitude of anticipated extreme conditions can change substantially as an event approaches. One interviewee described how weather systems expected to affect western Nepal can subsequently shift towards the east, noting that similar uncertainty applies to heat forecasts. Microclimatic variability can further result in forecast temperatures exceeding warning thresholds several days ahead but falling below them closer to the event. Interviewees indicated that this uncertainty can reduce confidence in escalating to higher warning levels, particularly when forecasts suggest that threshold exceedances may be short-lived or spatially limited. Improving forecast skill and the representation of Nepal's complex terrain and local climates in models is therefore important for extending useful lead times and developing more spatially targeted heat warnings.



Warning dissemination and communication

National dissemination

DHM is the authoritative source of heatwave information in Nepal. Interviewees explained that DHM bulletins include expected temperatures, anticipated duration, and colour-coded district maps. Bulletins are first posted on DHM's website, then circulated by email to disaster management agencies, municipal offices and media contacts, and shared through social media such as Facebook and X, after which media outlets amplify the information nationally. Interviews also described a downstream amplification role for the National Disaster Risk Reduction and Management Authority (NDRRMA), which republishes DHM information through its own channels. Health sector communication runs through established institutional networks, including press releases disseminated via the National Health Education, Information and Communication Centre and onward to health facilities through hub-and-satellite structures during emergency periods.

Interviewees indicated that local dissemination increasingly occurs through local government and community-level channels. Local Emergency Operation Centres (LEOCs) reportedly share DHM bulletins through Facebook tagging and local distribution networks. Local FM radio stations were repeatedly identified as important last-mile channels, with interviewees explaining that they translate technical messages into local languages, supporting comprehension among communities that may not understand Nepali. National radio and television also broadcast station-level temperatures and seasonal advice, which interviewees viewed as providing some localization for listeners. Local organizations fill remaining gaps by translating technical warning content into community-facing materials. Interviews described animated videos and Information, Education and Communication (IEC) materials in local languages (Figure 2), as well as door-to-door campaigns and street drama approaches to reach groups unlikely to receive online information. Interviewees also reported producing multi-day situational updates during peak heat periods, combining different forecast horizons while continuing to treat DHM as the authoritative source for official alerts.



Figure 2 Heat awareness campaign from NDRRMA and Prosper Global on NDRRMA Facebook page. Source: <https://www.facebook.com/reel/555440607663596>

Local HAPs illustrate how this national information can be translated into more structured local communication and response arrangements. The 2023 Nepalgunj HAP, for example, envisages DHM alerting the city, after which the District Disaster Management Committee (DDMC) would activate the heat response, the LEOC would inform ward committees and media, the NRCS would inform private organizations, and health services would communicate with hospitals, clinics and doctors (Subedi et al., 2023). The same framework links communication to protective actions such as public awareness, cooling centres, and drinking-water provision. However, the plan explicitly noted that Nepalgunj did not yet have a dedicated HEWS at the time and presented these arrangements as a framework for its development (Subedi et al., 2023).

Reach, accessibility, and actionability

Despite this expanding communication architecture, studies describe heat warning dissemination as fragmented and insufficiently locally relevant, limiting its ability to reach vulnerable groups with actionable guidance (Bhandari et al., 2025; Khan et al., 2025a). Evidence from Dhangadhi shows this gap: a community perception study found that only 26 per cent of respondents had received information or messages about extreme heat risks, while 74 per cent had not. Among those receiving heat information, most checked forecasts only one day or a few days in advance (Khan et al., 2025a).

In response, local HAPs increasingly propose communication arrangements designed specifically around extreme heat. In Dhangadhi, once DHM issues a heat alert or warning, a municipal Heat Task Force would coordinate communication across relevant departments, the NRCS, local disaster management committees, and the media, while linking alerts directly to response actions and prioritizing identified heat-hotspot areas (Khan et al., 2025b; Figure 3). Nepalgunj similarly proposes a city-wide communication and response chain linking DHM, the DDMC, LEOC, NRCS, health services, ward committees, and media with communication followed by actions such as opening cooling centres and increasing access to drinking water (Subedi et al., 2023).

Language, accessibility, and the choice of communication channel are recurring concerns. Communities in Dhangadhi called for clearer information on extreme heat impacts and practical protective actions and expressed preferences for communication through mobile phones, radio, and in-person channels (Khan et al., 2025a). Survey results also highlight the importance of informal networks, with family and neighbours among the most commonly used sources of weather information (Khan et al., 2025a). Communities recommended translation into local languages, clearer information on warning duration and expected maximum temperatures, and communication approaches tailored to differences in age, gender, education, occupation and disability developed in coordination with relevant stakeholders (Bhandari et al., 2025; Khan et al., 2025a; Sen et al., 2022).



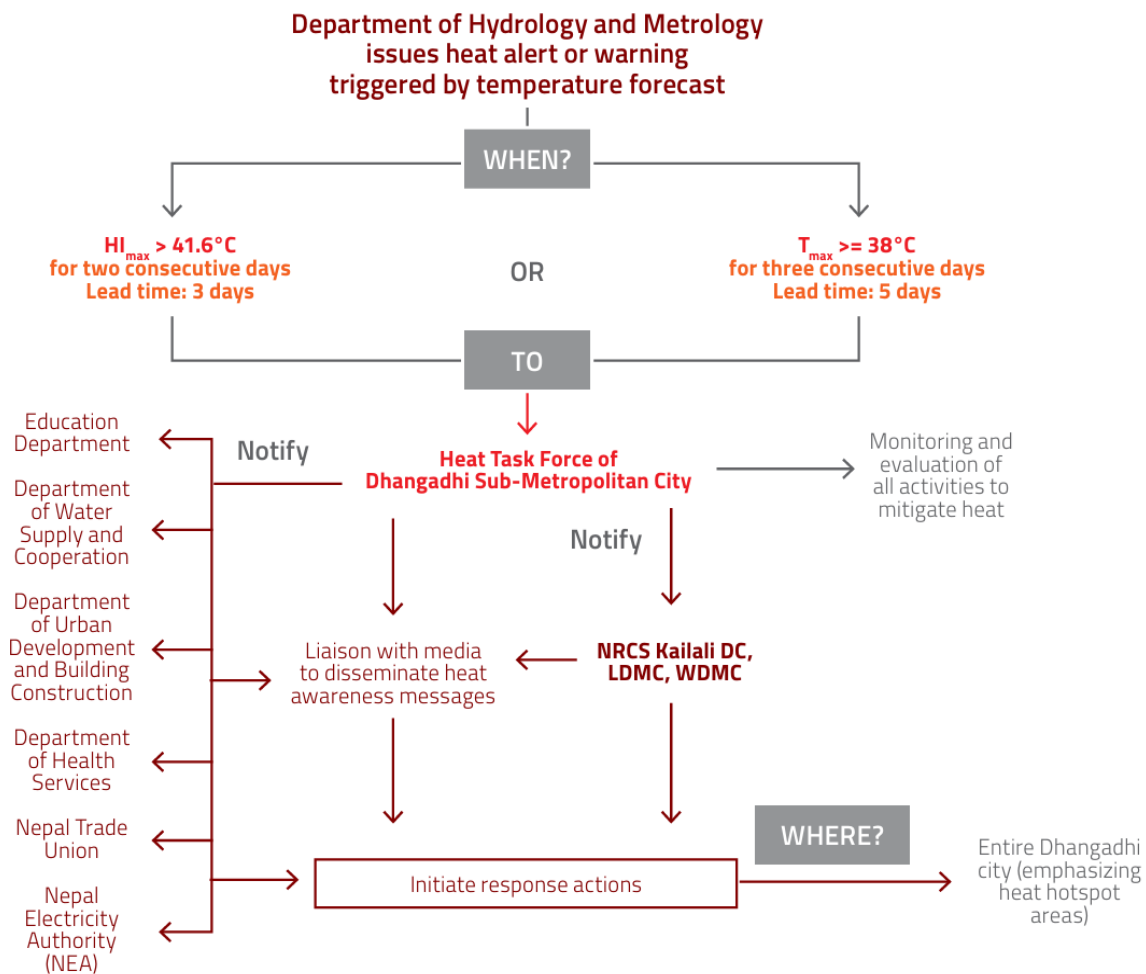


Figure 3 Proposed communication flow for the Dhangadhi HAP. Source: Khan et al., 2025b

The Nepalgunj HAP provides a concrete example of this type of multi-channel and targeted approach (Subedi et al., 2023). It proposes using television and radio, mobile public-address systems, pamphlets, social media, SMS, Viber, websites and other channels to reach different audiences. During the heat season, warnings are intended to include not only information that an extreme heat is approaching but also its potential health impacts, actions people can take to reduce their risk, and information on where to seek help. The plan specifically proposes broadcasting radio messages in both Nepali and Awadhi and targeting groups such as outdoor workers, street vendors, rickshaw pullers, and women through dedicated awareness and education activities. During heat events, the plan further recommends using television, radio, bulk SMS, newspapers, social media, email, and websites to communicate information including symptoms of heat-related illness, preventive measures, and the locations of services such as cooling centres and drinking-water points.

Interviewees similarly highlighted digital and literacy barriers, particularly for groups with limited access to online information. DHM interviewees noted that local actors can struggle to interpret technical forecast terminology and described ongoing work with BBC Media Action to simplify meteorological language for public communication. Interviewees also identified trusted community networks, including female community health volunteers, as a potentially important but currently underused channel for heat communication. Practical Action likewise pointed to the value of embedding messages in existing indigenous and community practices to strengthen acceptance and comprehension.

A further challenge is that heat warnings remain more focused on the meteorological hazard than on its consequences. Studies and interviewees call for more sector-specific heat advice and clearer links between warning levels, expected impacts, and recommended actions (Bhandari et al., 2025; Sen et al., 2022). The local HAPs demonstrate movement in this direction by connecting warning communication to concrete measures such as hydration advice, cooling centres, drinking-water provision, health-service preparedness, and changes to outdoor working practices. In Nepalgunj, for example, pre-season activities include dedicated workshops for occupationally exposed groups on hydration, cooling, symptoms of heat stress and heatstroke, first aid, and where to seek help (Subedi et al., 2023). This is particularly important for heat because exposure is closely tied to everyday activities and livelihoods: people may receive and understand a warning but still be unable to reduce their exposure if their work requires them to remain outdoors.

Trust and feedback

Interviewees generally described trust in DHM forecasts as relatively strong and considered greater spatial tailoring important for improving their relevance. However, trust does not necessarily translate into protective action. Limited understanding of technical forecasts, livelihood constraints, and a lack of sufficiently specific action-oriented guidance can all reduce warning uptake.

Communication also remains largely one-way at the national level. Interviewees identified an absence of systematic and inclusive mechanisms through which communities can report whether warnings were received, understood and useful, or communicate locally observed heat impacts back to DHM. Local HAPs nevertheless provide examples of how such feedback loops could be incorporated. The Nepalgunj HAP proposes an after-action review involving key stakeholders after each heat season and community- or household-level surveys, particularly among vulnerable groups, to determine whether residents received heatwave messages and identify groups that need to be reached more effectively in the future. Lessons would then be documented and used to improve subsequent heat response activities (Subedi et al., 2023).

Strengthening and institutionalizing such feedback mechanisms, alongside greater use of local languages, trusted community networks, and impact- and sector-specific advice, could help move heat communication from the dissemination of meteorological information towards a more people-centred warning system.



Preparedness and response capabilities

National preparedness framework

Heat preparedness and response sits within Nepal's wider disaster risk management (DRM) system, led by the NDRRMA as the central coordinating body for preparedness, response, capacity building, and public awareness (NDRRMA, n.d.). The Disaster Risk Reduction and Management Act 2017 promotes a comprehensive approach beyond relief, spanning prevention, preparedness, response, and recovery (Government of Nepal, 2018a). The National Plan of Action 2018-2030 recognizes heatwaves within Nepal's wider multi-hazard risk landscape and includes heat among climate-related hazards to be considered in risk assessments. The plan also provides a broader framework including multi-hazard early warning, preparedness, communication, and community-based DRR, although heat receives less dedicated attention than other hazards (Government of Nepal, 2018b).

Interviews suggest that heat-specific preparedness at the national level is relatively new and only partly institutionalized. Heat-health protocols have not been developed, and response continues to rely largely on broader emergency directives and disaster management structures. Roles and responsibilities following a heat warning were considered less clearly established than for more longstanding hazards such as floods. Interviewees reported that emergency declarations are coordinated through the Ministry of Home Affairs and that, although an Emergency Incident Command System exists, it had not been activated specifically for heatwaves as of 2025. At the same time, they point to increasing government recognition and engagement on extreme heat in recent years. Interviewees described emerging heat-specific planning by NDRRMA from 2024 onwards, and the government is also preparing to pilot the recently developed Extreme Heat Risk Governance Framework and Toolkit, in collaboration with the United Nations Office for Disaster Risk Reduction (UNDRR), the Global Heat Health Information Network (GHHIN), Prosper Global, Practical Action, IFRC, and other humanitarian and development partners (GHHIN et al. 2025).

Local Heat Action Plans and partner-supported preparedness

Much of the operational development of heat preparedness has occurred at the municipal level, often with substantial support from the Red Cross, NGOs, and development partners. The NRCS, with technical support from the Red Cross Red Crescent Climate Centre and in coordination with other RC network partners, has supported the respective local governments of Nepalgunj, Dhangadhi, Siddharthanagar, and Biratnagar in developing municipal HAPs (NRCS, 2024). In 2023, Nepalgunj launched its HAP (NRCS, 2024). Following this, the NRCS and partners expanded the approach to three other cities, including locally informed heat thresholds and triggers, stakeholder consultation, and HAP validation. Dhangadhi's HAP was subsequently published in 2025, integrating locally defined heat risk information with measures for preparedness, response, and long-term adaptation (Subedi et al., 2023; Khan et al., 2025b).

Practical Action and Prosper Global are also working with multiple municipalities to support the development and strengthening of local heat preparedness and HAPs. For example, four cross-sectoral HAPs are under development in Gulariya Municipality, Kailari Rural Municipality, Bedkot Municipality, and Bhimdutta Municipality, and are currently undergoing legal review prior to endorsement. These plans aim to balance early action with longer-term heat resilience.

The Nepalgunj HAP provides a roadmap for actions before, during and after the heat season, including stakeholder coordination, public awareness, health-sector preparedness, protection of outdoor workers, cooling centres, and drinking-water provision (Subedi et al., 2023). It also explicitly links heat alerts to activation of local response measures through the DDMC, LEOC, NRCS, and municipal authorities.

The Dhangadhi HAP similarly links heat alerts to predefined actions coordinated through a municipal Heat Task Force (Khan et al., 2025b). Priority measures include adjusting school and work schedules, preparing hospitals for increased demand, installing water access points, activating cooling centres, distributing heat-relief supplies, conducting outreach in high-risk neighbourhoods and strengthening protections for outdoor workers. These plans therefore represent an important shift from ad-hoc response towards more anticipatory, locally organized heat preparedness, although their implementation and institutionalization remain uneven across Nepal.

Other partner-supported initiatives include awareness campaigns, drinking-water provision and heat-safety messaging through local FM radio (People in Need, 2025). Nevertheless, the literature highlights important limits to household and individual coping capacity. Outdoor workers report that personal protective measures are often insufficient when work must continue during extreme heat (Sharma et al., 2025), while schools face constraints including inadequate roofing and limited drinking-water access, contributing to absenteeism and other impacts during periods of high heat (Prosper Global Nepal, 2025). More broadly, studies emphasize the need for stronger local implementation, and sustained financing and coordination, alongside longer-term measures such as heat-resilient infrastructure and urban greening (Bhandari et al., 2025; Khan et al., 2025a, 2025b; Sharma et al., 2022).



Figure 4 Nepal Red Cross Society volunteers raising awareness of the dangers of extreme heat and how to stay safe during heatwaves, June 2025. Photo by the Nepal Red Cross Society:
<https://www.flickr.com/photos/climatecentre/54913966493/in/album-72177720330242294>

Heat-specific early actions

Interviews identified several recurring heat-specific preparedness and response measures. In the health sector, these include health camps and desks, provision of drinking water and Oral Rehydration Solution, free medicines and check-ups, and additional facility capacity during periods of high demand. Rapid Response Teams operating from central to local levels can also be mobilized for heat-related incidents. However, interviewees stressed that many such activities remain

concentrated in a limited number of urban areas and are frequently supported by organizations such as NRCS, People in Need, Practical Action, and Prosper Global rather than implemented systematically nationwide.

Local government decisions around schools and working hours are among the most established protective measures. Local governments have authority over school operations, and school closures are frequently used during severe heat. In the Terai, shifting classes to the morning is also used to reduce children's exposure during the hottest part of the day. Interviewees additionally described emerging efforts to adjust working hours for highly exposed workers, including brick-kiln workers, by reducing activity during peak heat hours. These measures are particularly important because studies show that exposure cannot always be avoided through individual behaviour alone, especially where schooling or livelihoods require continued activity during hot conditions (Prosper Global Nepal, 2025; Sharma et al., 2025).

At the community level, people use a range of coping practices, including increasing fluid intake, using umbrellas, cloth, or vegetation for shade, and storing drinking water in traditional clay pots. Interviewees repeatedly emphasized, however, that the ability to protect against heat is strongly constrained by affordability and access to cooling. This reinforces the importance of preparedness measures that go beyond individual behavioural advice.

From response to anticipatory action

Overall, interviewees characterized Nepal's heat preparedness system as still predominantly response-oriented, with school closures often among the first visible measures and other actions varying considerably between municipalities and depending on partner support. However, there are signs of a shift towards anticipatory action. Interviewees described how some HAPs have been revised to place greater emphasis on measures that can be implemented before peak impacts, while the NRCS simplified Early Action Protocol, established in 2025, provides a more formal mechanism linking forecast triggers to predefined early actions (IFRC, 2025). At the national level, NRCS, together with Red Cross Red Crescent Network partners, is also supporting the Government of Nepal in developing a National Roadmap for the Institutionalization of Forecast-based Anticipatory Action for Extreme Heat and Heatwaves into Disaster Management. The draft roadmap has been finalised and is awaiting official launch by NDRRMA.



Figure 5 Provincial Disaster Dialogue Program on Heatwaves in Madhesh Province, May 2025. Source: <https://www.dpnet.org.np/news/detail/heatwave-special-provincial-disaster-dialogue-program-madhesh-province>

Capacity building is also increasingly focused on translating heat forecasts into action. Interviewees described training for local authorities, humanitarian organizations, and journalists on interpreting forecasts and communicating appropriate actions. Start Network provides training and refresher sessions for partners using forecasts for anticipatory action, while DHM's collaboration with BBC Media Action aims to improve the translation of technical forecasts into understandable public information.

Provincial dialogue is also being used to strengthen coordination around early action. In May 2025, a Provincial Disaster Dialogue Programme on Heatwaves in Madhesh Province brought together government, humanitarian, resilience and media actors to discuss heatwave preparedness and response (Figure 5). Rather than treating this solely as general awareness raising, its relevance to preparedness lies in building a shared understanding of roles, preparedness measures, and actions that can be taken before and during extreme heat.



Multi-hazard approach

Nepal's early warning capacity is more established for rapid-onset hazards such as floods, landslides, and Glacial Lake Outburst Floods than for extreme heat. The literature identifies persistent challenges in implementing all components of end-to-end EWS consistently, including ambiguities in institutional roles and communication responsibilities across hazards and levels of government (Kafle, 2017; Bhandari, 2025). Although the National DRR Strategic Plan of Action 2018-2030 recognizes heatwaves within Nepal's multi-hazard risk landscape, their integration into established early warning and disaster risk management structures remains relatively recent (Government of Nepal, 2018b; Bhandari et al., 2025).

Interviews nevertheless indicate increasing integration of heat into multi-hazard and cross-sectoral approaches. Interviewees highlighted interactions with agriculture, water, ecosystems, transport, and energy, as well as compound risks associated with drought and prolonged hot periods, although these linkages are not yet systematically incorporated into planning. Emerging integration includes collaboration between DHM and health sector actors to strengthen impact information and the incorporation of heat- and cold-wave anticipation tools into DHM systems. Interviewees also described efforts to connect heat warning and preparedness activities to existing local DRM structures. However, formal integration remains constrained by incomplete SOPs, unclear responsibilities, and the relatively recent recognition of heat as an operational hazard.

Gender and social inequalities addressed inclusively

Heat vulnerability in Nepal is differentiated by gender, age, occupation, socioeconomic circumstances, and access to cooling and essential services. Research highlights gendered exposure associated with indoor heat and domestic activities such as cooking, while studies in Dhangadhi document women's experiences of extreme heat and constraints on their ability to adapt (Ghimire et al., 2025; Subedi et al., 2025). Outdoor workers face particularly high occupational exposure and limited possibilities to avoid heat during working hours, while inadequate school infrastructure and access to drinking water can increase exposure among children (Prosper Global Nepal, 2025; Sharma et al., 2025). Research among pregnant women also identifies heat-related impacts and differences in perceived risk and adaptive capacity, with some evidence of greater perceived vulnerability in urban settings (Rhomborg et al., 2024; KC et al., 2024).

Interviewees similarly identified older people, children, pregnant women, people with chronic illnesses, and outdoor workers as groups requiring particular consideration in heat preparedness and warning. However, vulnerability is rarely quantified systematically, reflecting limited hotspot and impact data. Warning accessibility is also shaped by language, literacy, and digital access, while households with fewer financial resources have fewer options for cooling or reducing exposure.

These findings point to a broader Gender Equality and Social Inclusion (GESI) challenge: identifying vulnerable groups does not necessarily ensure their participation in the design and evaluation of HEWs. More inclusive approaches would require representation of different social groups in the development of messages, communication channels, and preparedness measures, alongside accessible feedback mechanisms through which communities can indicate whether warnings are received, understood, and actionable (Khan et al., 2025a; Sen et al., 2022).

Local community involvement

Community participation is increasingly recognized in Nepal as important for locally relevant heat warning and preparedness. Research in Dhangadhi emphasizes the importance of local-language communication, tailoring warning channels to different population groups, and involving communities in the design of heat warning and preparedness communication (Khan et al., 2025a). Guidance for South Asian cities similarly emphasizes community-informed communication strategies that reflect locally trusted channels and different information needs (Sen et al., 2022). Municipal HAPs and NRCS anticipatory-action initiatives provide examples of attempts to embed heat preparedness and early action within local structures (IFRC, 2025; Khan et al., 2025b).

Interviews indicate that community involvement is active but uneven and is frequently facilitated by municipalities, humanitarian organizations, and NGOs rather than embedded systematically within national programmes. Examples include Community Disaster Management Committees, youth groups, door-to-door campaigns, street drama, and locally produced materials in different languages. Local FM radio was repeatedly highlighted as a valuable intermediary because it can translate technical information into local languages and dialects, while interviewees also stressed the value of incorporating existing and indigenous community practices into heat warning and preparedness communication and dissemination pathways, including through locally embedded systems in the Terai.

At the same time, trusted community networks remain underused. Interviewees particularly highlighted female community health volunteers as established and credible local intermediaries who could play a greater role in heat preparedness and warning dissemination. More diverse community participation, including representation of groups facing different forms of heat vulnerability, could also strengthen the design and evaluation of warning messages and platforms. Capacity building provides another enabling mechanism: interviewees described training and refresher sessions for humanitarian and local actors to interpret heat forecasts and translate them into early action, including activities undertaken with DHM and NDRRMA.

Effective governance and institutions

Heat governance operates within Nepal's broader DRM architecture established under the Disaster Risk Reduction and Management Act, with NDRRMA providing national coordination and DHM responsible for meteorological monitoring, forecasting, and official warning information (Government of Nepal, 2018a; Bhetuwal et al., 2016). However, the literature identifies continuing ambiguities in DRM responsibilities across levels of government and challenges in translating institutional mandates into effective operational coordination (Bhandari et al., 2020; Bhandari, 2025). Compared with established hazards such as floods, heat warning and preparedness arrangements remain comparatively recent and less institutionalized (Bhandari et al., 2025).

‘Some organizations are working on the ground... but that is not an integrated system. There are not clearly defined roles and responsibilities and there is no clear coordination.’

Non-governmental and humanitarian actors have played a particularly important enabling role in the development of Nepal's heat early warning capabilities. Interviewees described NGOs, the Red Cross, and humanitarian organizations as supporting threshold development, HAPs, anticipatory-action protocols, monitoring and forecasting tools, community engagement, training, and advocacy. Some of these initiatives are beginning to be incorporated into government systems, including the integration of heat- and cold-wave anticipation tools into DHM's operational structures. This shows



an important pathway through which externally supported pilots can contribute to institutional development.

At the same time, interviews flagged coordination gaps. Projects sometimes engage directly with local governments without consistent integration at the federal level, while roles and responsibilities for heat remain less clearly defined than for more established hazards such as floods. Incomplete SOPs and fragmented implementation further constrain coordination across levels of government. While NGOs and humanitarian organizations continue to play an important role in supporting heat-related initiatives, the extent to which these activities can be sustained and scaled beyond individual projects remains an important consideration.

Key recommendations

- **Strengthen heat-health surveillance and impact attribution:** Limited health and other impact data remain a major barrier to impact-based warning and evaluation. The emerging collaboration between DHM and health authorities provides an opportunity to define a minimum heat-health dataset for the hot season, initially focusing on selected high-risk locations and health facilities. Linking meteorological and health data would support evaluation and refinement of warning thresholds, identification of vulnerable populations, and more targeted health preparedness.
- **Build on local temperature thresholds towards heat-stress and impact-based warning:** DHM's use of location-specific percentile temperature thresholds is an important strength, reflecting Nepal's substantial climatic diversity. However, current temperature thresholds focus primarily on daytime maximum temperature and do not account for humidity, nighttime heat, or observed impacts. These factors may be particularly relevant for some regions and population groups. Opportunities include testing whether humidity-based heat indicators, such as the HI, and minimum/nighttime temperature add predictive value to existing thresholds, building on work in Nepalgunj and the NRCS sEAP. In the longer term, stronger health and impact data could support locally calibrated impact thresholds. Expansion should be guided by data availability and demonstrated forecast skill rather than adding complexity where observations or models cannot reliably support it.
- **Scale and institutionalize HAPs and anticipatory action:** Municipal HAPs and the NRCS sEAP provide important foundations for translating heat warnings into predefined actions, but implementation remains concentrated in select cities and often relies on humanitarian and NGO support. Lessons from existing initiatives, including Nepalgunj and Dhangadhi, could inform the development and scaling of locally appropriate HAPs across other municipalities. Plans should clearly link warning levels and lead times to responsibilities and early actions across health, education, labour, and other relevant sectors, supported by SOPs and regular review.
- **Strengthen last-mile communication and inclusive feedback:** DHM information is disseminated through websites, email and social media, and amplified by NDRRMA, municipalities, media and humanitarian organizations, but language, literacy, digital access, and technical terminology continue to affect reach and understanding. Last-mile communication could be strengthened through greater use of local FM radio, municipal and community networks, and trusted intermediaries such as female community health volunteers, alongside ongoing efforts to simplify forecast terminology. Communication should also move beyond one-way dissemination by establishing accessible and GESI-responsive feedback mechanisms to assess whether warnings are received, understood, trusted, and actionable. Locally established coping practices and communication channels can further inform messages and recommended actions.
- **Build on growing government engagement to strengthen the governance and resourcing of HEWSs:** Extreme heat is an emerging risk in Nepal and has received increasing government attention in recent years, but its integration into established DRM structures remains at an early stage. Building a stronger evidence base on current and future heat impacts can support this momentum and inform greater investment in HEWs. This should be accompanied by clearer operational mandates and stronger coordination across government levels and sectors, building on emerging national and municipal efforts and partner-supported initiatives. Sustained resourcing is needed to move from individual initiatives towards an integrated HEWs that links risk knowledge, monitoring, communication, and preparedness to effective early action.



References

- Bhandari, D. (2025) 'Challenges and opportunities in Nepal's early warning communication', *International Journal of Disaster Risk Reduction*, vol. 119, 105318, accessed 1 February 2026, <<https://doi.org/10.1016/j.ijdr.2025.105318>>
- Bhandari, D., Maharjan, P., Bhuju, K. and Renfrew, A. (2025) *Extreme heat in Nepal: Risks and response*, Prosper Global Nepal, accessed 1 February 2026, <<https://www.prosperglobal.org/research-resources/extreme-heat-nepal>>
- Bhandari, D., Neupane, S., Hayes, P., Regmi, B. and Marker, P. (2020) *Disaster risk reduction and management in Nepal: Delineation of roles and responsibilities*, Oxford Policy Management, accessed 1 February 2026, <<https://www.opml.co.uk/files/Publications/a1594-strengthening-the-disaster-risk-response-in-nepal/delineation-of-responsibility-for-disaster-management-full-report-english.pdf>>
- Bhetuwal, C., Karki, R. and Koirala, S. (2016) 'Challenges and plans for phasing out mercury based meteorological instruments from Nepal', paper presented at the Technical Conference on Meteorological and Environmental Instruments and Methods of Observation, Madrid, Spain, 27-30 September 2016, <https://www.researchgate.net/publication/309490633_Challenges_and_plans_for_phasing_out_mercury_based_meteorological_instruments_from_Nepal>
- Budhathoki, N.K., Paton, D., Lassa, J.A. and Zander, K.K. (2020) 'Assessing farmers' preparedness to cope with the impacts of multiple climate change-related hazards in the Terai lowlands of Nepal', *International Journal of Disaster Risk Reduction*, vol. 49, 101656, accessed 1 February 2026, <<https://doi.org/10.1016/j.ijdr.2020.101656>>
- Department of Hydrology and Meteorology (DHM) (2023) *Hot days & heat wave*. Government of Nepal, Department of Hydrology and Meteorology, accessed 1 February 2026, <https://www.dhm.gov.np/uploads/dhm/climateService/Heat_wave_bulletin_year_2023_issue2_09_June20231.pdf>
- Department of Hydrology and Meteorology (DHM) (n.d.a) *Heat and cold wave monitoring*, Government of Nepal, accessed 1 February 2026, <<https://dhm.gov.np/climate-services/heat-and-cold-wave-monitoring>>
- Department of Hydrology and Meteorology (DHM) (n.d.b) *Heat Wave Cold Wave*, Government of Nepal, accessed 1 February 2026, <<https://hwcw.naxa.com.np/>>
- Department of Hydrology and Meteorology (DHM) (n.d.c) *Meteorological forecast - temperature*, Government of Nepal, accessed 5 February 2026, <<https://dhm.gov.np/mfd/#/nwp>>
- Dhungana, G., Stoddard, H. and Bollettino, V. (2023) *Towards resilient communities: Scoping study report - Nepal*, Harvard Humanitarian Initiative, accessed 1 February 2026, <<https://hhi.harvard.edu/publications/towards-resilient-communities-scoping-study-report-nepal>>
- Ghimire, A., Manandhar, M.D., Karki, S. and Bajracharya, K. (2025) 'Negotiating household heat: Thermal labor, energy justice, and women's health in Nepal's Madhesh Province', *Frontiers in Public Health*, vol. 13, 1657267, accessed 1 February 2026, <<https://doi.org/10.3389/fpubh.2025.1657267>>
- Global Heat Health Information Network (GHHIN), United Nations Office for Disaster Risk Reduction (UNDRR) and World Meteorological Organization (WMO) (2025) *Extreme Heat Risk Governance Framework and Toolkit*, accessed 1 February 2026,

<<https://www.undrr.org/publication/documents-and-publications/extreme-heat-risk-governance-framework-and-toolkit>>

Government of Nepal (2018a) *Disaster Risk Reduction and Management Act 2074 (2017)*, Government of Nepal, accessed 5 February 2026, <<https://leap.unep.org/en/countries/np/national-legislation/disaster-risk-reduction-and-management-act-2074-2017>>

Government of Nepal (2018b) *Nepal disaster risk reduction national strategic plan of action 2018-2030*, Government of Nepal, accessed 5 February 2026, <<https://www.preventionweb.net/publication/nepal-disaster-risk-reduction-national-strategic-plan-action-2018-2030>>

Government of Nepal (2019) *National Adaptation Plan: Climate change scenarios for Nepal*, Government of Nepal, accessed 5 February 2026, <<https://www.dpnet.org.np/public/resource-detail/814>>

Howson, K. (2026) Impact assessment of Start Network's smaller grants, *Start Network*, accessed 5 February 2026, <<https://startnetwork.org/whats-new/resources/impact-assessment-start-networks-smaller-grants>>

International Federation of Red Cross and Red Crescent Societies (IFRC) (2025) *Nepal - Heatwave simplified Early Action Protocol (sEAP) (MDRNP020)*, International Federation of Red Cross and Red Crescent Societies, accessed 5 February 2026, <<https://reliefweb.int/report/nepal/nepal-urban-heatwave-simplified-early-action-protocol-seap-no-seap2025np02-operation-no-mdrnp020-december-2025>>

Kafle, S.K. (2017) 'Disaster early warning systems in Nepal: Institutional and operational frameworks', *Journal of Geography & Natural Disasters*, vol. 17, no. 2, accessed 5 February 2026, <<https://www.longdom.org/open-access/disaster-early-warning-systems-in-nepal-institutional-and-operational-frameworks-36366.html>>

Kandel, S. and Shyangtan, S. (2023) 'Why focus on "heat"? A silent disaster unfolding in Nepal', *International Journal of Urban and Regional Research*, accessed 5 February 2026, <<https://www.ijurr.org/spotlight-on/extreme-heat/why-focus-on-heat-a-silent-disaster-unfolding-in-nepal/>>

KC, A., Maharjan, S., Basnet, O., Malla, H., Gurung, R., Pokharel, S.M., Ghimire, G.K., Vaezghasemi, M. and Schröders, J. (2024) 'Development, validation and reliability of scales and items for heat wave risk assessment of pregnant women', *International Journal of Biometeorology*, vol. 68, no. 11, pp. 2205-2214, accessed 5 February 2026, <<https://doi.org/10.1007/s00484-024-02738-x>>

Khan, R., Subedi, A. and Grünholz, M. (2025a) *"Missed warnings, missed opportunities": Optimising heat alert communication for community resilience in Dhangadhi city, Nepal*, accessed 5 February 2026, <https://nrccs.org/wp-content/uploads/2025/05/4.2Web-version_Fact-sheet-1_Heat-Alert-Communication-Factsheet_V4.pdf>

Khan, R., Subedi, A., Grünholz, M., Mistry, M. (2025b) *Dhangadhi Heat Action Plan 2025*, Red Cross Red Crescent Climate Centre, accessed 5 February 2026, <<https://www.climatecentre.org/wp-content/uploads/Dhangadhi-Heat-Action-Plan-2025.pdf>>



- Prosper Global Nepal (2025) *Heatwave impact and coping strategies in public schools of Madhesh Province: A perception study*, Prosper Global Nepal, accessed 5 February 2026, <<https://www.prosperglobal.org/sites/default/files/2025-10/heat-study-summary-english.pdf>>
- National Disaster Risk Reduction and Management Authority (NDRRMA) (n.d.) National Disaster Risk Reduction and Management Authority website, Government of Nepal, accessed 5 February 2026, <<https://ndrrma.gov.np/en/introduction>>
- Nepal Red Cross Society (NRCS) (2024). *Leading change through heat action: Initiative to prepare for, respond to and reduce heat risks*, Global Disaster Preparedness Center, accessed 5 February 2026, <<https://preparecenter.org/wp-content/uploads/2025/05/Nepal-Heat-Action-Leaflet-Aug24.pdf>>
- People in Need (2025) 'From forecast to early action: How the RAIN programme acted on rising heat', *People in Need*, 30 June 2025, accessed 1 February 2026, <<https://nepal.peopleinneed.net/en/from-forecast-to-early-action-how-the-rain-programme-acted-on-rising-heat-13033gp>>
- Rhomberg, A., Schröders, J., Vaezghasemi, M. and KC, A. (2024) 'Predictors of heatwave risk perception and care adaptation among Nepalese pregnant women: Baseline assessment of a longitudinal concurrent cohort', *Research Square*, 17 December, accessed 5 February 2026, <<https://doi.org/10.21203/rs.3.rs-5446570/v1>>
- Sen S., Cartagena, O., Khan, R., Powell, R. (2022) *Heat Communication Guide for the cities in South Asia*, Red Cross Red Crescent Climate Centre, accessed 5 February 2026, <<https://cdkn.org/sites/default/files/2022-04/RCCC%20Guidance%20Note-Heat%20Comm%20Plan.pdf>>
- Sharma, A., Andhikaputra, G. and Wang, Y.-C. (2022) 'Heatwaves in South Asia: Characterization, consequences on human health, and adaptation strategies', *Atmosphere*, vol. 13, no. 5, 734, accessed 5 February 2026, <<https://doi.org/10.3390/atmos13050734>>
- Sharma, S., Marasini, S., Joshi, A., Dangaura, N.R., Timsina, L.R., Guragain, D. and Karmacharya, B.M. (2025) 'Exploring outdoor workers' knowledge, attitudes, practices, and perceived risks of heatwaves in Nepal', *PLOS ONE*, vol. 20, no. 8, e0329557, accessed 5 February 2026, <<https://doi.org/10.1371/journal.pone.0329557>>
- Shrestha, S.L. (2018) 'Negative binomial model in linking water-borne and vector-borne disease hospitalizations with climate sensitive variables in Nepal', *Nepalese Journal of Statistics*, vol. 2, pp. 11-26, accessed 5 February 2026, <<https://doi.org/10.3126/njs.v2i0.21152>>
- Subedi, A., Khan, R., Grünholz, M. (2025) *"Under the Scorching Sun": Women's Experiences of Extreme Heat in Dhangadhi, Nepal*, Red Cross Red Crescent Climate Centre, accessed 5 February 2026, <<https://ifrc.soutron.net/public/catalogue/en-GB/DownloadImageFile.ashx?objectId=30168&ownerType=0&ownerId=31355>>
- Subedi, A., Khan, R., Singh, R., (2023) Nepalgunj Heat Action Plan 2023, *Red Cross Red Crescent Climate Centre*, accessed 5 February 2026, <<https://preparecenter.org/wp-content/uploads/2023/07/Nepalgunj-Heat-Action-Plan-2023.pdf>>
- Subedi, A., Khan, R., Hassan, A. and Hogesteeger, S. (2022) Identification of heat threshold and heat hotspots in Nepalgunj, Nepal, *Red Cross Red Crescent Climate Centre*, accessed 5 February 2026, <<https://cdkn.org/sites/default/files/2022-04/RCCC%20Heat%20Threshold%20Report-Nepalgunj%2C%20Nepal.pdf>>

World Bank (2025) Handbook on urban management in the Global South, *World Bank*, accessed 5 February 2026, <<https://openknowledge.worldbank.org/entities/publication/92e9d108-0c0a-4369-b22a-fba4ba850d1c>>



Authors

The main authors are Ramiz Khan (Red Cross Red Crescent Climate Centre), Carolina Pereira Marghidan (Red Cross Red Crescent Climate Centre) and Chiara Proietti (Red Cross Red Crescent Climate Centre).

Acknowledgements

We thank the interviewees from the Department of Hydrology and Meteorology of Nepal (DHM), Ministry of Health Nepal, Start Network Nepal, Practical Action Nepal, and Prosper Global, and Debbie Hillier (Prosper Global), Chris Anderson (Practical Action), and Alana Livesey (Plan International) for their valuable feedback.

We also acknowledge Mirianna Budimir (Practical Action) and Francisco Ianni (IFRC) for their conceptual guidance and oversight, and Rachel Norton (ISET International) for copyediting support.

This case study complements our global report: Understanding the Global Landscape of Heat Early Warning Systems. You can view the full report [here](#).

This report is published by the Zurich Climate Resilience Alliance, but the content is the sole responsibility of the named authors and organizations. Members of the Zurich Climate Resilience Alliance are funded by the Z Zurich Foundation, with the exception of Zurich Insurance Group. However, the views expressed in this publication do not necessarily reflect the official position of either the Foundation or the company.

Front cover image: Nepal Red Cross Society volunteers raising awareness of the dangers of extreme heat and how to stay safe during heatwaves, June 2025. Photo by the Nepal Red Cross Society: <https://www.flickr.com/photos/climatecentre/54913966558/in/album-72177720330242294>

About the Zurich Climate Resilience Alliance

The Zurich Climate Resilience Alliance is a collaboration between humanitarian, NGO, research and private sector partners, working to build resilience to climate hazards in rural and urban contexts.

Formerly the Zurich Flood Resilience Alliance, we have over a decade of experience in generating evidence of communities' current levels of climate resilience and identifying appropriate solutions.

Through long-term community programmes, new research and stakeholder influencing, we strive to deliver systemic change at scale and realize our vision of a world in which communities are more resilient to climate hazards, and able to thrive.

The Alliance is powered by the Z Zurich Foundation. Find out more: www.ZCRAlliance.org You can find out more about the Alliance's work in Nepal here: <https://zcralliance.org/where-we-work/our-impact/nepal/>

In partnership with:



Powered by:  **ZURICH** Foundation

© Zurich Climate Resilience Alliance



Visit ZCRAlliance.org Follow [@ZCRAlliance](https://twitter.com/ZCRAlliance)