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Risk communication in Nepal: a scoping review of trends, gaps and future directions

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Nepal is among the most disaster-prone countries in the world, yet risk communication remains fragmented and largely non-proactive. To explore how risk communication developed over time and across various hazards, we conducted a scoping review of academic literature. The analysis covers the past 4 decades and includes floods, glacial lake outburst floods, earthquakes, climate change effects, landslides, COVID-19 and multi-hazard. We used structured analytical framework based on the "5 Ws and H" (*who, what, when, where, why, how*), to identify key trends, gaps and future directions through the analysis of 38 peer-reviewed publications carefully selected from the academic literature indexed in Web of Science and Google Scholar. Findings show that both *two-way* and *one-way* communication models are used primarily to disseminate information and raise awareness among citizens, government agencies, and students. Previous disaster events often serve as reference points. Standard methods, such as face-to-face interactions, leaflets and printed materials remain predominant, with television and radio as the main sources of risk-related information. In contrast, social media plays a relatively minor role. Risk communication efforts mainly focus on informing rather than promoting proactive behaviors during preparedness phases. Simulation exercises and action-oriented guidance are rarely used and the most vulnerable groups, such as women, children and persons with disabilities, are underrepresented. Although mobile phone and internet access is widespread, digital tools remain underutilized. Notably, none of the reviewed publications applied or tested established risk communication theories, revealing a general lack of academic research in this field in Nepal. Overall, the current scoping review offers a novel synthesis of a highly fragmented evidence base and provides a theoretical contribution by demonstrating that existing studies do not explicitly apply established risk-communication frameworks. It also shows how the 5Ws + H approach can be adapted to a multi-hazard, low-income context, thereby offering a structured lens for future research. Our findings support policy recommendations to institutionalize government-led communication, promote drills-based learning and develop tailored tools for diverse audiences in disaster-prone areas.

KEYWORDS

awareness, Nepal, preparedness, risk communication, risk education, risk perception, scoping review

1 Introduction

Nepal, a geographically diverse country in the Himalayas, is highly prone to natural hazards due to its topography, tectonic activity and climatic conditions (Poudel et al., 2015). The country experiences recurrent earthquakes, floods, landslides, glacial lake outburst floods (GLOFs), droughts and epidemics (MoHA, 2024). Major events such as the 2015 Mw 7.8 Gorkha Earthquake, annual monsoon-induced floods and landslides, and the COVID-19 pandemic exemplify the challenges faced by Nepal's Disaster Risk Reduction and Management (DRRM) system (MoHA, 2008; MoHA, 2015; Muñoz-Torrero Manchado et al., 2021; Muñoz-Torrero Manchado et al., 2022).

Hazard distribution varies across the country's ecological zones: the Higher Himalayas are prone to rockfalls and avalanches, the Middle Mountains to landslides and heavy rainfall, valleys to flooding, and the Terai to annual flash floods and inundations (Upreti, 1999; Dahal and Hasegawa, 2020). This complex topography also constraints infrastructure development, transportation and the efficiency of risk communication networks (Chhetri et al., 2024; Bhandari, 2025).

To address these multiple and recurring hazards, Nepal has aligned its policies with major international DRRM frameworks, including the 1994 Yokohama Strategy, the Hyogo Framework for Action 2005–2015 and the Sendai Framework 2015–2030, which together underpin its national DRRM policies (IDNDR, 1994; UNISDR, 2005; 2015). Policy reforms have often followed major disasters, such as the 2017 DRRM Act (Vij et al., 2020), which strengthened hazard awareness, promoted resilient housing and improved multi-stakeholder coordination in preparedness and response.

At the community level, awareness programs led by national Non-Governmental Organizations (NGOs) and International Non-Governmental Organizations (INGOs), especially after the 1934 Great Bihar-Nepal earthquake and 1988 Udaipur earthquake, have contributed to improving risk understanding (Tuladhar, 2012; Vij et al., 2020). Meanwhile, technological improvements, including more accurate weather forecasting and dissemination of warnings via television, radio, SMS and web platforms - such as the *Flood Forecast Bulletin* (Department of Hydrology and Meteorology, 2022) - have enhanced early warning capacity.

Despite these advancements, risk communication in Nepal remains challenged by issues of accessibility, actionability and inclusiveness, which mirror broader gaps in disaster risk governance. Although internet coverage in Nepal has expanded significantly, access is not yet universal or evenly distributed across geographic and socio-economic groups. By late 2024, approximately 98% of Nepal's population had access to mobile phones and broadband internet services in principle (NTA, 2024); however, connectivity quality, affordability and reliability remain limited in many rural and mountainous areas. For hydrometeorological hazards, residents in flood- and landslide-prone zones receive free SMS alerts from the Department of Hydrology and Meteorology (DHM) when rainfall thresholds are exceeded (Adhikari et al., 2023; Bhandari, 2025). However, these alerts rarely include actionable guidance, limiting their effectiveness for communities and local authorities (Smith et al., 2017; Brown et al., 2019; Thapa and Adhikari, 2019; Shrestha et al., 2021; Bhandari and Dixit, 2022;

Bhandari et al., 2025). Moreover, alerts often fail to reach vulnerable groups, including women, people with disabilities and marginalized communities, who remain underrepresented in preparedness, decision-making and program design (Bradshaw, 2013; Yadav, 2019; Thapa and Pathranarakul, 2019; Muehlenhoff et al., 2020; Gautam and Sharma, 2019; Brown et al., 2019; Shrestha et al., 2021; Bhandari et al., 2025).

Although recent institutional initiatives, such as the National Disaster Report of Nepal (MoHA, 2024) and the draft risk communication strategy under development by National Disaster Risk Reduction and Management Authority (NDRRMA) (2019), have begun to address the importance of information and communication in disaster management, academic research on the topic remains limited and fragmented. Understanding how risk communication is conceptualized and practiced within Nepal's diverse hazard landscape is therefore essential for improving all the above components of preparedness and resilience.

Risk communication is a key component of DRRM. Although risk communication does not have a single goal (Bostrom et al., 2018), it plays a critical role across all DRRM phases - preparedness, response, recovery and mitigation and essential for effectively reducing risks and managing disasters (Flanagan et al., 2011; NOAA Social Science Committee, 2016). Presently, there is no comprehensive synthesis of how risk communication has been interpreted or practiced across Nepal's diverse hazard landscape over time. This limited research makes it difficult to identify common patterns, methodological gaps and opportunities for developing effective and inclusive communication strategies. Collectively, these limitations make it difficult to strengthen Nepal's overall approach to risk communication and highlight the need for a more coordinated understanding of how it is currently framed and practiced. To address this gap, it is important to examine the factors that shape effective risk communication in disaster-prone countries such as Nepal. These factors include how people understand risk, their past disaster experiences, patterns of vulnerability, levels of preparedness, and access to disaster-related information and technologies (Cavelty and Haggmann, 2009; Roth and Brönnimann, 2013; Roth et al., 2014).

This paper contributes to addressing this gap by undertaking a scoping review of academic literature on risk communication in Nepal, identifying key trends and practices across major hazards, establishing a baseline for comparative studies and providing evidence-based recommendations to support the development of more inclusive, proactive and coherent communication strategies.

2 Materials and methods

This study adopts a scoping review approach to map risk communication practices in Nepal. The approach follows the general principles of Arksey and O'Malley (2005), Kitchenham et al. (2011), Paré et al. (2015) and Munn et al. (2018) and adapts the analytical framework developed by Musacchio et al. (2023) for seismic risk communication in Europe. The same logic is applied here in a multi-risk, low-income-country context, with adjustments to account for the broader range of hazards, the smaller body of literature and the socio-institutional specificities of Nepal.

The review addresses the following guiding questions: *How have risk communication practices been conceptualized and implemented in Nepal across different hazards and time periods? What are the main trends and gaps?*

A structured literature search was conducted between November and December 2024 using the *Web of Science* and *Google Scholar* databases. Because the academic literature on risk communication in Nepal is limited, no temporal restrictions were applied and references were traced back to the 1980s.

The search combined targeted keywords through Boolean operators (AND/OR) to capture the diversity of terminology used in disaster and hazard communication research.

In *Web of Science*, the following search terms were used: *risk communication, risk communication strategy, disaster communication, hazard communication, crisis communication, disaster education, risk education, risk preparedness, disaster risk perception, hazard risk perception and risk understanding*, each paired with the geographic constraint “Nepal”.

In *Google Scholar*, the “all in title” option was applied to refine the search, using the keywords *risk communication, risk education, disaster risk perception and risk awareness*, linked by the Boolean operator “OR”. *Google Scholar* was used as a supplementary search tool - also in 2025, to complement the primary database - *Web of Science* searches. Its inclusion was particularly important because research on disaster risk and communication in Nepal is dispersed across multiple disciplines and is often published in journals not indexed in major databases. Using *Google Scholar* therefore increased the likelihood of capturing relevant studies that might otherwise have been overlooked, ensuring that the review reflects the full scope of published scholarly evidence.

To further enhance completeness and minimize selection bias, cross-referencing and citation chaining (snowball sampling) were applied. Reference lists of included studies were screened to identify additional relevant publications (backward citation searching), while forward citation tracking was conducted to capture more recent studies citing the included articles. These strategies complemented the database and *Google Scholar* searches, contributing to a robust and comprehensive evidence base for the scoping review.

Only English-language, peer-reviewed, full-text publications were included in the study. The initial search yielded 73 records, which were screened through a three-phase selection process:

1. Title review—Duplicates and non-English publications were excluded.
2. Abstract review—Grey literature (e.g., conference papers, theses, reports and web articles) and studies unrelated to Nepalese case studies were removed.
3. Full-text review—Only publications directly addressing risk communication strategies or practices in Nepal were retained, following predefined inclusion criteria applied at all stages (title, abstract and full text).

The final dataset comprised 38 peer-reviewed publications that explicitly discuss risk communication within the Nepalese context. The selected papers in this study were primarily published in risk or disaster journals (26), with a smaller portion in geoscience journals (10), books (1) and in specialized communication journals (1). A summary of the selection process is presented in [Table 1](#).

Following a coding scheme adapted from [Musacchio et al. \(2023\)](#), each publication was systematically categorized according to predefined analytical dimensions summarized in [Table 2](#). The 5Ws + H framework (*who, what, when, where, why and how*) was adopted as the main organizing principle and subsequently simplified and adapted to the Nepalese context. All extracted information was compiled into spreadsheets and analyzed using descriptive statistics (frequency counts, percentages and temporal trends). In addition, qualitative notes were examined to identify recurring themes, innovative practices and critical gaps.

3 Results

The results are presented in two main parts: (i) an overview of publication trends, thematic focus and authorship characteristics and (ii) an analysis of the key features of risk communication practices based on the adapted 5Ws + H framework.

[Table 3](#) offers a summary of the dataset, outlining the hazard types addressed, the corresponding study locations, and the associated funding agencies.

3.1 Descriptive overview

The findings of our study reveal that a significant increase in publications on risk communication emerged particularly after 2015, coinciding with the Gorkha Earthquake ([Figure 1](#)). The earliest publication included in our review dates back to 1986 and focuses on risk perception among Sherpa communities, who regarded hazards as acts of God ([Bjonness, 1986](#)). A similar perspective was reported by [Bhandari et al. \(2021a\)](#) after the 2015 Gorkha Earthquake, as the hazard-prone areas of the Pokhara Valley showed limited disaster preparedness due to limited risk understanding and awareness.

In terms of authorship, approximately 30% of the analyzed contributions were authored by women, while 70% were authored by men, highlighting the need for greater gender inclusion in this research domain. Not all reviewed studies examined risk communication practices in Nepal comprehensively. Rather, many focused on a single aspect, primarily risk perception and understanding ([Thompson et al., 2020](#)), reflecting a shift over time from response and recovery towards preparedness and mitigation.

The selected articles also provide valuable insights into perception, understanding and capacity-building efforts among Indigenous communities, women, students and farmers in the context of climate change impacts ([Bjonness, 1986](#); [Dahal and Hagelman, 2011](#); [Tuladhar et al., 2014](#); [Shrestha et al., 2018](#); [2022](#); [Chmutina and Rose, 2018](#); [Sherpa et al., 2019](#); [Banerjee et al., 2019](#); [Maharjan and Maharjan, 2020](#); [Budhathoki et al., 2020a](#); [Bhandari et al., 2021a](#); [Rai et al., 2022](#); [Yildiz et al., 2023](#); [Darjee et al., 2023](#); [Khadka et al., 2024](#); [Sakamoto et al., 2024](#); [Maharjan et al., 2025](#)).

Only about one-third of the papers (32%) evaluated the effectiveness or performance of risk communication initiatives. Notably, apart from [Bhandari et al. \(2025\)](#), most studies did not explicitly refer to or test theoretical frameworks of risk communication. An exception is [Shrestha et al. \(2021\)](#) who discussed models, such as the Actionable Risk Communication

TABLE 1 Publications shortlisted at each phase of selection.

Electronic database	Selected publications	Total Selected publications	Phase 1 Shortlisted publications	Phase 2 Shortlisted publications	Phase 3 Shortlisted publications
Web of Science	56	73	51	43	38
Google Scholar	12				
Other	5				

TABLE 2 Coding framework for categorizing publications using the 5Ws + H approach.

5Ws + H	Coding categories	Details
What	Communication models	One-way, two-way, three-way (Stewart and Hurth, 2021)
	Message focus	Based on Balog-Way et al. (2020)
	Hazards studied	Floods/Glacial Lake Outburst Floods (GLOFs), landslides, seismic events, multi-hazards, climate change, all-hazards, COVID-19
Where	Geographic coverage	Local, regional, national, multi-country
When	Disaster cycle stage	Preparedness/mitigation, warning, emergency response, recovery (NOAA Social Science Committee, 2016)
Who	Actors (senders/recipients)	Government agencies, NGOs, education institutions, researchers, communities, private sector
	Engagement modes	Co-design, co-development, co-implementation, co-evaluation (Löffler and Bovaird, 2021)
Why	Communication objectives	Awareness-raising, information-sharing, behavioral change, belief change (Bostrom et al., 2018)
How	Tools	Printed materials, maps, drills, games, infographics, videos, AR applications, communication plans (Venutti et al., 2021)
	Channels	Social media, face-to-face, mass media, mobile apps, web platforms
	Modes	In-person, remote/virtual, hybrid
	Methods	Interviews, surveys, outreach events, focus groups, classroom activities
	Funding sources	National, international, private, multiple or not specified
	Theoretical frameworks	Deficit model, risk information seeking, social amplification of risk, crisis and emergency communication, others

Model (Wood et al., 2012), the Risk communication and Disease management in the context of Lyme disease among countryside users (Quine et al., 2011) and Disaster and Emergency Planning for Preparedness, Response and Recovery (Alexander, 2015).

Beyond these thematic insights, our analysis also examined the structural characteristics of risk communication practices in Nepal, following the 5Ws + H framework. The main findings are summarized below.

3.2 Risk communication key features

When - Risk Communication Lifecycle. Most risk communication practices focus on the ordinary time (before any disaster occurred), particularly to enhance preparedness, risk perception/awareness, adaptation and reduce vulnerability (74%). In contrast, the other stages of the risk communication lifecycle, such as warning (5%), crisis (0%) and recovery communication (21%), receive far less attention in the literature (Figure 2), indicating a gap in how risk communication is conducted during and after disasters. Moreover, communication in ordinary time should not be interpreted as automatically fostering long-term preparedness,

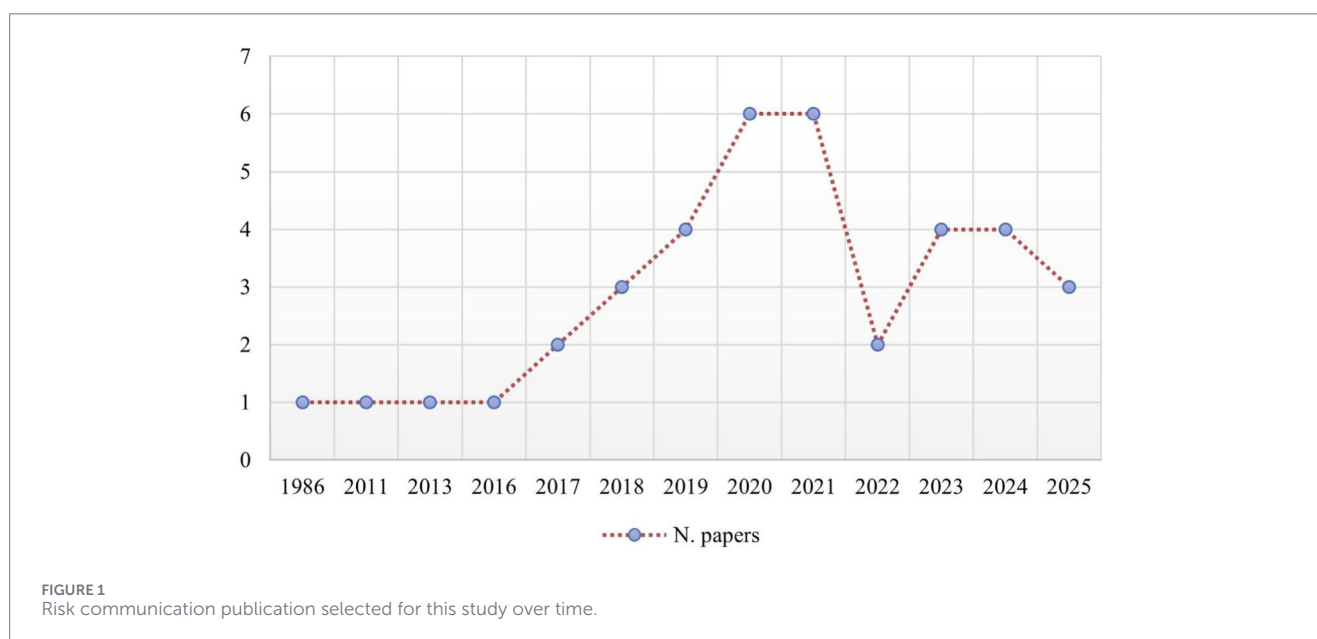
prevention, or adaptation. Indeed, (see Figure 6), only 3% of the analyzed studies explicitly address behavioral change or concrete preparedness actions. Rather, “ordinary time” risk communication simply denotes communication that takes place far from the emergency phase and follows logics and constraints that differ substantially from those governing communication during an actual crisis.

Who - Key Actors and Engagement - Research centers and universities are the primary senders or organizers of communication activities (84%), followed by public agencies involved in disaster risk management (8%), with NGOs accounting for just 5%. Most initiatives were internationally funded (58%) or supported by national public institutions (13%), while the private sector played only a minor role (3%). The primary recipients are citizens and the general public (58%), followed by public agencies working in disaster risk management (16%) and students (11%) (Figure 3). Recipient engagement is limited, appearing in only 8% of cases, of which 5% involve co-implementation and 3% co-design.

What - Communication Models and Content. Among the studies analyzed, 32% addressed risk communication related to floods/GLOFs, 24% to seismic events, 13% to climate change effects, 10% to all hazards, 8% to landslides, 8% to multi-hazards

TABLE 3 Summary table.

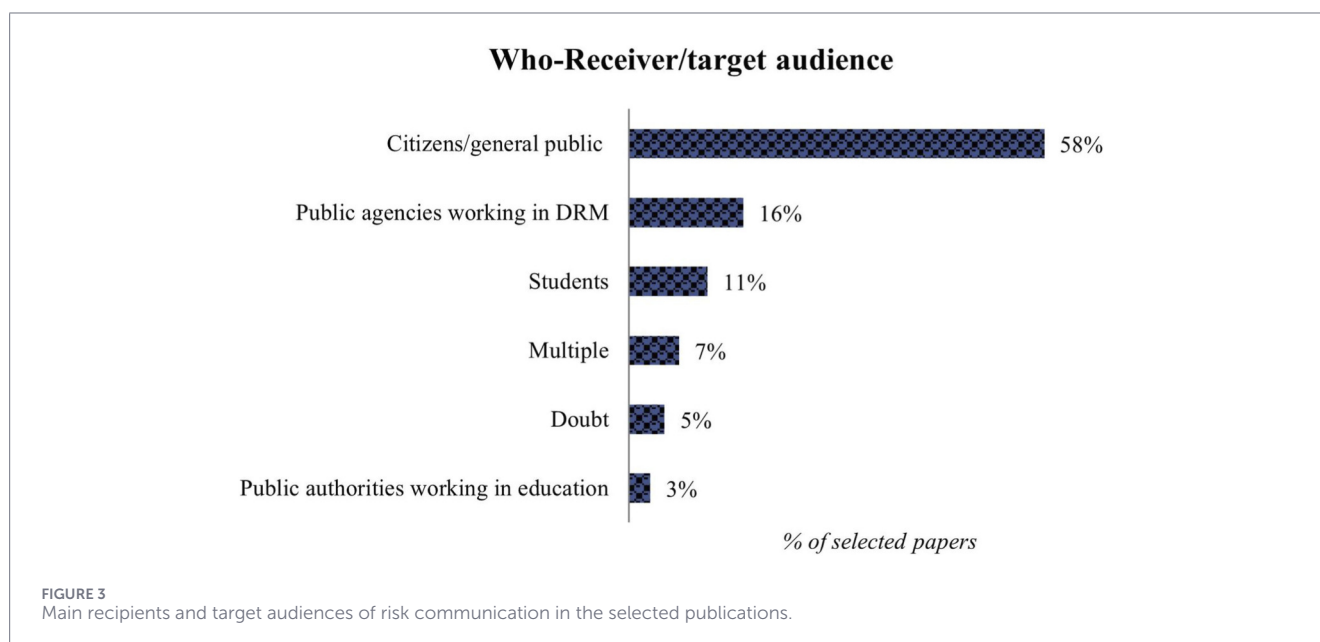
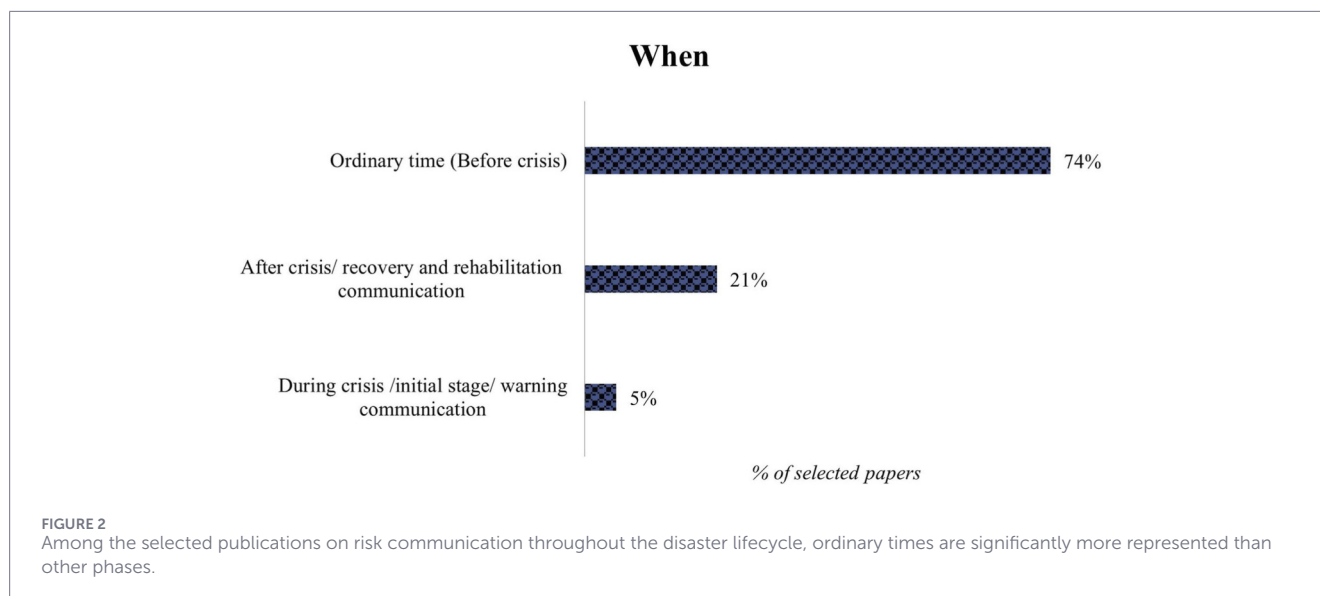
Year	No. of papers	Types of hazards	Geographical location	Funding agencies
1986	1	All Hazards	Regional	Public international agencies
2011	1	Floods/GLOFs	Regional	Public international agencies
2013	1	All Hazards	Regional	Not Available
2016	1	Seismic	Local	Not Available
2017	2	Floods/GLOFs, COVID-19	National	Public international agencies, Not Available
2018	3	All Hazards, Seismic	Local	Public international agencies, Not Available
2019	4	Floods/GLOFs, Climate change effects, Landslides	Regional and Local	Public international agencies, Not Available
2020	6	Floods/GLOFs, Climate change effects, Multi-Hazard, Seismic	National, Regional and Local	Public international agencies, Public national Agencies
2021	6	Floods/GLOFs, Seismic	National, Regional and Local	Public international agencies, Private Sectors, Public national Agencies
2022	2	Climate change effects	Regional and Local	Public international agencies, Not Available
2023	4	All Hazards, Climate change effects, Seismic, Landslides	National, Regional and Local	Public international agencies, Not Available
2024	4	Floods/GLOFs, COVID-19, landslides	International, National and Local	Public international agencies, Not Available
2025	3	Floods/GLOFs, Multi-Hazards	International, National and Regional	Public international agencies, Public national Agencies



and 5% to COVID-19 (Figure 4). The two-way communication model was the most frequently used (47%), followed by the one-way communication model (39%), which focuses on information dissemination and audience analysis. The remaining 14% of publications were classified as uncertain (in doubt category) and did not correspond to any of the communication models (one-, two-, or three-way) (Figure 5). Interestingly, the three-way communication model, which encourages co-creation and interactive feedback, was not found in any of the studies reviewed.

From a perspective of research focus, literature predominantly addresses audience risk understanding and perception (71%), followed by message attributes (26%) including framing, encouraging effective responses and addressing uncertainty. However, there is minimal attention to the sender or messenger, particularly regarding trust-building (3%).

Why - Objectives of Risk Communication. Most communication efforts focus on raising awareness (45%) and sharing information (44%), with only 3% addressing



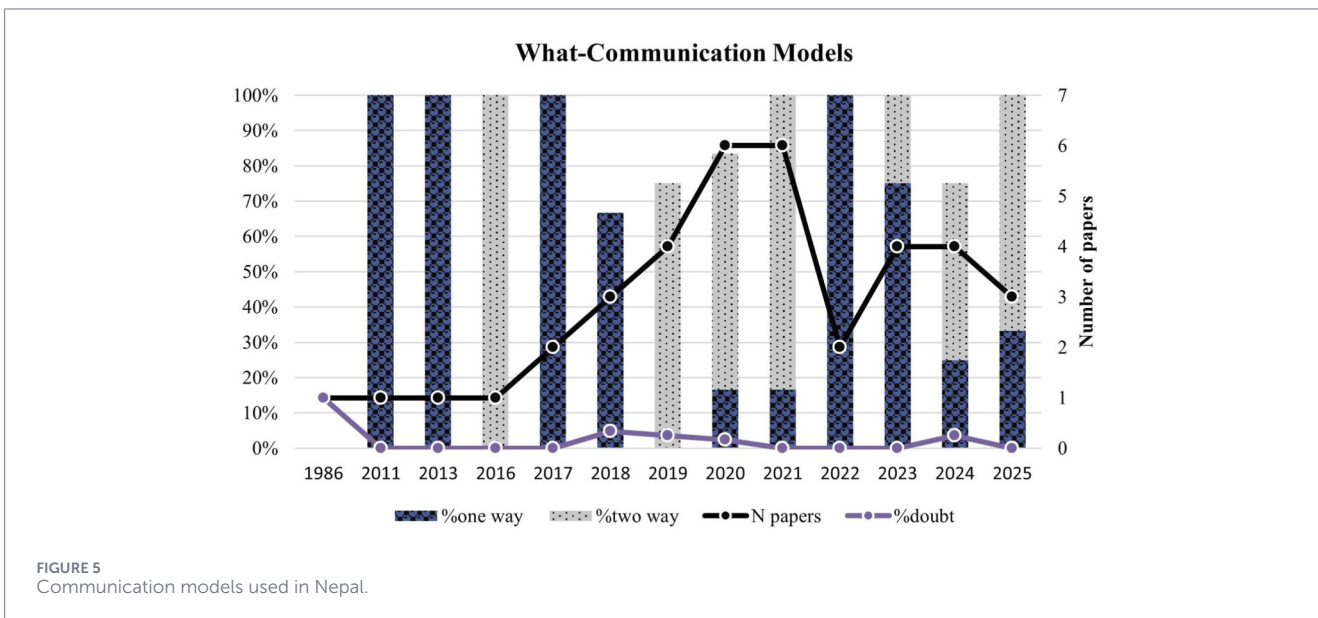
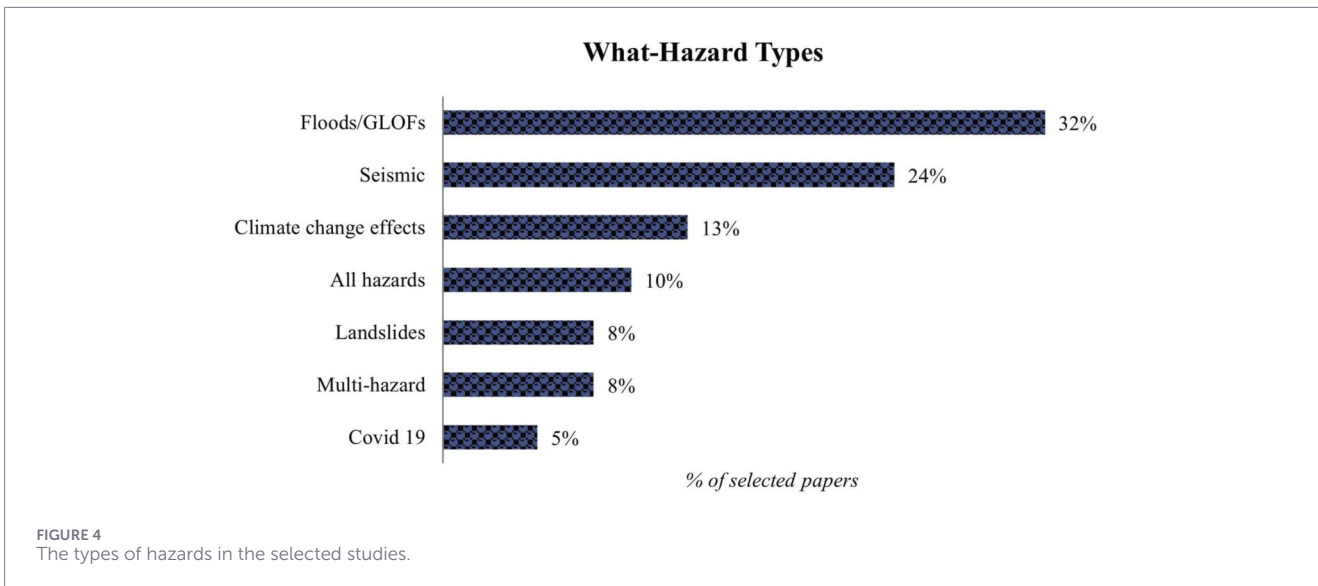
behavioral change (Figure 6). This points to a prevailing tendency towards reactive communication, rather than proactively promoting disaster preparedness.

How - Tools and Channels of Communication. The most commonly identified tools were leaflets and documents (39%). Videos were scarcely used (Sanquini et al., 2016) and there was a lack of mock drills or simulation exercises. Face-to-face communication remains the primary channel (65%), while social media and websites were used minimally (both at 3%). Traditional media such as television and radio still played a role (8%), and monsoon-related messages were occasionally delivered via SMS (3%) (Figure 7). This trend is consistent with the predominant use of in-person communication methods (84%), while virtual channels accounted for only 11%.

A significant portion of the studies (63%) focused on past disaster events as key tools for communicating risk, followed by risk reduction strategies (16%) and warnings and alerts (11%) (Figure 8). Common research methods included surveys (18%) and interviews (16%), while focus groups and outreach events were among the least used methods. Notably, 53% of studies employed multiple communication methods.

Where - Geographic Scope of Communication Practices. Risk communication practices were predominantly conducted at the regional (42%) and local (29%) levels, with fewer studies addressing national (21%) efforts (Figure 9).

The full dataset synopsis in Table 3 indicates that floods and GLOFs are the most frequently examined hazards. Over time, the geographic dimension broadens from local to international scale.



Financial support to the communication of risk is consistently provided by public and international institutions.

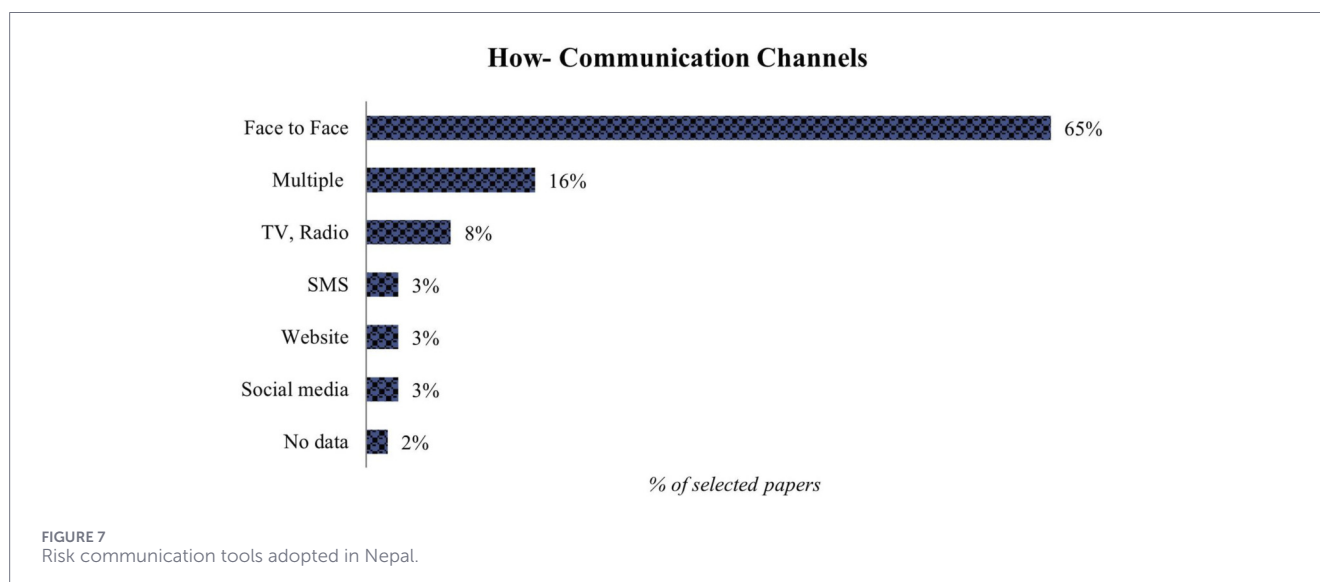
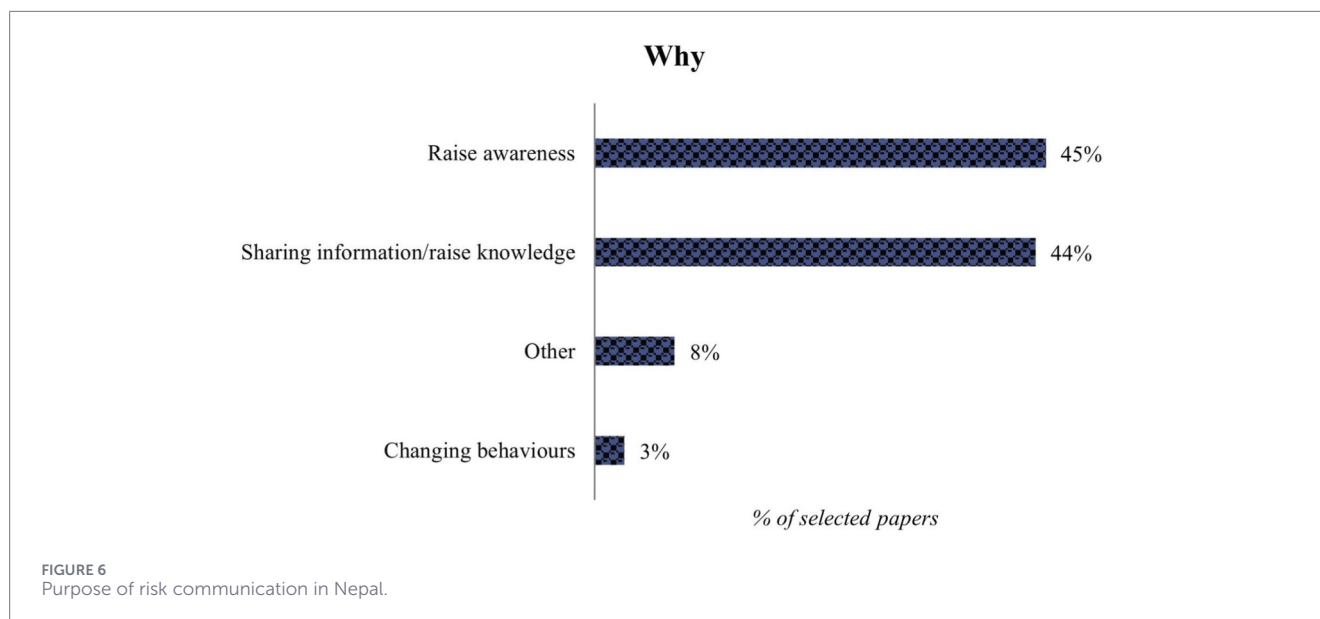
A comparison across hazards shows that studies related to floods and GLOFs rely more heavily on one-way, information-based communication strategies, whereas earthquake-related studies demonstrate relatively greater use of two-way engagement. Communication channels for flood-related risks are also more diverse, encompassing television, radio, websites and face-to-face interactions, while seismic risk communication is delivered predominantly through face-to-face formats. The tools used to convey flood risk commonly include warning or alert messages, in addition to references to past events, whereas earthquake communication relies mainly on past event history and, to a lesser extent, on risk-reduction plans. Leaflets and other printed materials are used across both hazard types, although only to a limited extent.

4 Discussion

This scoping review reveals recurring patterns in risk communication practices in Nepal across hazards, actors and disaster phases. These patterns are interpreted through the 5Ws + H framework to examine their institutional, cultural and theoretical drivers and implications.

4.1 Temporal, institutional and spatial patterns of risk communication

The predominance of risk communication framed around ordinary times and preparedness-oriented activities (*When*) suggests that risk communication is not treated as a continuous process embedded across the disaster cycle, but rather as an episodic intervention. The increase in risk communication studies after the



2015 Gorkha Earthquake shows that communication efforts in Nepal are largely driven by major disaster events rather than long-term planning. This pattern reflects broader structural challenges, including fragmented responsibilities, reliance on short-term projects, and limited government leadership in risk communication (Edwards and Hulme, 1996; Karkee and Comfort, 2016; Anup K. C., 2018; Vij et al., 2020; Ogra et al., 2024). Research attention remains uneven, with floods/GLOFs and earthquakes receiving more focus than landslides, multi-hazard situations and slow-onset climate risks.

Institutionally, the central role played by research institutions, universities and NGOs (*Who*) suggests that risk communication is frequently implemented through project-based and externally funded initiative, while its systematic institutionalization within public disaster management systems remains uneven. As a consequence, communication efforts may struggle with continuity, coordination and long-term ownership (Kanta Kafle, 2017; Anup K. C., 2018; Karkee and Comfort, 2016).

From a spatial perspective (*Where*), the uneven distribution of communication efforts across governance levels further reinforces fragmentation. Locally grounded initiatives allow for contextualized and culturally sensitive communication but limited vertical integration across local, regional and national levels constrains coherence and consistency. This spatial pattern reflects broader challenges of coordination within multi-level disaster governance systems and contributes to uneven access to risk information across hazard-prone regions (Ruszczuk, 2018; Shrestha et al., 2018; 2022).

4.2 Communication models, objectives and theoretical implications

The dominance of one-way and limited two-way communication models (*What*) reflects an underlying deficit-oriented logic in which information dissemination is implicitly assumed to lead

How-Risk management tools used for communication purposes

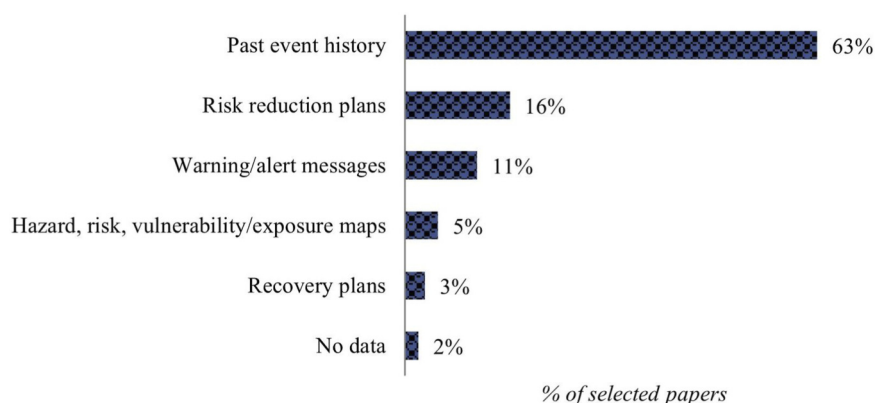


FIGURE 8
Risk management topics included in risk messages.

Geographical distribution of risk communication

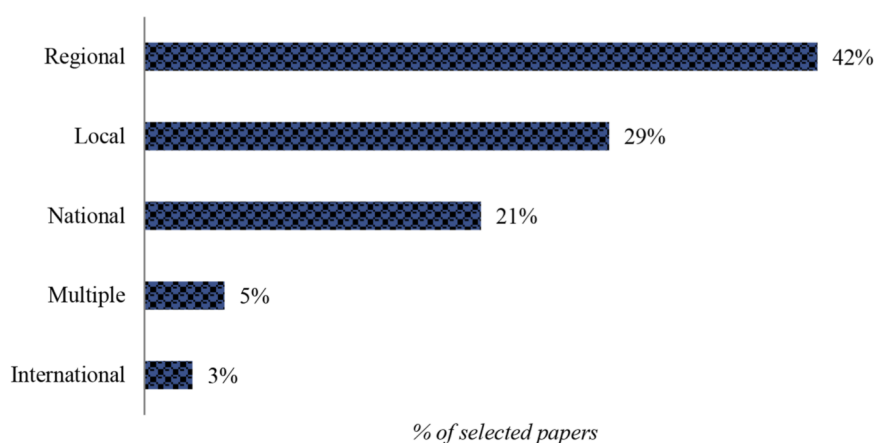


FIGURE 9
Geographical distribution of sites selected to communicate risk in Nepal.

to preparedness and appropriate action. Communication content primarily targets risk awareness and perception, while attention to trust-building, messenger credibility and uncertainty communication remains limited. This orientation persists despite extensive evidence from risk communication research showing that knowledge alone rarely translates into sustained behavioral change (Douglas and Wildavsky, 1982; Slovic, 1993; Budimir et al., 2020). The limited engagement with established theoretical frameworks across most studies further highlights a disconnect between empirical practice in Nepal and advances in risk communication theory (Dallo et al., 2020; Saha et al., 2021).

The prevailing emphasis on awareness-raising and information-sharing (*Why*) further reinforces this pattern. Communication objectives are rarely framed in terms of enabling action, supporting decision-making under uncertainty or promoting long-term

preparedness behaviors (Lamontagne and Flynn, 2014; Goulet and Lamontagne, 2018; Kouskouna et al., 2020; Savadori et al., 2022). In the Nepalese context, such approaches insufficiently account for structural, cultural and socio-economic constraints that shape people's capacity to act, including livelihood pressures, poverty and recurring exposure to hazards (Subba et al., 2014; Walker et al., 2019; Subedi and Hetényi, 2021).

Importantly, the absence of explicit theoretical application should not be interpreted solely as a limitation of individual studies, but rather as a key finding of this scoping review. It underscores the need for future research to systematically test, adapt and evaluate risk communication theories within Nepal's specific socio-institutional context, thereby strengthening the empirical and conceptual foundations of the field.

4.3 Tools, channels, trust and inclusiveness in practice

The continued reliance on face-to-face communication and printed materials, alongside the limited uptake of digital tools (*How*), reflects the influence of institutional capacity, path dependency, digital literacy and concerns about misinformation rather than technological availability alone. Decisions about communication tools and channels are shaped by resource constraints, organizational practices and perceptions of credibility, rather than by access to mobile or internet infrastructure (Alexander, 2014; Budimir et al., 2020; Arora, 2022; UNDRR, 2022).

Trust emerges as a critical cross-cutting issue. Past experiences, such as the false alarm at Tso Rolpa Lake (Dahal and Hagelman, 2011), and more recent evidence from the COVID-19 pandemic (Kayastha et al., 2024), have contributed to skepticism toward official warnings. These findings align with theoretical perspectives emphasizing credibility, transparency and uncertainty communication as prerequisites for effective risk communication (Douglas and Wildavsky, 1982; Dryhurst et al., 2020; Pathak et al., 2020; Bajracharya et al., 2021; Bhandari et al., 2021b; Rieger, 2021; Thapa et al., 2023; Hendriks and Stokmans, 2024; Tayebi et al., 2024; Saraò et al., 2025). Without sufficient trust, even technically accurate messages may have limited impact on individual and collective action. This interpretation is supported by recent empirical evidence from Nepal, showing that preparedness-oriented communication initiatives are effective only when messages are perceived as locally relevant, credible, and accompanied by clear, actionable guidance (Bhandari et al., 2025).

Issues of inclusiveness further shape how communication is received and acted upon. Barriers related to literacy, disability, gender roles and socio-economic conditions continue to limit access to risk information for many groups (Banerjee et al., 2019; Subedi et al., 2020; Sufri et al., 2020; Huang et al., 2022; Mackintosh, 2022). While participatory and inclusive communication models are widely advocated in theory, practical challenges continue to constrain their implementation in Nepal (Budhathoki et al., 2020b; Rai et al., 2022; Hetényi and Subedi, 2023).

5 Limitations

While this study provides the first scoping review of risk communication practices in Nepal, several limitations constrain the generalizability and depth of the findings. The review included only peer-reviewed publications in English, potentially omitting valuable insights from grey literature, local-language reports and documents from NGOs, INGOs, or UNDRR initiatives. As much of Nepal's disaster communication is conducted outside academic channels, community-level efforts may therefore be underrepresented.

Given that risk communication research in Nepal is still emerging, the pool of available studies is limited and often overlaps with broader disaster management literature. The review thus prioritized analytical depth over quantity, aiming to establish a foundation for future comparative research with other Global South and European contexts.

Although major databases such as Web of Science and Google Scholar were used, search filters may have excluded studies

in regional or discipline-specific repositories. In line with the scoping review methodology, the selected studies may vary in methodological rigor. Given the limited size of the final dataset (38 articles) and the exploratory nature of the review, formal inter-rater reliability statistics were not calculated. Moreover, as risk communication evolves rapidly with technological and institutional change, older studies may not capture recent advances in mobile connectivity, digital literacy, or lessons from the COVID-19 pandemic.

Geographically, most research published focuses on central and eastern Nepal and a limited range of hazards, leaving gaps in understanding communication practices for threats such as droughts, wildfires or public health emergencies.

6 Conclusions and recommendations

This paper examined how the academic literature conceptualizes and values risk communication in Nepal, and shows, through a 5Ws + H analysis that it is characterized by reactive timing, fragmented institutional arrangements, deficit-oriented content, awareness-driven objectives, reliance on traditional tools and uneven spatial coverage.

Although risk communication is recognized as essential across all phases of disaster management, our studies are largely concentrated in the preparedness stage, relying primarily on one-way or limited two-way communication. Such approaches often fail to produce sustained behavioral change or long-term community resilience.

Risk communication practices tend to emerge reactively, following major disasters, rather than being embedded in routine, proactive strategies. Despite notable technological progress, early warning systems and message dissemination remain fragmented, short-lived and inaccessible to many vulnerable groups, constrained by infrastructural limitations, low literacy levels and limited digital access. Trust deficits in official sources, limited community engagement and the spread of misinformation further weaken the effectiveness of communication efforts. Moreover, the reviewed studies display geographical and thematic imbalances, focusing predominantly on central and eastern Nepal and a narrow set of hazards. Few works test communication theories or evaluate the effectiveness of interventions.

Given the observed challenges and gaps, several priorities emerge to strengthen risk communication research and practice in Nepal. The recommendations below aim to guide future studies and support the design of more inclusive, evidence-based communication strategies.

- Address governance and institutional coordination. Strengthen multi-level governance of risk communication by establishing a central, permanent body within the NDRRMA to lead, coordinate and sustain risk communication initiatives nationally; promote platforms for coordination among the DHM, sectoral ministries, NGOs, academia and local communities to share expertise, develop targeted advisories and build community resilience. Empower local authorities with funding, training and technical support to develop sustainable, context-specific communication plans.

- Promote two-way and action-oriented communication. Shift from passive information dissemination to interactive models that engage communities in dialogue, decision-making and actionable preparedness practices tailored to local contexts.
- Enhance public trust through transparency and credibility. Strengthen the capacity and confidence of government agencies to deliver accurate and timely information and designate credible spokespersons to restore public confidence in official warnings.
- Integrate simulation-based learning. Introduce regular, practical disaster drills in schools and communities, especially in high-risk zones, to bridge the gap between awareness and adoption of protective behaviors.
- Develop and implement inclusive communication strategies. Use a mix of traditional, visual and audio methods, such as community radio, pictograms and interpersonal communication, to reach illiterate populations, people with disabilities and marginalized groups including women and the elderly. Invest in expanding mobile and internet connectivity in remote and hazard-prone regions to facilitate reliable communication and emergency response.
- Strengthen academic and data sharing culture. Encourage NGOs, INGOs and government agencies to document and publish risk communication initiatives in accessible, peer-reviewed formats to avoid duplication and promote learning.
- Combat misinformation with verified messaging. Collaborate with media companies and social media platforms to counter fake news and ensure verified, science-based messages are prioritized, especially during and after disasters.
- Develop a National Early Warning Framework. Establish a legally binding mechanism for multi-hazard early warning systems that mandates coordination among sectoral agencies, defines roles at all administrative levels and includes a warning communication strategy.

Together, these measures can help Nepal transition from reactive, event-driven communication to a systematic, trust-based and inclusive risk communication approach, strengthening the country's overall capacity to reduce disaster risks and build community resilience.

While this study faces inherent limitations related to language, data availability and the scope of academic databases, it represents the first systematic effort to consolidate fragmented knowledge on risk communication in Nepal. Despite these constraints, this scoping review provides a structured evidence base that can inform both policy and future comparative, multi-source research. From a research perspective, future studies would benefit from systematically testing communication models, evaluating effectiveness across different disaster phases and exploring comparative perspectives across different regions/countries and governance contexts.

Author contributions

CB: Conceptualization, Formal Analysis, Methodology, Writing – original draft, Writing – review and editing. AgS:

Conceptualization, Methodology, Supervision, Writing – review and editing. AS: Conceptualization, Methodology, Supervision, Writing – review and editing. GM: Conceptualization, Methodology, Supervision, Writing – review and editing. SF: Conceptualization, Methodology, Supervision, Writing – review and editing. MS: Supervision, Validation, Writing – review and editing.

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The author(s) declared that generative AI was not used in the creation of this manuscript.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feart.2026.1744196/full#supplementary-material>

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