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EXAMINING CLIMATE MISINFORMATION ON X: A STUDY OF PAKISTAN'S FLOOD 2025

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ABSTRACT

Globally, flood catastrophes have become more frequent and severe due to climate change, and social media platforms are increasingly serving as a means to obtain, comprehend, and disseminate information about disasters. In this context, the objectives of the study are to identify types of climate-related misinformation about Pakistan's 2025 floods that create uncertainty on Twitter/X (2 May-31 October 2025) and to examine the dominant frames of climate misinformation tweets on Pakistan's 2025 floods. This quantitative study analyzed the content of 300 tweets purposively selected on Twitter (X) related to misinformation about the 2025 floods in Pakistan. The study identifies the types of misinformation in circulation and the dominant frames used to communicate such content between 2 May and 31 October 2025. The tweets were coded according to misinformation type and dominant frame. Descriptive statistics and Chi-square goodness-of-fit tests were used to analyze the data. The findings demonstrate that false causal explanations constituted the most prominent form of climate misinformation in flood-related discourse. Responsibility and blame framing emerged as the dominant framing approach, directing attention toward the actions, failures, or responsibilities of particular actors and institutions. Overall, the findings highlight how different forms of misinformation and framing patterns interacted in the Twitter/X discourse surrounding the 2025 Pakistan flood.

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Introduction

Rationale

Across Punjab, Sindh, and the northern catchments, rivers swollen by an unusually intense monsoon season swept through towns and villages, displacing millions and reviving painful memories of the

devastating floods that preceded them, with current research confirming that glacier melt, rising temperatures, and increasingly erratic rainfall patterns are converging to make such disasters more frequent and more severe across the country (Khoso et al., 2025). It is at this intersection, where a climate disaster of historic scale meets a digital information environment still poorly understood in the Pakistani context, that this study begins (Wardle & Derakhshan, 2017).

Social media platforms create facilitated conditions for the spread of misleading narratives. The structural basic features of such platforms promote engagement over precision in accuracy. This is a remarkable feature that hinders a comprehensive assessment of online misinformation, especially in our case about climate change and identifying a network of actors involved in financing, producing, and amplifying false or misleading content. This consistency of their pre-existing perspectives and beliefs. They all highlight that interdisciplinary approaches are necessary that combine educational, technological, regulatory, and psychological interventions, as no single discipline can respond to the multi-faceted nature of climate misinformation. The current examination into the spread of misinformation throughout Pakistan's 2025 flood event is motivated by the recognition of significant research gaps, such as the significance of understanding the spread of climate misinformation on social media, and the under-explored phenomenon of climate propagation (Treen et al., 2020).

More specifically, Twitter/X's algorithmic architecture boosts the visibility of low-credibility content, systematically disadvantaging science-based climate communication. Research conducted by Corsi in 2024, an observational study of around 2.7 million tweets on climate change, showed that Twitter's recommender system increased low-credibility content by an average of 95.8% compared to high-credibility sources. The amplification effect was particularly pronounced for politically biased content with right-leaning partisanship (+24.3%) and Tweets with high-toxicity language (+15.2%), which got extra algorithmic boosts. The study discovered that verified accounts amplified low-credibility tweets by over 138%, implying that peripheral credibility signals, such as verification status, can outweigh actual content quality in determining engagement and reach. Our findings show that the platform's engagement-based recommender system inadvertently exposes users to misinformation about climate change, particularly at times of emotional urgency, when users are most likely to seek and share information. This structural predilection for sensational and politically polarizing content necessarily distorts the information communication of the ecosystem that shapes public understanding of climate disasters (Corsi, 2024).

According to Daume, extreme weather emergencies are fertile ground for the production and consumption of misinformation, with consequences that extend beyond immediate crisis response to long-term perceptions of climate change and reviewed 289 publications and identified only 13 studies that specifically focused on online misinformation in the context of extreme weather frameworks, pointing to a critical empirical gap in the understanding of the emergence of misinformation where short-term emergency communication and long-term climate discourse converge. The author offers a conceptual framework for understanding how misinformation in environmental emergencies crosses domains (mixing climate science with political conspiracy), time

scales (confusing immediate weather events with decadal climate trends), and spatial scales (localizing global phenomena with distorted attribution), (2024).

A meta-synthesis methodology, grounded in social epistemology and post-truth theory, is employed to show that climate change disinformation is not just a collection of false claims, but a wider epistemic problem over the long term of digital platforms, power dynamics, and organizational interests. Research indicates that algorithmic recommendation systems, right-wing populist movements, and fossil fuel companies are the major participants in climate skepticism, which in turn deepens political divides and undermines public trust in scientific authority. The 2025 flood season in Pakistan provides an important context for examining the packaging and amplification of climate-related misinformation on Twitter/X and throughout, as this information is shaped by public perception of the climate drivers, state capacity, and the adaptation of priorities. Pakistan is among the world's most climate-susceptible countries, and in 2022 experienced catastrophic flooding that killed more than 1,700, affected 33 million, and caused economic losses of more than USD 30 billion. Despite national policies including the National Climate Change Policy (2012) and the Climate Change Act of 2017, Farooq (2026) describes a continuing pattern of policy paralysis, through a large gap between formal policy instruments and practical implementation of the pattern. Institutional fragmentation following the 18th Constitutional Amendment, weak administrative capacity, and political short-termism, and absence of adequate evidence-based decision-making collectively contribute to weakening the effectiveness of climate governance and turning natural hazards into large-scale humanitarian crises. The 2025 floods present an opportunity to explore the interaction in between these governance failures and the social media misinformation in shaping in public understanding of c the climate attribution on effectiveness, government responsibility on social media, and the adaptation to needs. Recognizing this dynamic is key to crafting communication strategies that can protect vulnerable populations through information about hazards while bolstering democratic deliberation on climate resilience (2026).

Social Media

Social media represents a transformation of the digital ecosystem. The platform's simplicity and low barriers to entry enabled rapid global adoption across diverse demographics. Its integration into journalistic practice further cemented its cultural and institutional significance. Reporters began using Twitter as a source for real-time reporting and audience engagement, creating new norms for news production and consumption (Esteve-del-Valle, 2025).

Seddighi et al. suggested that the interactive nature of social media allows for immediate feedback loops. It also provides a participatory engagement that standard media formats are unable to replicate. In the context of climate and disaster communication, Twitter/X emerges as a particularly high-speed environment. Information about environmental crises circulates rapidly among professional and public communities alike on Twitter, subsequently named X. The platform's architecture supports the instantaneous dissemination of news, scientific findings, and personal accounts during critical events and crises. These features make Twitter/X an essential tool for contemporary risk communication and public engagement strategies (2020a).

The studies of Hurricane Sandy in 2012 documented how ordinary citizens published timely information about the unfolding situations that emergency organizations could utilize for situational awareness and response planning (Liu et al., 2019).

Since around 2010, Twitter has functioned as a key channel for climate change communication and flood disaster response, and academic interest in this role has grown steadily, beginning with studies of major events and expanding as more disasters unfolded on the platform. One of the earliest and most influential studies in this area examined how the 2013 IPCC Working Group 1 report was discussed on Twitter, mapping out the topics people raised, the communities that formed around the conversation, and how scientific findings moved from experts to the wider public. That study found that very different groups scientists, policymakers, journalists, and climate skeptics, among them talked about the same report in strikingly different ways, often talking past one another rather than to one another. This pattern of fragmented, audience-specific interpretation is a key reason why a single piece of climate information can end up understood, or misunderstood, in very different ways depending on who is reading it and within which online community (Pearce et al., 2014).

The 2015 Nepal earthquake displayed a method in which police department units communicated risk information through Twitter/X, providing general information, disaster warnings, encouragement via a framework, and rumor correction to bridge gaps between the public and the authorities. Research on the 2022 Southeast Queensland floods found that government leaders used Twitter/X alongside traditional media conferences, revealing conflicting messaging that was created by confusion about evacuation directives. In October 2022, Elon Musk acquired Twitter and later changed it as "X" in July 2023, transforming of the platform's identity, functionality, and the governance structures of while maintaining, its role in the public discourse notes, that Musk's bid to the obtain Twitter began on April 14, 2022, marking a pivotal moment that preceded by extensive platform modifications and the policy shifts under a new ownership.

The continued use of Twitter in climate and disaster communication research must account for these structural changes and their potential effects on information flows and community dynamics. In climate communication specifically, Twitter serves multiple critical functions, acting as a platform for the dissemination of scientific information, public engagement, activist mobilization, and real-time discourse monitoring among diverse stakeholders. The research focuses on media and climate stakeholders who used visual social media during COP21, revealing how Twitter serves as a space for visualizing and negotiating climate politics during significant international events. Their work showed that images shared during the summit were not just illustrations of events but active tools through which activists, journalists, and officials competed to frame the meaning of the negotiations. This pattern of visual contestation on Twitter during high-profile climate events offers a useful point of comparison for understanding how flood-related imagery and claims circulated on Twitter/X during Pakistan's 2025 disaster, where visual and textual content similarly became a battleground for competing interpretations of causality and blame (Hopke & Hestres, 2018).

Explored how Twitter promoted the organization of mass mobilization action around climate change movements, demonstrating the platform's role in facilitating ecological collaboration among

dispersed activists. Their analysis highlighted that the platform's open, decentralized structure allowed protest messages to travel across loosely connected networks without requiring a central organizing body. This capacity for rapid, decentralized circulation is directly relevant to understanding how flood-related content spread across Pakistan's Twitter/X user base in 2025, where both accurate warnings and misleading claims moved through similarly dispersed networks of individual users rather than through a single coordinated source. (Segerberg & Bennett, 2011).

Climate Communication in media

Climate communication in media is shaped by the complex and scientific nature of climate change. In Pakistan, belief in climate misinformation is particularly prevalent, and studies indicate that determinants of false beliefs about climate change in Pakistan are consistent with those found in other countries, with trust in social media positively correlating with acceptance of misinformation and conspiracy theories, thereby undermining public understanding and impeding collective action (Ejaz et al., 2025).

Information About Climate Change

Digital media on climate may contain scientific descriptions and predictions, political assertions of accountability, and policy positions. Because these different types of content circulate together on the same platforms, the way they are presented, and not just their factual accuracy, plays a crucial role in shaping public understanding, awareness, and discourse on climate-related issues. Scholars have emphasized that framing choices, such as which causes or actors are highlighted, carry significant power to influence public opinion and policy decisions. This means that two pieces of content covering the same climate event can lead audiences toward very different conclusions, depending on how each one selects and presents the underlying facts (Boykoff, 2011).

Recent flood-related disasters in Pakistan are highlighted in peer-reviewed literature to draw attention to the fact that physical drivers tend to exacerbate governance and land-use susceptibilities, increasing the effects. Pakistan is ranked among the top five most vulnerable countries in the world, frequently confronting climate-induced disasters such as floods, droughts, and water scarcity, risks that are further intensified by glacier melt, rising temperatures, unpredictable rainfall, rapid urbanization, limited public awareness, and weak adaptive capacity (Khoso et al., 2025).

Disinformation in Climate Change

Climate disinformation is strategically generated false or misleading statements that seek to disorient audiences, procrastinate mitigation and adaptation, or blame the actions of responsible parties. It is recommended that climate communication messages should consider ways in which scientific content can be distorted and should include pre-emptive inoculation messages that build resistance to misinformation before any damage is done (Cook et al., 2017).

It also needs proactive communication strategies that build trust, teach people how to use the media, and give people clear, easy-to-understand, and timely information before and during climate-related emergencies. This multiliteracies-based approach treats media literacy not as a one-time skill but as an ongoing practice that must adapt alongside changing platforms and evolving misinformation tactics. Applied to Pakistan's 2025 flood context, such an approach suggests that building long-term public resilience against climate misinformation on Twitter/X requires sustained institutional investment in media education rather than isolated fact-checking efforts during the disaster itself (Damasceno, 2021).

Misinformation in Climate Change

Misinformation on Twitter/X can be posted in the form of false information regarding the drivers of rainfall, glacier melting, dam operations, evacuation orders, numbers of casualties, or relief distributions. Due to the focus on speed over verification in disaster situations, fake information has the potential to spread fast by way of retweets and the amplification of influencers (Edwards et al., 2019).

Conflicting information can damage people's trust in official sources and lead to heightened emotional responses and behaviors that hinder response efforts, such as unnecessary evacuations or the disregard of safety measures. False alerts also result in inefficient use of resources, as emergency services must divert attention to less critical areas, delaying essential assistance elsewhere. Misinformation about the climate is not only a communication obstruction, but also a governance and public safety concern, since misinformation can hinder emergency response efforts and misdirect resources. The 2025 floods in Pakistan can educate us about the impact of digital misinformation on both immediate responses to a crisis and comprehensive understanding of climate exposure and adaptation (Hilberts et al., 2025).

Climate Context and Timeline Pakistan Flood 2025:(May-October 2025)

The 2025 flood season in Pakistan occurred in the context of the South Asian monsoon cycle. The river basins were highly vulnerable. Moreover, high vulnerability was formed by the vulnerable exposure of infrastructural limitations. The population settlement in the flooded areas also made the conditions worse. The most devastating flood was experienced in late June. We have opened the analytical window of the study from 2 May 2025 to reflect early flood-related discourse and anticipatory messaging in the pre-flood context (May to Jun 2025).

Government actions: The National Disaster Management Authority (NDMA) organized warnings, rescue, relief camps, and damage assessment during the period of monsoon (NDMA, 2025). Provincial governments also played a deep role in assisting this authority. Health agencies warned about waterborne illnesses and breakdown of vital services. So, after the flood, the major activities of relief halted (Fahim et al., 2025).

Problem Statement

The nature, trends, framing, and dissemination of climate misinformation on Twitter/X during Pakistan's 2025 floods are still not well understood in the academic literature, despite the importance of this context. The floods themselves and the widespread dissemination of claim information on social media, both of which are known facts, are not the research problem. Instead, the issue is the lack of quantitative data about the kinds of climate misinformation that spread on Twitter/X and how it was framed.

This study, Examining Climate Misinformation On X: A Study of Pakistan's 2025 Flood, addresses that problem directly by conducting a quantitative content analysis of 300 tweets published on Twitter/X between 2 May and 31 October 2025, examining climate misinformation across two research objectives, aligned with misinformation type and dominant framing. The significance of the study lies not only in its contribution to the empirical literature on climate communication in the Global South, but also in its practical value for disaster communication agencies, media practitioners, and policymakers who require an evidence-based understanding of how deceptive climate narratives are constructed and circulated during flood events in a climate-vulnerable national context through a framework.

Significance of Study

The research contributes to the following.

Theoretical Significance: It contributes to theory because it combines climate communication theory with framing theory to clarify the construction and spread of climate misinformation in a disaster situation.

Empirical Significance: It offers evidence on misinformation types and frames during a large-scale flood in Pakistan, which is a Global South research gap.

Practical Significance: Results can be used to inform crisis communication about disaster management agencies, journalists, and climate communicators by understanding the most popular false narratives and the frames through which they are communicated.

Research Objectives

RO1: To identify types of climate-related misinformation about Pakistan's 2025 floods that create uncertainty on Twitter/X (2 May–31 October 2025).

RO2: To examine the dominant frames of climate misinformation tweets on Pakistan's 2025 flood on Twitter/X.

Literature Review

The literature review of this study evaluates the existing studies on climate communication, media framing, and digital misinformation, with a main focus on how false and misleading stories about flood events were produced and spread over social media platforms such as Twitter, drawing on both global scholarship and Pakistan-specific research to situate the 2025 flood disaster within the broader context of climate misinformation studies.

Climate Misinformation and Disinformation

Climate change is more than just a biophysical phenomenon; it is fundamentally a communication problem that is driven by how challenges, causes, standards, and responsibilities are framed within social discourses. Lewandowsky et al. (2017) argue that the post-truth the time period emerged from societal mega-trends. This includes declining social capital, rising economic inequality, increased political polarization, and a more divided media landscape. These are all elements collectively against the epistemic framework upon which informed democratic deliberation depends. Mal-information is authentic information weaponized to cause damage. Their framework outlines that the transmission of misleading content during crises is facilitated by social media platforms. Because it is undergoing rapid evolution, as the affected populations are the most vulnerable to emotional manipulation. They are least likely to verify sources systematically (Lewandowsky et al., 2017; Wardle & Derakhshan, 2017).

Climate misinformation literature documented such recurring myths as denial of anthropogenic warming, amplification of doubt, conspiracy theories, and delay discourses that project mitigation/adaptation as unnecessary and excessively expensive (Lewandowsky et al., 2017).

Information disorder models distinguish between misinformation (an incorrect piece of information disseminated unintentionally and without any malicious intent) and disinformation (deliberately misleading information). Both problems could damage risk communication and mistrust. False warnings, inflated damage estimates, and scapegoating narratives can also be classified as misinformation that might spread quickly in situations of disaster due to lack of certainty and increased attention (Wardle & Derakhshan, 2017).

Social Media and Digital Platforms

Social media platforms are strategic in the advancement of environmental and disaster communication. Twitter/X is especially effective in establishing agendas and elite discussions since journalists, authorities, and notable individuals use it to hold real-time communication. Recent studies show that platform affordances have the capacity to enhance emotional and polarized messages, and that false information can be spread through networked amplification. Event-based research indicates that the dynamics of misinformation are typically different in one crisis stage and peak after notable news events, official statements, or evident disruptions (Tandoc et al., 2018).

Pakistan Media Landscape

Preparation, coordination, and long-term resilience planning are among the challenges that appear to be recurrent when policy and governance of the 2025 flood disaster are examined.

Content Analyses in Environmental Communication

Quantitative content analysis is a popular technique of mapping frame and narrative prevalence in the texts of media and examining relationships between message attributes and audience reaction. In climate communication studies, content analysis has been used to evaluate the issue framing, attribution of responsibility, and depiction of scientific certainty/uncertainty. The content analysis of Twitter/X can be used to examine the systematic manner the substantial amount of real-time discourse occurs when incidents such as climate-related disasters occur, to help in both descriptive mapping and hypothesis testing (Chae, 2015; Nisbet, 2009).

Climate Communication and Public Understanding

Public belief in the reality of climate change is strongly shaped by whether people understand that scientists broadly agree on the issue, and this connection matters because most people significantly underestimate how much consensus actually exists within the scientific community. Once that foundation moved, participants also reported greater willingness to support public policy action, meaning the effect extended beyond attitude change into behavioral intention. This indicates that public understanding of climate change is not simply a matter of exposure to facts, but depends heavily on how consensus itself is communicated and framed for a general audience (Van Der Linden et al., 2015).

The study's central contribution was therefore to show that uncertainty is a persistent and measurable feature of public opinion in its own right, not merely a fixed minority position that can be safely ignored (Whitmarsh, 2011).

Newspaper coverage of climate change over nearly two decades further shows that how the topic gets framed is not consistent across time but instead shifts across distinct periods, each shaped by the political and media conditions of that moment. Examining British broadsheet reporting from the mid-1980s through the early 2000s, the analysis identified several such periods, each carrying its own dominant framing of what made climate change risky and to whom that risk applied. Two forces stood out as especially influential in setting these shifts: the actions and statements of senior political figures, whose framing choices rippled outward into press coverage, and the editorial leanings of individual newspapers, which filtered the same underlying events through different ideological lenses. The result was that readers encountered meaningfully different versions of the same climate story depending on which outlet they followed and when they were reading it (Carvalho & Burgess, 2005).

Climate Misinformation During Disasters and Floods

Early research applying rumor theory to Twitter during crisis events examined how the presence or absence of a traceable source shaped whether users treated a given post as trustworthy. Analyzing posts from several major crisis events, the study found that when a tweet lacked any clear indication of where its information had originally come from, users were nevertheless more likely to accept and forward it rather than pause to question its accuracy. Once that happened, user engagement with the corrective information rose sharply, showing that verification status functions as a kind of trust shortcut during moments when people have little time or capacity to evaluate claims independently. The overall picture that emerges is one where false claim can travel freely until an institutionally credible source intervenes, at which point correction becomes possible but not before some damage has already been done (Hunt et al., 2020).

The review also noted that this pattern repeats across very different types of disasters, suggesting it reflects something structural about how information ecosystems behave under acute stress rather than something specific to any one event or platform. Taken together, these three studies indicate that the speed and severity of a disaster directly shape how much room misinformation has to circulate before it can be meaningfully corrected, and that closing this early information gap is where intervention would matter most (Hilberts et al., 2025).

Framing of Climate-Related Information on Social Media

A large-scale study analyzing several million-climate strike-related tweets over a multi-year period similarly found that framing on the platform was far from static, shifting noticeably around major real-world events such as global strike days and elections. This divergence between actor types adds a further layer of complexity beyond the temporal shifts already observed, since framing on social media varies not only across time but across who is doing the framing. Together, these findings show that framing on social media is not a fixed or settled property of an issue but is actively renegotiated in real time as an event develops and as different actors compete for interpretive influence (Chen et al., 2023).

However, the existing literature reviewed in this study remains limited in connecting climate misinformation, disaster-related communication, and framing within the specific context of Pakistan's flood events. Previous studies have examined misinformation during crises, the role of social media platforms in information dissemination, public understanding of climate change, and framing of climate-related issues (Oh et al., 2013; Chen et al., 2023; Hilberts et al., 2025). Moreover, limited attention has been given to systematically examining climate misinformation surrounding a specific flood event in Pakistan through Twitter/X, particularly in terms of misinformation types, dominant framing patterns, account verification, and audience engagement. This study addresses this gap by applying quantitative content analysis to flood-related Twitter/X content associated with Pakistan's 2025 flood.

Theoretical Framework

The theoretical framework of this research is grounded in two interrelated theories, Climate Communication Theory and Framing Theory, which collectively provide an in-depth lens. For evaluating how climate-related misinformation is created, framed, and circulated on social media platforms during Pakistan's 2025 flood disaster.

Theoretical perspectives in climate communication

Theoretical perspectives in climate communication emphasize how social development and civic participation are shaped by the processes through which climate information is produced, mediated, and interpreted within broader sociopolitical contexts. These are all fundamentally shaped by the processes through which climate information is produced, mediated, and interpreted within a broader sociopolitical context Therefore, climate and risk of communication must be conceptualized as a dynamic, interactive process where institutions, media, individual users, and citizens work together to engage in sense-making. This perspective makes it more imperative to design transparent, contextually sensitive, and well-suited communication tactics for climate-related emergencies.

In climate-related disasters, people mostly depend on communication to gain an understanding of why an event has occurred. Who is accountable, and what actions or measures should be taken. As a result, the effectiveness of climate communication relies on clarity, credibility, and its capability to connect expert school of the knowledge, with the lived concerns of affected communities, as communication tactics that must be applied to the best available. Science in such a way that the public can easily understand, especially when some uncertainties and competing interpretations are circulating in society (Pidgeon & Fischhoff, 2011). Thereby raising public awareness and fostering collective action. However, these same platforms are vulnerable to the rapid dissemination of misinformation, the amplification of emotional reactions, and the entrenchment of polarized interpretations, especially when official communication is delayed or unclear (Schäfer & Schlichting, 2014).

Application of Climate Communication Perspectives

Based on these perspectives, the following assumptions can be identified:

(a) Communication frames are not merely a means of transmitting information; they also influence how audiences interpret information and make decisions within narrative platforms.

(b) Frames, credibility signals, and emotions can shape audience attention and interpretation.

(c) The effects of climate messaging, including audience engagement, skepticism, or polarization, depend on political and cultural conditions.

These assumptions are particularly applicable to Twitter/X because its short-form and rapidly distributed content can simplify complex climate-related issues into brief narratives that emphasize particular causes, responsibilities, risks, or responses. Therefore, understanding how climate communication perspectives operate on Twitter/X helps explain how climate-related messages may shape audience interpretation, engagement, skepticism, and polarization within rapidly changing information environments (Nisbet, 2009).

Relevance to the Pakistan Context

In Pakistan, the communication process of climate risk is created in the environment of permanent floods, uneven capacity of the state, and politicized concerns about responsibility and allocation of resources. The analysis of the 2025 floods highlights the combined production of risk by the climate and management susceptibility. Pakistan's 2022 floods showed serious governance and adaptation flaws, with disaster response being delayed and fragmented due to insufficient state-level leadership and inadequate coordination, a pattern that directly influences how climate risk information is produced, spread, and received by the public during flood emergencies (Hassan et al., 2024).

The institutional response to Pakistan's major flood disasters has frequently been marked by delayed mobilization, fragmented governance, and poor coordination in federal, provincial, and humanitarian actors, with relief efforts further hampered by unequal allocation of resources. These conditions further help create an information vacuum in which misinformation on social media platforms quickly fills the gaps left by unclear and delayed official climate communication (Zachariah et al., 2025).

Framing Theory

Framing Theory was first formulated as a sociological concept by Erving Goffman, who defined interpretive frames as organizational principles that control the subjective meaning an individual gives to social events, arguing that people use these mental structures to make sense of and navigate their daily experiences (Goffman, 1974).

In the context of this study, Examining Climate Misinformation On X: A Study of Pakistan's 2025 flood, framing theory is applied to evaluate how tweets and social media posts on Twitter/X specifically construct and circulate interpretations of flood causality, governmental responsibility, and climate change attribution. Research applying framing theory to Twitter discourse on climate change shows that social media platforms enable a range of actors, including movement actors, news organizations, political figures, and ordinary users, to frame climate events differently, with partisan debates, disaster consequences, and governance failures emerging as dominant frames that influence how audiences understand and respond to climate-related crises (Chen et al., 2023).

Applications for Framing Theory

According to framing theory, communicators choose some facts of reality and emphasize them to promote certain definitions of a problem, causal perceptions, moral judgments, and treatment suggestions. Media and political communication frames Responsibility Frame, Conflict Frame, Economic Consequences Frame, Morality Frame, and Human-Interest Frame have been applied to assess issue construction and perception by the audience.

These frameworks on narrative platforms provide a useful basis for identifying the production and persuasive strategies of misleading narratives in the context of flood-related communication and climate misinformation. For example, a morality frame would attribute floods to fate or religion, whereas a responsibility frame might blame politicians or organizations. A conflict frame can make political divisions worse, while a human-interest frame can make that suffering more relatable. This can lead to powerful emotional responses and increase involvement. The study uses framing theory to evaluate the tweets, investigating the types of misinformation that could be circulating and the specific framing devices that amplify. Their resonance with public fears, grievances, and values during climate-related disasters(Semetko & Valkenburg, 2000).

Relevance to Pakistan Context

Contextually in Pakistan's flood disasters, framing theory gives a powerful analytical lens for evaluating how media and social media actors selectively emphasize specific causes, responsibilities, and solutions. Studies on Pakistan's 2022 floods show that vulnerability and responsibility frames dominated coverage, and that both Global North and Global South media framed human and governance causes as responsible for the scale of disaster rather than purely natural causes (Khawaja et al., 2025).

The 2025 floods gave rise to a heated debate in society concerning governance, preparedness, and the perceived disparities in relief allocation. Twitter/X frames (e.g., blame distribution, political group conflict) and morality-based readings (e.g., fate narratives) are likely to manifest such debates. Framing theory offers a systematic technique to examine the packaging of misinformation narratives to appeal to these contextual fears(Ullah & Jan, 2026; Wasil Khan et al., 2025).

Integration of Climate Communication Perspectives and Framing Theory

In the model of analysis of this study, climate misinformation is a communicative product of conflicting explanations of the causes and the responsibility of floods. Tweets are constructed as framed communication in which,

(1) Climate communication mechanisms influence topic salience and the credibility indicators,

(2) Frames structure the presentation and the defense of false information.

In fact, the research is tested empirically to ascertain whether certain frames are more common in the misinformation content.

This approach is important because it links the content of misleading statements to the communication dynamics that make them visible and convincing on social media. The research does not see misinformation as separate false claims. Rather, it views it as a component of a larger meaning-making process. In which users select interpretations, place blame, and search for indications of reliability. By looking at which frames dominate, the study can show which stories are most common in flood-related misinformation and how they are framed.

SDG Alignment (Pakistan Flood 2025 -Twitter Study)

This study, Examining Climate Misinformation on X: A Study of Pakistan's 2025 Flood, is aligned with SDG-13 (Climate Action), SDG-16 (Peace, Justice and Strong Institutions), and SDG-4 (Quality Education). Through its research objectives, research questions, and hypotheses, the study examines climate-related misinformation and framing patterns on Twitter/X during Pakistan's 2025 floods to promote accurate climate communication, strengthen institutional trust, and enhance climate literacy.

Research Questions

RQ1: To what extent did climate-related misinformation circulate on Twitter/X about Pakistan's 2025 floods certainty and uncertainty (2 May–31 October 2025)?

RQ2: To what dominant frames are used to communicate climate misinformation about the 2025 floods on Twitter/X?

Hypotheses

H1 (Prevalence of frames in misinformation)

Climate-related misinformation circulated on Twitter/X about Pakistan's 2025 floods creates uncertainty.

H2 (Framing of responsibility in misinformation)

Responsibility-dominant framing is more frequent than other misinformation frames in flood 2025 on Twitter/X.

Research Design

The basic empirical backdrop of this study, Examining Climate Misinformation On X: A Study of Pakistan's Flood, is the 2025 flood season in Pakistan. It uses a quantitative content analysis design. Because it allows for the methodical, objective, and repeatable classification of massive amounts of

social media content into predetermined categories, quantitative content analysis was chosen as the most suitable approach. This allows for statistical comparison across groups and periods. The individual tweet serves as the analytical unit, and each tweet is coded separately for misinformation type and dominating frame (Neuendorf, 2017).

Descriptive mapping of misinformation kind and framing patterns throughout the dataset, and the statistical testing of their distribution, are two complementary analytical goals supported by the framework. The study may systematically address both research objectives and test both hypotheses using the proper statistical procedures, such as the Chi-Square goodness-of-fit test and descriptive frequency distributions, due to this dual-purpose methodology.

The positivist paradigm also supports the use of standardized coding schemes and statistical testing. These are central to the methodological approach adopted in this study.

Research Approach

In this study, Examining Climate Misinformation on X: A Study of Pakistan's 2025 Flood, employs a deductive research methodology, in which the analysis of empirical data is guided by the existing theoretical frameworks, specifically Climate Communication Theory (Moser, 2010; Schäfer & Schlichting, 2014) and Framing Theory (Entman, 1993). The deductive technique is the best option for research design. Since the study examines a theoretically formed hypothesis against the gathered Twitter/X dataset, throughout developing new theory from the data (Clark et al., 2021). Through statistical analysis of the coded tweet content, the five hypotheses proposed in Chapter 2 are empirically tested.

Research Method

The principal of this research approach utilized in this investigation is quantitative content analysis, characterized as a methodically and reproducible process for condensing large amounts of words, images via frames, or text into specific coding guidelines (Neuendorf, 2017).

A total of 300 original tweets that were gathered from Twitter/X during Pakistan's 2025 flood season are subjected to quantitative content analysis in this study, Examining Climate Misinformation on X: A Study of Pakistan's 2025 Flood. A designed codebook that operationalizes the analytical variables of misinformation type and dominant frame into mutually exclusive categories is used to methodically code each tweet.

In this study, the objectives are to test the hypotheses, and a statistical analysis is applied to the frequency counts of misleading narratives and framing patterns.

Population and Sampling

Population: The population of this study consists of all publicly accessible original tweets published on Twitter/X between 2 May and 31 October 2025 that refer to Pakistan's 2025 floods, including statements, false narratives, or claims related to climate change. These tweets span a variety of sources, including government and official accounts, media outlets, civil society organizations, and individual users.

Sampling Frame and Retrieval: Keywords and the hashtag to inquiries in both Urdu and English were used to gather tweets. These are all queries included in different phrases, such as:

#PakistanFloods,

#Flood2025,

#Monsoon2025,

#SwatFlood,

#SindhFloods,

سیلاب, and مون سون,

A combination of these subjects with relevance and the language filters. To guarantee that only original content was included, retweets and verbatim duplicate posts on Twitter/X were removed from the dataset, avoiding duplication of the bias in the coding and statistical analysis.

Sampling: The dataset of tweets, which covers May through October 2025, was divided into six months, using a classification based on the purposive sampling. To ensure equal coverage across all three determined flood phases pre-flood, peak-flood, and early-recovery- and to be enabled throughout the crisis cycle, about 300 original tweets were sampled in each monthly standard stratum.

Sample Size

Throughout the course of a six-month study of the period (May through October 2025), about 50 tweets were sampled each month, for a total number of 300 original tweets in the final data collection. There are two main reasons why this sample size was considered adequate for this investigation.

First, a sample of 50 tweets is acceptable to perform Chi-square testing, with statistically significant findings. It also offers a solid foundation for calculating the prevalence of misinformation types and the dominant frames.

Time Frame

This study examines the time span of six months of Pakistan's flood season, from May 2 to October 31, 2025, and this includes early predictive discourse, peak flooding during the monsoon, and early recovery of communication.

Time Frame Justification

The chosen period is supported by empirical evidence. Major flood impacts from late June to early October 2025 are documented in the NDMA consolidated status reporting for monsoon2025, indicating this time frame as the main window of disaster activity NDMN, (2025).

Because it covers several stages of the disaster cycle rather than concentrating only on the time of most media attention, this time frame is significant from an analytical standpoint. The study is positioned to determine whether false narratives are more common during the anticipation, emergency response, or recovery phases and whether official communication becomes more effective or more contested as the crisis develops over the specified temporal periods by incorporating discourse from before, during, and after peak flooding.

Hashtags Used for Data Collection

The following hashtags were used to retrieve flood-related and climate-related tweets during the study period:

Climate Action and Mainstream Discourse

#ClimateActionPakistan,

#GreenPakistan,

#ClimateJusticePK,

#PakistanClimateCrisis

Flood and Disaster-Specific

#PakistanFlood2025,

#FloodsInPakistan,

#PakistanFloodCrisis,

#Monsoon2025,

#SindhFloods2025,

#PunjabFloods2025

Urdu-language Terms

سیلاب،

مون سون

پاکستان سیلاب2025

Tweet Collection

Appendix A contains samples of tweets that were gathered from Twitter/X as part of the data collection for this study. In this, every tweet was chosen based on how pertinent it was to the conversation about climate change and evaluated for signs of misinformation. To preserve source material for the coding and verification, screenshots of the original tweet content, context, and interaction signals were taken.

Data Analysis and Findings

This chapter presents the results of the quantitative content analysis conducted on 300 tweets collected from Twitter/X during Pakistan's 2025 monsoon flood season, covering the period from 2 May to 31 October 2025. The chapter is organized into two sequential sections, each directly corresponding to the first two research objectives and hypotheses established in Chapter 2. The analysis examines the types and dominant frames of climate-related misinformation circulated on Twitter/X during the disaster, drawing on Climate Communication Theory (Moser, 2010; Schäfer & Schlichting, 2014) and Framing Theory (Entman, 1993) as the analytical framework.

The results and findings of the quantitative content analysis conducted on 300 tweets gathered from Twitter/X during Pakistan's 2025 flood season are presented in this chapter. They are arranged according to the first two research objectives, research questions, and the hypotheses that go along with them. Each section begins with the relevant research objective and question, followed by the corresponding data table, a detailed analysis of the results, and the statistical test used to evaluate the associated hypothesis. This structure allows the reader to follow the logical progression from raw data to interpreted findings for each area of investigation in turn. Together, these sections provide a comprehensive account of how climate-related misinformation was distributed, framed, and engaged with across Twitter/X during the study period.

Distribution of Misinformation Types (Twitter/X, 2 May–31 October 2025)

This section addresses RO1 and RQ1 by identifying the specific types of climate-related misinformation that circulated on Twitter/X during Pakistan's 2025 flood season. Each of the 300 tweets in the dataset was coded into one of six mutually exclusive categories, allowing the frequency and relative prevalence of each misinformation type to be systematically compared. The findings presented below establish the descriptive foundation upon which the subsequent framing analysis in this chapter is built.

Table 1 Distribution of Misinformation Types in Flood-Related Tweets

Misinformation Type	Frequency (n) Percentage (%)	Cumulative %
False Causality	98(32.7%)	32.7%
Climate Change Denial	72 (24.0%)	56.7%
Exaggeration of Flood Severity	51(17.0%)	73.7%
Misleading Attribution	34 (11.3%)	85.0%
Conspiracy Narrative	25(8.3%)	93.3%
Other / Mixed / Unclear	20(6.7%)	100%
TOTAL	N =300 (100%)	100%

RO1. To identify types of climate-related misinformation about Pakistan's 2025 floods that create uncertainty on Twitter/X (2 May–31 October 2025).

The frequency distribution of climate-related disinformation types found in 300 Twitter/X posts that were published during Pakistan's 2025 flood season is shown in the table. With 98 posts (32.7%), False Causality was constituted as the most common type of misinformation. This means that nearly one-third of all the misinformation attempted to determine the number of cause-and-effect relationships through the floods. Such as falsely attributing the disaster to governmental actions or isolated weather events, leading to increased public uncertainty about actual flood frames.

Climate Change Denial was the second most standard category, accounting for 72 posts (24.0%). Nearly 25% of false information denied or disputed the scientifically proven link between flood severity and climate change. This potential confusion among the public about long-term climate implications. With 51 posts (17%), Exaggeration of Flood Severity came into third place, overstating the destruction. These posts overstated the extent of the damage, the number of casualties, or the impacted areas, with increased anxiety. At the eroded confidence in official sources when the statements were later proven false.

At this point, the conspiracy narrative made up 25 posts (8.3%), claiming the floods were intentionally shaped or concealed. While misleading attributions made up 34 posts (11.3%), falsely attributing flood Responsibility to certain groups or individuals without supporting this evidence.

Both types led to public uncertainty and institutional mistrust, but less frequently. The remaining 20 posts (6.7%) included misinformation classified as other /mixed/unclear.

False Causality (32.7%), Climate Change Denial (24.0%), and the overestimation of Flood Severity (17.0%) together accounted for 73.7% of all misinformation. This indicates that most of the misinformation about floods distorted causal explanations, denied climate science, and exaggerated the effect of the disaster.

RQ1. What and to what extent did climate-related misinformation circulated on Twitter/X about Pakistan's 2025 floods certainty and uncertainty (2 May–31 October 2025)?

According to the analysis, the most common disinformation type was false Causality (32.7%), followed by Climate Change Denial (24.0%) and Exaggeration of Flood Severity (17.0%), which together accounted for 73.7% of the total sample. Though less common, misleading Attribution (11.3%), Conspiracy theories (8.3%), and Other/Mixed/Uncertain (6.7%) were all statistically significant.

Result. Distorted causal explanations, rejection of climate science, and overblown disaster narratives were the main characteristics of the circulation of misinformation surrounding Pakistan's 2025 floods, confirming significant dissemination of content that created uncertainty during the study period.

Finding. Most of the False information encouraged ambiguous or deceptive interpretations of flood causes, impacts, and capabilities as evidence. The prevalence of false causality, climate change denial, misleading attribution, and conspiracy narratives. The public's anxiety and perplexity were further increased by the predominance of exaggeration. Therefore, rather than providing evidence-based explanations of Pakistan's 2025 flood disasters, climate-related misinformation on tweeter/x mostly created confusion.

Table 2 Chi-Square Test Misinformation Type

certainty and uncertainty				
Test	χ^2	df	p-value	Decision
Misinformation	91.40	5	0.000 < .001	Significant

Finding. The distribution of misinformation types differed statistically significantly (χ^2 (df 5, N = 300) = 91.40, p <.001) according to a Chi-squared goodness -of-fit-test, indicating that misinformation did not spread equally across categories. False causality was the most prevalent type (32.7%). Followed by climate change denial (24.0%), while conspiracy narratives (8.3%) and other /mixed/ uncleared (6.7%) were least common, confirming that certain misinformation frames were significantly more dominant than others during Pakistan's 2025 floods.

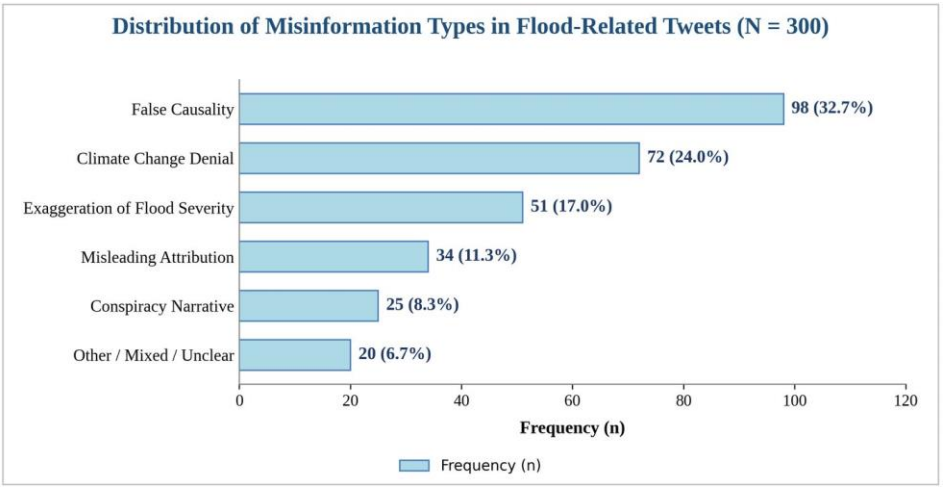


Figure 1 Distribution of Misinformation Types in Flood-Related Tweets (N = 300)

H1. Climate-related misinformation circulated on Twitter/X about Pakistan's 2025 floods creates uncertainty.

These frames dominated Twitter/X discourse during the study period, as evidenced by statistically significant predominance of uncertainty-generating categories such as Misleading Attribution, False Causality, Conspiracy Narratives, and Climate Change Denial-based narratives. The Chi-Square statistic, χ^2 (df 5, N = 300) = 91.40, p < .001, indicates that misinformation was systematically concentrated in narratives that created uncertainty. H1 is therefore supported.

Frequency Distribution of Dominant Frames (Twitter/X, 2025)

This section addresses RO2 and RQ2 by examining the dominant frames used to communicate climate misinformation on Twitter/X during Pakistan's 2025 flood season. Each tweet was coded into one of five frame categories based on Framing Theory, allowing the relative prevalence of each framing strategy to be systematically compared. The findings presented below build on the misinformation-type distribution established in the previous section by showing not just what was said, but how it was framed for audiences.

Table 3 Frequency Distribution of Dominant Frames

Dominant Frame	Frequency (n)/ Percentage (%)	Rank
Responsibility/Blame Frame	138 (46.0%)	1
Human-Interest Frame	62(20.7%)	2
Morality/Religious Frame	48(16.0%)	3
Scientific Uncertainty Frame	35(11.7%)	4
Conflict Frame	17(5.7%)	5

TOTAL	N = 300(100%)	—

RO.2. To examine the dominant frames of climate misinformation tweets on Pakistan's 2025 flood on Twitter/X.

The frequency distribution of prominent frames used in climate-related misinformation among 300 Twitter/X posts about the flood in Pakistan in 2025 is shown in this table. With 138 posts (46.0%), the Responsibility/Blame Frame was the most used; this suggests that almost half of all misinformation content attempted to place blame or responsibility for the flood disaster on governments, political or institutional actors, regardless of whether such claims were backed up by evidence. This frame's prominence indicates that accountability attribution is clearly prioritized over information regarding the causes or effects of the flood.

With 62 posts (20.7%), the Human-Interest Frame came second, emphasizing victim stories, emotive narratives and personal experiences in manners that prioritized emotional connection above factual truth. The Morality/Religious Frame was the third most prevalent, accounting for 48 posts (16.0%), in which flood events were interpreted across moral judgments or religious views, depicting the calamity as the result of spiritual reasons rather than meteorological or climatic issues.

35 posts (11.7%) used the Scientific Uncertainty Frame to throw doubt on expert expertise by challenging scientific facts related to climate change, flood forecasts, or environmental studies. Lastly, the Conflict Frame, which focused on political disputes or differences among individuals and organizations regarding flood origins, management, or repercussions, was the least common with 17 posts (5.7%).

The dataset was dominated by the Responsibility/Blame Frame (46.0%), while the remaining four frames Human-Interest (20.7%), Morality/Religious (16.0%), Scientific Uncertainty (11.7%), and Conflict (5.7%) all together accounted for 54.0% of all posts. This indicates that accountability narratives were the main means by which the climate misinformation crisis was spread during Pakistan's 2025 flood.

RQ.2. To what extent dominant frames are used to communicate climate misinformation about the 2025 floods on Twitter/X?

According to the examination, the most common framing technique in climate disinformation was the responsibility/blames frame (46.0%), which was subsequently followed by the Human-Interest Frame (20.7%), Morality/Religious Frame (16.0%), Scientific Uncertainty Frame (11.7%), and Conflict Frame (5.7%).

Result. The Responsibility/Blame Frame was primarily used to spread Climate-related false information about Pakistan's 2025 floods on twitter/x, indicating that accountability narratives were the most popular method for spreading false flood-related content during the study period.

Finding. That misinformation about climate change was dominated by the Responsibility/Blame Framework, which contributed to over half of all postings examined. The other frames together accounted for 54.0% of the sample, suggesting that narratives of Blame and Accountability, rather than just Conflict or Scientific Uncertainty, were the pre-dominant means of disseminating misinformation.

Table 4. Chi-Square Test (Dominant Frame)

Misinformation			
Dominant Frame	Observed (O)	Expected (E)	$(O-E)^2/E$
Responsibility/Blame	138	60	101.40
Human-Interest	62	60	0.07
Morality/Religious	48	60	2.40
Scientific Uncertainty	35	60	10.42
Conflict	17	60	30.82
Total χ^2			145.11

Finding. The distribution of dominant misinformation frames differed statistically significantly (χ^2 (4, N = 300) = 145.11, p=.000 because p<.001) according to a Chi-Square Goodness-of-Fit test. The Responsibility/Blame Frame occurred considerably more frequently than all other framing categories, and the measured frequencies deviated significantly from an equal distribution. These results verify that the most common framing technique employed to spread false information about climate change during Pakistan's 2025 floods was responsibility attribution.

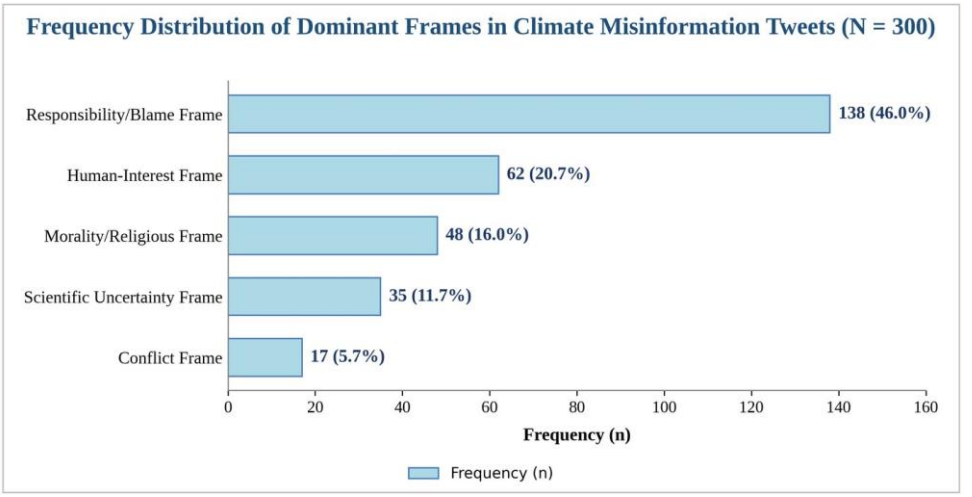


Figure 2 Frequency Distribution of Dominant Frames in Climate Misinformation Tweets (N = 300)

H.2. Responsibility dominant framing is more frequent than other misinformation frames in flood 2025 on Twitter/X.

Within this study, the Responsibility/Blame Frame refers specifically to misinformation content that assigns fault or accountability for the 2025 flood to a specific actor or institution without evidentiary support, distinguishing it from legitimate journalistic accountability reporting. The Responsibility/Blame Frame accounted for 46.0% of all misinformation posts, a substantially higher proportion than the Human-Interest, Morality/Religious, Scientific Uncertainty, and Conflict frames combined. A Chi-Square Goodness-of-Fit test confirmed that this distribution of frames was statistically significant, χ^2 (4, N = 300) = 145.11, p < .001, indicating that responsibility-based framing was the most common communication strategy used in climate-related misinformation about Pakistan's 2025 flood. H2 is therefore supported.

Discussion and Conclusion

Using the context of Pakistan's 2025 flood crisis on Twitter/X, the discussion links the empirical findings in Chapter 4 to the larger academic literature on climate communication, framing theory, and digital misinformation.

Discussion of Findings

The outcomes of the hypotheses' objectives and research questions serve as the foundation for the presentation of findings.

Prevalence of Climate Misinformation Types (RO1, RQ1, H1)

RQ.1. What and to what extent did climate-related misinformation circulated on Twitter/X about Pakistan's 2025 floods certainty and uncertainty (2 May–31 October 2025)?

Finding. According to the study's findings, the most common type of climate misinformation spread on Twitter/X during Pakistan's 2025 flood was False Causality 98932.7%), followed by Climate Change Denial (72, 24.0%) and Exaggeration of flood Severity (51, 17.0%). These three categories together accounted for 51(73.0%) of all misinformation found in the sample, demonstrating that most false information on floods misrepresented accepted climate science, twisted causal theories, or exaggerated the effects of disasters beyond what was supported by evidence. The substantial Chi-Square finding, χ^2 (5, N = 300) = 91.40, p <.001, verified that false information was systematically concentrated in narrative categories that cause uncertainty rather than being randomly distributed.

H.1. Climate-related misinformation circulated on Twitter/X about Pakistan's 2025 floods creates uncertainty.

Uncertainty-generating frames dominated the discourse during the study period, as seen by the statistically significant frequency of False Causality, Change Denial, Misleading Attribution, and Conspiracy Narratives. H1 consequently becomes supported.

These results are in line with previous research on climate misinformation, which found that inaccurate attribution and false causality are two of the most harmful types of information disorder because they directly impair the public's comprehension of complicated processes like climate change (Wardle & Derakhshan, 2017).

RO.1. To identify types of climate-related misinformation about Pakistan's 2025 floods that create uncertainty on Twitter/X (2 May–31 October 2025).

From a cultural perspective, during times of tragedy, Pakistanis have traditionally relied on unofficial avenues of communication, such as local media, religious leaders, and community elders, rather than formal institutional channels. Misleading causal narratives regarding the sources of the floods circulate quickly and are accepted without question due to this Cultural propensity.

Geographically, Pakistan's diverse landscapes, which include a coastal region, monsoon-prone central parts, and the glacial northern regions, mean that different communities of the experience floods through completely different physical factors. This makes it easier for false information about flood Causality to spread in communications that is geographically distant from the actual disaster zones.

From a climate perspective, the public finds it difficult to discern between natural variability and human-induced climate change due to the rising frequency of extreme weather events in Pakistan, brought on by the intensification of the South Asian monsoon, and the accelerated melting of the Himalayan glaciers. This leads to false causality and climate change denial. Denial Narratives are especially good at taking advantage of this gap in the knowledge.

Dominant Framing of Climate Misinformation (RO2, RQ2, H2)

RQ.2. To what dominant frames are used to communicate climate misinformation about the 2025 floods on Twitter/X?

Finding. The Responsibility/Blame Frame emerged as the dominant framing strategy in climate misinformation, accounting for 46.0% of all posts analyzed. The Human-Interest Frame ranked second with 62 posts 60(20.7%), followed by the Morality/Religious Frame 48(16.0%), Scientific Uncertainty Frame 35(11.7%), and Conflict Frame 17(5.7%). The Chi-Square Goodness-of-Fit test confirmed that the Responsibility/Blame Frame occurred significantly more frequently than all other framing categories, χ^2 (4, N = 300) = 145.11, p < .001.

H.2. Responsibility dominant framing is more frequent than other misinformation frames in flood 2025 on Twitter/X.

The Responsibility/Blame frame accounted for 138(46.0%) of all misinformation posts and happened considerably more often than all other frame types. H2, consequently, is supported.

This finding corresponds closely with the Framing Theory, which identifies Responsibility attribution as well as one of the four core functions of framing alongside the problem definition, moral evaluations, and treatment recommendations (Entman, 1993).

These patterns are consistent with the findings from the analysis of the media coverage of Pakistan's 2022 floods, which equally identified the Responsibility and Governance Frames as Dominant narratives, suggesting an ongoing aptitude in Pakistani social media's discourse to interpret climate disasters through the lens of institutional failure and political accountability (Khawaja et al., 2025)

While public scrutiny of governance is valid, the prevalence of unsupported Responsibility claims within a misinformation content problem generates institutional distrust and reduces public confidence in official disaster communication agencies such as NDMA.

RO.2. To examine the dominant frames of climate misinformation tweets on Pakistan's 2025 flood on Twitter/X.

From a Cultural analysis, Pakistani public discourses that has a profound embedded on tradition political critique and institutional blame, particularly during times of crisis when governance failures are visible, and the immediate. This cultural predisposition makes Responsibility/Blame of the frames a natural and highly resonant communication strategy on social media, regardless of whether the Blame Attributed is supported. From a geographical analysis of context, Pakistan's federal administrative structure in which the Responsibility for flood management is shared via federal, provincial, and local authorities to creates genuine an ambiguity about the who is accountable during disasters, making Blame Attribution Framing through particularly of effective in the exploiting governance confusion. From a climate analysis of the context, Pakistan's persistent an experience of the devastating floods without adequate of the government preparedness, or response infrastructure means, that audiences are primed to accept Blame's narratives, as the repeated failure of the official disasters response through systems creates a historically grounded expectation of the institutional failure, that misinformation actors take advantage of this easily.

Conclusion

This study, Examining Climate Misinformation on X: A Study of Pakistan's 2025 Flood, examined climate-related misinformation circulated on Twitter/X during Pakistan's 2025 monsoon flood season, covering the period from 2 May to 31 October 2025. Grounded in Climate Communication Theory (Moser, 2010; Schäfer & Schlichting, 2014)and Framing Theory (Entman, 1993). The study employed quantitative content analysis of 300 flood-related tweets to examine misinformation types and dominant frames across two research objectives and two corresponding hypotheses.

The findings demonstrate that climate misinformation during Pakistan's 2025 floods was predominantly characterized by False Causality 98(32.7%), Climate Change Denial 72 (24.0%), and Exaggeration of Flood Severity 51(17.0%), together accounting for 51 (73.7%) of all misinformation identified in the dataset. The Responsibility/Blame Frame dominated framing patterns, appearing in 138(46.0%) of all analyzed tweets.

Collectively, these findings confirm that climate misinformation in Pakistan is not a random or uniform phenomenon but is systematically concentrated in specific narrative types and framing strategies. The study contributes empirically to the growing body of Global South climate misinformation research by providing Pakistan-specific evidence of how false and misleading flood narratives are constructed, framed, circulated, and engaged with on social media during disaster events, addressing a critical and underexplored gap in both Pakistani disaster communication research and the broader Global South climate misinformation literature.

Recommendations

Based on evidence-based findings or results of this study, the following recommendations are offered for Government Agencies, Media Practitioners, Social Media platforms, and Education Policymakers operating in Pakistan and comparable climate-vulnerable contexts.

For Government and Disaster Communication Agencies

The findings strongly recommend that Institutions, as well as the National Disaster Management Authority (NDMA), develop proactive, timely, and culturally sensitive crisis communication strategies, specifically to anticipate and counter Responsibility/Blame and the Morality/Religious misinformation narratives before gaining traction during a peak disaster period. The official communication should directly address the most prevalent misinformation types obtained in this study, particularly False Causality and Climate Change Denial, by providing clear, evidence-based Counter-narratives that are accessible to the general audience across all digital platforms.

For Media Practitioners and Journalists

The study highlights the urgent need for rapid fact-checking protocols specifically designed for disaster periods, when misinformation spreads at the most rapid rate and at the highest extent. Media organizations operating in Pakistan should invest in dedicated verification infrastructure being able to identify and the correcting False Causality and Conspiracy Narrative content within hours of publication on Twitter/X and other social media platforms.

For Social Media Platforms

The study recommends the development and enforcement of more powerful content moderation policies targeting climate misinformation during officially declared disaster events. Integrated misinformation identification systems, coordinated classification of disputed climate content, and

rapid responses and protocols during activation disaster periods are suggested as platform-level strategies to reduce the spread and impacts of misleading flood narratives (Hilberts et al., 2025).

Limitations of the Study

Contrary to its contributions, this research has various limitations that should be acknowledged and considered while interpreting the findings.

Sample Size

The sample of 300 tweets, while appropriate for master's thesis-level quantitative content analysis and sufficient for the statistical analyses conducted, represents a relatively small proportion of the total extent of flood-related content published on Twitter/X during the six-month study period. Future studies should consider larger samples to enhance the statistical power and generalizability of findings.

Single Platform

The study is limited to a single Social Media platform, Twitter/X. While Twitter/X is an important platform for public discourse in Pakistan, significant extents of flood-related misinformation also circulate on Facebook, YouTube, WhatsApp, and TikTok. A cross-platform analysis would provide a more comprehensive and representative picture of the misinformation ecosystem during disaster events in Pakistan (Muhammed T & Mathew, 2022).

Future Research Directions

Based on the findings and limitations of this study, the following directions are recommended for future research in the field of climate misinformation, disaster communication, and social media studies in Pakistan and the Global South.

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