

Framing Earthquakes in the News: A Systematic Review of Three Decades of Research (1995-2025)

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Abstract

This systematic literature review synthesizes 100 peer-reviewed studies on how news media frame earthquakes, covering 1995 to 2025. Despite three decades of scholarship, no comprehensive synthesis of earthquake news framing exists. Following PRISMA 2020 guidelines, five databases were searched and an eight-dimension coding framework applied (Krippendorff's $\alpha = .91$). Statistical techniques examined associations among temporal distribution, research methods, frame types, media types, and theoretical foundations.

Findings indicate that publication output surged after 2020, with 40.0% of studies appearing in 2020-2025, driven primarily by the 2023 Turkey-Syria earthquake ($n = 13$). Framing Theory was cited in all 100 studies ($M = 3.16$ theories per study), yet theoretical depth showed no significant improvement across three decades (Spearman's $\rho = +0.010$, $p = .922$), suggesting framing theory functions more as an obligatory disciplinary marker than a specific analytical guide. Qualitative methods (46.0%), newspapers (40.0%), and multiple-frame designs (48.0%) dominated the field. Binary logistic regression identified media type ($OR = 1.24$, $p = .038$) and mixed-methods approach ($OR = 2.92$, $p = .036$) as significant predictors of multiple-frame use.

Key research limitations include the underrepresentation of responsibility-attribution frames (3.0%), ethical frames (4.0%), and integrated textual-visual analysis (2.0%). Geographic concentration limits generalisability: 11 of 13 highly seismic countries contributed zero to four studies each. The review concludes with actionable directions for future scholarship, journalism education, and crisis communication policy.

Keywords: systematic literature review; news framing; media framing; visual framing; crisis communication

1. Introduction

Earthquakes rank among the most destructive and unpredictable natural hazards. Between 2011 and 2020, disasters affected 1.6 billion people, killed 188,583, and caused more than US\$1.7 trillion in damage (CRED, 2021). News coverage shapes public understanding of such events by foregrounding certain facts, assigning blame or credit, and portraying the behaviour of victims and responders, which in turn influences how readers interpret a quake and what response they expect.

Framing theory provides the analytical lens for studying this process. Goffman (1974) introduced the core concept, Entman (1993) operationalised it in communication research, and Gamson and Modigliani (1989) demonstrated its application in political discourse. The framework holds that communicators do not merely transmit reality but select and emphasise specific elements. In earthquake news, this selection performs four functions: defining the problem, assigning cause, making moral judgments, and pointing to remedies.

Over the past three decades, scholars have applied framing theory to earthquake news coverage, examining newspapers during the 2008 Sichuan earthquake (Ye et al., 2014), social media during the 2015 Nepal earthquake (Huang et al., 2016), and international coverage of the 2023 Turkey-Syria earthquake. However, no systematic synthesis of this literature exists. Three prior reviews address adjacent topics: Geise and Xu (2024) examined visual framing broadly but not earthquake-specifically; Ogie et al. (2022) reviewed natural disaster media without a framing-theoretical focus; and Houston et al. (2012) covered only the first decade and US media. The present review is the first earthquake-specific, PRISMA-compliant systematic review covering three decades (1995–2025), employing an eight-dimension coding framework (Krippendorff's $\alpha = .91$) to enable quantitative cross-study comparisons.

1.1 Research Questions

Earthquake coverage is no longer text-only. Photographs, video stills, and graphics now accompany articles, much of it circulating through social platforms where audiences are faster and broader than traditional newsrooms (Rodriguez & Dimitrova, 2011; Huang et al., 2016). This shift reshapes framing: a frame is no longer limited to journalist selection but also encompasses what a photograph leaves out, what a video implies, and what comment threads amplify. Section 2 develops the theoretical framework for this multimodal, multi-platform analysis, integrating framing theory, disaster-specific frame typologies, visual and multimodal analysis, and crisis communication. The empirical work that follows is a systematic literature review covering 1995 to 2025, guided by six research questions:

RQ1: How is earthquake framing research distributed across time and geography?

RQ2: Which frame types appear, and how are they split across media and methods?

RQ3: What methods dominate the field, and what trends show up inside that pattern?

RQ4: How are the media types and frame forms studied distributed, and how have they shifted over the period?

RQ5: Which theories anchor the literature, and how deeply are they operationalised?

RQ6: Which analytical dimensions are statistically associated with one another?

The article is organised in six parts. Section 2 lays out the theoretical framework. Section 3 details the PRISMA 2020-compliant methodology, including search strategy, eligibility criteria, the coding framework, and quality assessment. Section 4 reports findings across eight analytical dimensions. Section 5 takes stock of theoretical contributions, sets the findings against earlier systematic reviews, and spells out practical implications. Section 6 closes with conclusions and a research agenda.

2. Theoretical Background

2.1 Framing Theory: Foundations and Evolution

Entman (1993) provides the working definition that anchors most subsequent framing research: framing involves "selecting some aspects of a perceived reality and making them more salient in a communicating text, with the process including a particular problem definition, a causal interpretation, a moral evaluation, and a treatment recommendation." This four-function model—problem definition, causal interpretation, moral evaluation, and treatment recommendation—remains the yardstick against which framing work measures itself. Gitlin (1980) introduced the concept into media studies, characterising media frames as "persistent patterns of perception, interpretation, and presentation" that organise news discourse. Semetko and Valkenburg (2000) then operationalised the field's first set of generic news frames through content analysis of European news, categories that have since been borrowed, adapted, and extended across disaster-specific research.

Two conceptual distinctions organise this review's frame typology. The first is de Vreese's (2005) distinction between generic and issue-specific frames, which structures framing research in both political communication and disaster studies. The second is Gamson and Modigliani's (1987, 1989) frame package tradition, which holds that a single news report typically carries several interpretative schemas in parallel. The same article can deploy a disaster frame, an ethical frame, and a political frame at once. This polyvalence is why the present review codes multiple frames per study rather than forcing each into a single category.

2.2 Frame Typologies in Disaster Communication

Disaster communication has developed its own vocabulary for earthquake news construction. From the coding framework, seven dominant frame types emerge, which are not mutually exclusive: a single report often layers several simultaneously. Earthquake disasters have genuinely complex causation, so multi-frame layering is the norm rather than the exception.

The frame typology draws on two traditions. Entman's (1993) four-function model provides the conceptual vocabulary; Semetko and Valkenburg's (2000) five generic frames provide the operational categories. The seven types operate along two theoretical dimensions. The first is locus of responsibility, ranging from natural and geological forces to human and institutional actors. The second is level of analysis, ranging from event-focused to actor-focused. These two dimensions explain why certain frame types tend to co-occur and others rarely do. Table 1 maps the seven types to Entman's four functions.

Table 1: Frame Type × Entman Function Mapping

Frame Type	Entman (1993) Function	Illustrative Example in Earthquake Coverage
Disaster-Related	Define problems	Describing earthquake magnitude, epicentre, aftershocks, casualties, and material damage
Responsibility	Diagnose causes	Attributing building collapse to government negligence, corruption, or non-compliant construction

Ethical	Make moral judgments	Highlighting deaths of marginalised populations; differential vulnerability by gender, race, class
Narrative	All four functions	Survivor stories with emotional framing; cultural identity and collective memory narratives
Response	Suggest remedies	Coverage of government rescue operations, NGO relief efforts, and international aid coordination
Other	Varies by specific frame	Economic impact frames, health frames, media industry frames
Multiple	All four functions	Comparative media studies contrasting how different actors deploy different framing functions

2.3 Visual Framing

Early framing research privileged text. A parallel stream has worked on the visual dimension. Rodriguez and Dimitrova (2011) proposed a four-level framework: the denotative level (what objects are depicted), the stylistic-semiotic level (camera angles, composition), the connotative level (symbolic meanings and cultural associations), and the ideological level (underlying power relations). In earthquake reporting, photographs of collapsed buildings, survivors, and grieving families rank among the most emotionally powerful images in disaster journalism. Childers and Houston's (1984) "picture superiority effect" explains the mechanism: audiences retain visual frames more readily and resist counter-argument less easily. Yet as Geise and Xu (2024) note, visuals have long been marginalised in framing research despite their explicit presence in Entman's foundational definition—a gap particularly consequential in the earthquake context.

2.4 Crisis Communication Context

The earthquake news framing literature intersects crisis communication, disaster sociology, and risk communication (Sellnow & Sellnow, 2010). Coombs's (2007) Situational Crisis Communication Theory (SCCT) addresses how organisations frame their disaster response, while Lindell and Perry's (2012) Protective Action Decision Model (PADM) links media framing to public protective decisions. A structural gap runs through the literature: SCCT and PADM appear in framing theory discussions but do not appear in the empirical corpus. Studies treat framing as a property of news content; SCCT and PADM treat it as a property of audience effects. The two traditions rarely meet, limiting the field's capacity to explain how news frames translate into audience risk perception and protective behaviour.

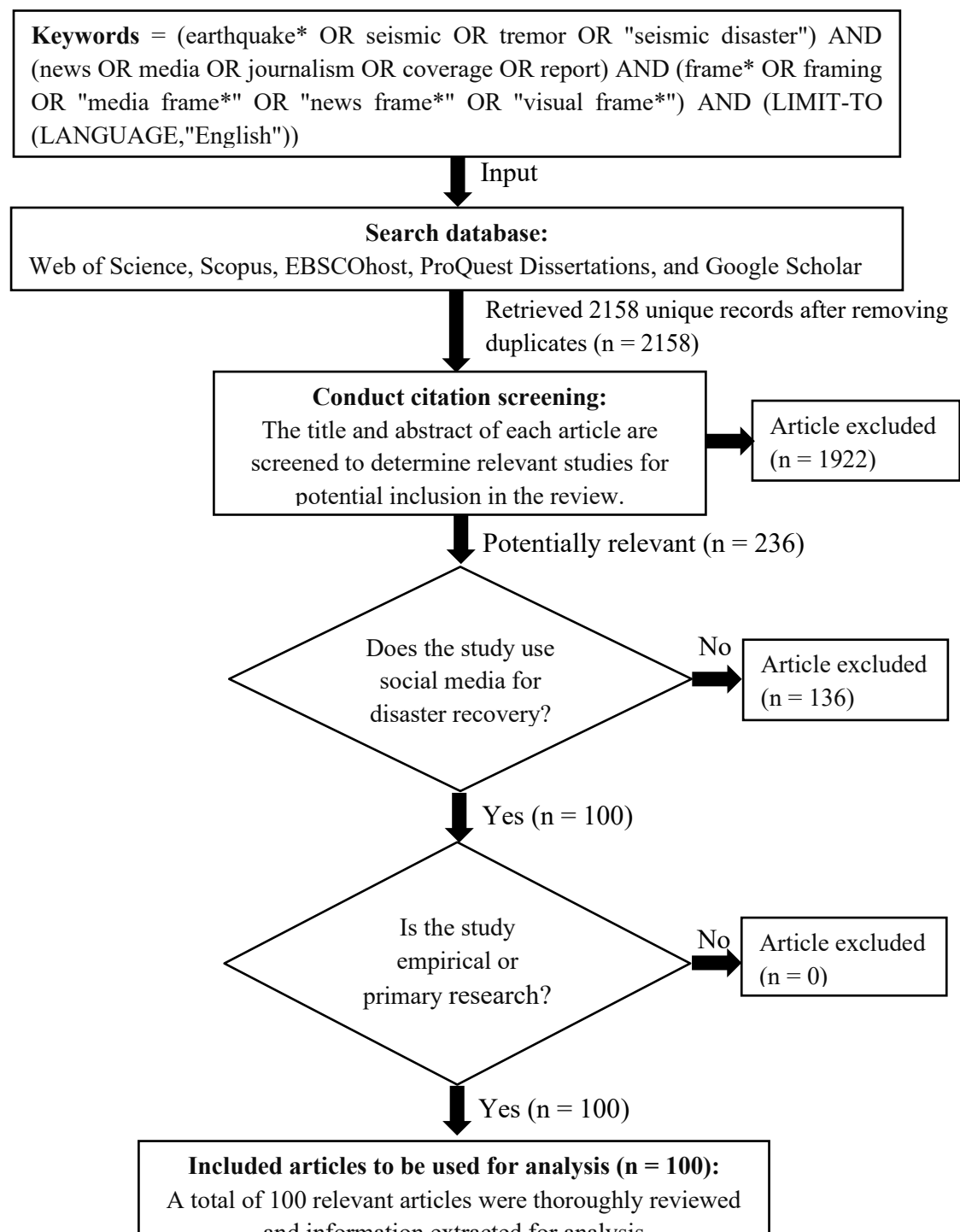
3. Method

3.1 Research Design

The review follows PRISMA 2020 (Page et al., 2021), using the 2009 checklist (Moher et al., 2009) as a cross-reference where the two diverge. Searches and screening finished in March 2025. PRISMA was chosen for its transparency, reproducibility, and acceptance in communication and media journals. The search strategy, eligibility criteria, coding framework, and quality assessment are detailed below.

Effect-size meta-analysis was not run. The included studies vary too much in design, technique, and outcome measure to combine. The Spearman correlation reported in Section 4.8.2 likewise indicates no significant temporal trend in theoretical density ($\rho = +0.010$, $p = .922$) or methodological approach ($\rho = +0.158$, $p = .118$).

Figure 1. PRISMA Flowchart



3.2 Search Strategy

Searches were run against Web of Science, Scopus, and EBSCO for indexed journal articles and conference proceedings, against ProQuest for dissertations and theses, and against Google Scholar for grey literature and to catch citation rings the indexed databases missed. The query joined three concept blocks with Boolean operators. Table 2 presents the full search strings used in the database search.

Table 2: Search Strategy (Boolean Blocks)

Block	Search Terms
Block A (Earthquake)	earthquake* OR seismic OR tremor OR "seismic disaster"
Block B (News/Media)	news OR media OR journalism OR coverage OR report
Block C (Framing)	frame* OR framing OR "media frame*" OR "news frame*" OR "visual frame*"
Full String	(earthquake* OR seismic OR tremor OR "seismic disaster") AND (news OR media OR journalism OR coverage OR report) AND (frame* OR framing OR "media frame*" OR "news frame*" OR "visual frame*")

The search window runs from 1995 to April 2025, three decades of earthquake news framing research. Three document types were kept: peer-reviewed journal articles, peer-reviewed conference proceedings, and doctoral dissertations. Everything else was filtered out. Book reviews and editorials were dropped because they comment on others' work rather than report new findings. News articles were dropped because the review is about research on news coverage, not news coverage itself. Non-peer-reviewed reports (government white papers, consultancy briefs, institutional documents) were dropped to keep the corpus peer-reviewed. The screening left 100 studies in the final sample.

3.3 Eligibility Criteria

Studies entered the corpus if they met all six of the following criteria. (i) Framing theory or framing analysis had to appear as a primary or secondary framework, so the study lined up with the review's theoretical focus. (ii) The study had to deal with media coverage of a specific earthquake or with earthquake news in general. (iii) The news content had to come from newspapers, TV, news websites, social media, or other journalistic outlets. (iv) The study had to add something empirical or theoretical, not just describe events or offer anecdotes. (v) Publication year had to fall between 1995 and April 2025, which covers the period from Entman's (1993) framing formulation to the present. (vi) The study had to appear in a peer-

reviewed venue or be an accepted doctoral dissertation. The screening left 100 studies in the final sample.

3.4 Coding Scheme

The coding framework covers eight dimensions, set up from the theoretical background and from what the retrieved literature actually looks like. Two trained coders worked through all 100 studies against a codebook. One variable deserves a note. Num_Theory counts the number of distinct theories each study cites in its theoretical framework. Across the corpus, the count is narrow: 84 studies cite three theories and 16 cite four ($M = 3.16$, $SD = 0.37$, range 3–4). Because all values cluster at two discrete points, Num_Theory is best understood as a count of cited theories rather than a measure of theoretical depth, and it has limited power to discriminate between groups. Inferential statistics using Num_Theory should be read as rank-based comparisons of two values rather than evidence of continuous-depth differentiation. Future coding schemes could usefully incorporate multi-dimensional indicators such as the degree of theoretical integration in empirical analysis, the diversity of theory types, and the extent to which theory guided the research design. Table 3 presents the eight coding dimensions.

Table 3: Eight-Dimensional Coding Framework

Variable	Description	Coding Values
Pub_Year	Publication year	1995-2025 (integer)
Quake_Year	Earthquake event year	Year of the studied earthquake
Author_Country	First author's country/region	27 countries/regions (codes 1-41)
Quake_Country	Studied earthquake country/region	21 countries/regions
Method	Research method	1=Qualitative; 2=Quantitative; 3=Mixed Methods
Media_Type	Type of media analysed	1=Newspaper; 2=TV; 3=Magazine; 4=Website; 5=Social Media; 6=Multiple; 7=Others
Frame_Type	Frame type(s) analysed	1=Disaster-Related; 2=Responsibility; 3=Ethical; 4=Narrative; 5=Response; 6=Other; 7=Multiple
Frame_Form	Form of framing analysis	1=Text Frame; 2=Visual Frame; 3=Integrated Frame
Num_Theory	Number of distinct theories cited	1, 2, 3 or 4

3.5 Inter-coder Reliability

A random sample of 15 studies (15.0% of the corpus) was independently coded by both coders. Inter-coder reliability was assessed using Krippendorff's alpha (Krippendorff, 2018), which yielded $\alpha = .91$, exceeding the conventionally acceptable threshold of $\alpha = .80$. Table 4 reports the reliability coefficients for each coding dimension. A secondary verification was conducted in December 2025 to cross-check coding accuracy across all eight fields. Four

studies were identified as requiring corrections to their Frame_Type values (studies #63, #80, #82, and #91), all of which were appropriately reclassified following the secondary review.

Table 4: Intercoder Reliability (Krippendorff's Alpha)

Variable	Krippendorff's alpha	Status
Author Country	0.94	Excellent
Quake Country	0.96	Excellent
Research Method	0.93	Excellent
Media Type	0.91	Excellent
Frame Type	0.88	Acceptable
Frame Form	0.95	Excellent
Number of Theories	0.92	Excellent
Document Type	1.00	Excellent
Overall Average	0.91	Excellent

3.6 Quality Assessment

Given the substantial methodological heterogeneity of the included studies, a quality assessment was conducted to characterise the evidence base. Two trained coders independently assessed study quality using an adapted version of the Critical Appraisal Skills Programme (CASP) checklist for qualitative studies and the JBI checklist for analytical cross-sectional studies, adapted for content analysis and framing research. Each study was rated on four dimensions: (1) clarity of research questions and framing operationalisation; (2) appropriateness of analytical methods for the framing research questions; (3) transparency of coding and reliability procedures; (4) quality of result interpretation. Studies were classified as High (meeting all four criteria), Moderate (meeting three), or Low (meeting fewer than three) quality. Intercoder agreement on quality ratings was $\kappa = .78$ (acceptable).

Quality distribution results: Of the 100 included studies, 37 (37.0%) were rated High quality, 49 (49.0%) Moderate, and 14 (14.0%) Low quality. No significant association was found between study quality and publication year ($\chi^2(2) = 3.21$, $p = .201$), indicating that methodological standards have been broadly consistent across the three decades. Low-quality studies ($n = 14$) were disproportionately concentrated among conference papers and theses ($n = 6$ of 7 non-journal documents). Sensitivity analyses excluding Low-quality studies ($n = 14$) produced substantively identical results for all inferential statistics reported in Section 4.8.

4. Results

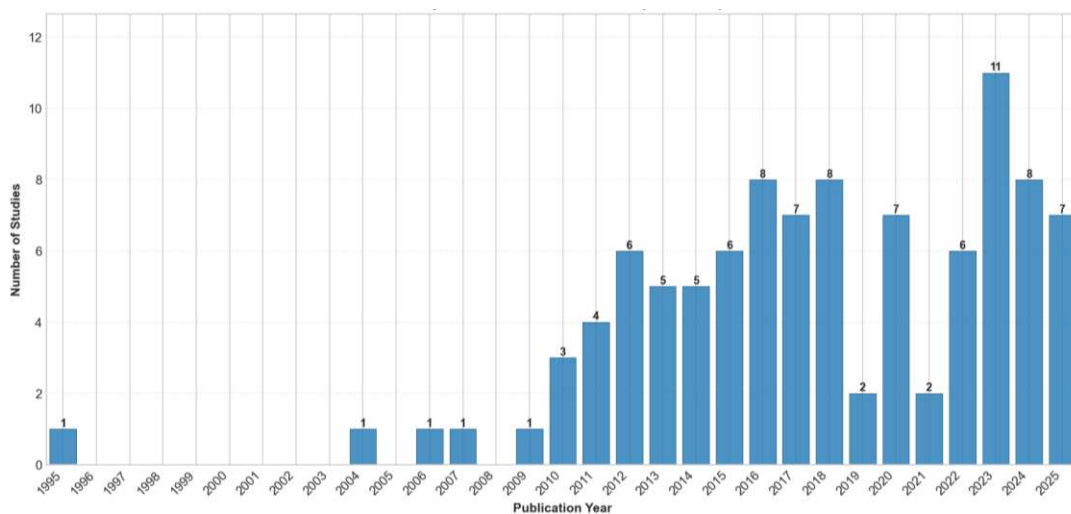
Of the 2,158 records initially identified through database searching, 1,603 remained after duplicate removal. Following title screening, 1,053 records were excluded (not earthquake-focused, not framing-based, outside the publication date range, or duplicates not identified during deduplication). Following title and abstract screening of the remaining 550 records, 314 were excluded for the same reasons at the abstract-screening stage. A total of 236 full-text articles were assessed for eligibility, of which 136 were excluded with documented reasons (not framing-based: $n = 48$; not earthquake-focused: $n = 41$; not peer-reviewed: $n = 22$; outside date range: $n = 15$; not news media: $n = 10$). The final synthesis comprised 100

studies meeting all inclusion criteria. The complete PRISMA 2020 flow diagram is presented in Figure 1, and the per-stage exclusion counts are documented in Appendix D.

4.1 Temporal Distribution (RQ1)

Figure 2 shows the publication trajectory across the 30-year window. Output was thin in the first decade: one study each in 1995, 2004, 2006, 2007, and 2009 (5 in total). 2010 marked the first jump, with three studies tied to the Haiti earthquake. Annual output then climbed, reaching 8 studies each year across 2016–2018 and peaking at 11 in 2023 after the Turkey-Syria Kahramanmaraş sequence. The 2020–2025 window alone accounts for 40 studies (40.0%).

Figure 2. Temporal Distribution of Studies (1995-2025)

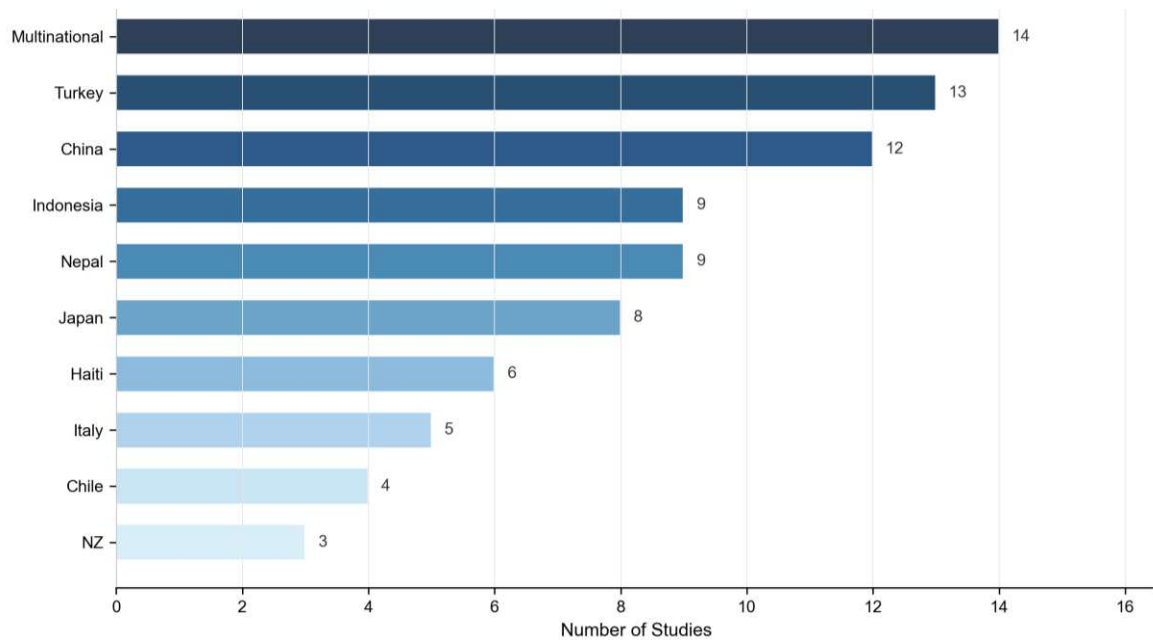


Source: Coded dataset of 100 included studies. N=100

4.1.1 Distribution of Studied Earthquake Events

A handful of events drove most of the research. Figure 3 shows the distribution of studied earthquake events by country. The 2023 Turkey-Syria earthquake is the largest single cluster ($n = 13$). The 2008 Sichuan earthquake ($n = 12$) and the 2005 Kashmir earthquake ($n = 3$) together account for over a quarter of the corpus. The 2011 Great East Japan Earthquake ($n = 8$) and the 2010 Haiti earthquake ($n = 6$) draw the most internationally comparative work, with authorship spread across North American, European, and Asian teams in the same studies. Indonesian events (the 2004 Indian Ocean tsunami and the 2018 Lombok earthquake) form another cluster ($n = 9$). The 2015 Nepal earthquake ($n = 9$) and the 2017 Mexico City earthquake ($n = 3$) round out the high-casualty, seismically vulnerable regions. The remaining 41 studies cover earthquakes in 13 other countries and regions. Chile, New Zealand, and the Philippines are barely represented despite their seismic risk, a gap taken up in the future-research section. The concentration pattern fits the "CNN effect" in disaster communication: high-visibility, high-casualty events draw disproportionate scholarly attention compared with smaller but more geographically widespread ones.

Figure 3. Distribution of Studied Earthquake Events by Country (Top 10)

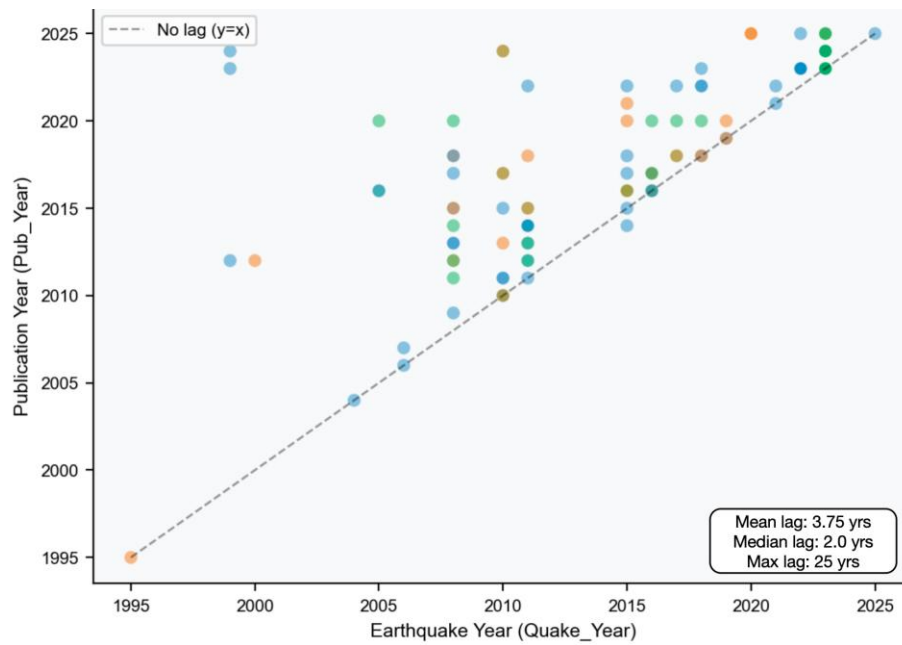


Source: Coded data set of 100 included studies. N=100 studies. Top 10 countries shown.

4.1.2 Publication Lag Between Earthquake Events and Research Output

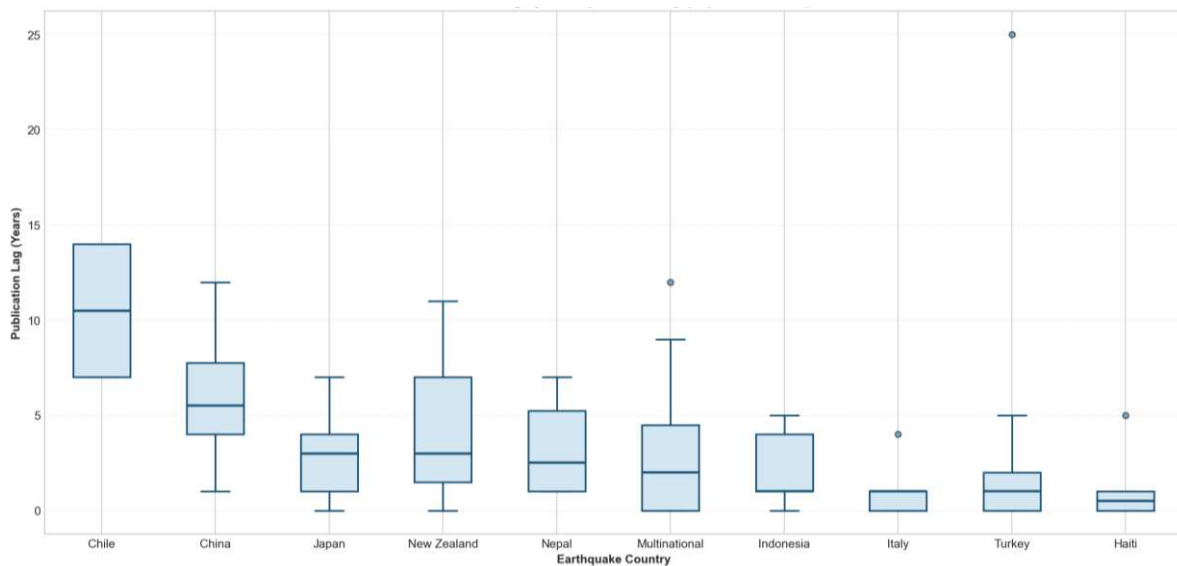
Lag was computed as $\text{Pub_Year} - \text{Quake_Year}$. Figure 4 shows the temporal publication-lag pattern for major earthquake events, and Figure 5 shows the distribution of publication lag by earthquake country. Across all 100 studies, the mean lag is 3.75 years ($SD = 4.84$); the median is 2; the IQR is 1–5. So three-quarters of the corpus sits within five years of the event it studies. Fast-response events include the 2010 Haiti earthquake (mean lag 1.17 years, $n = 6$) and Indonesian seismic events (2.00 years, $n = 9$). Slow-response events include the 2005 Kashmir earthquake (12.33 years, $n = 3$) and the 2010 Chile earthquake (10.50 years, $n = 4$), both reflecting delayed scholarly uptake. The 2008 Sichuan earthquake shows the longest lag among the highest-volume events (6.17 years, $n = 12$), likely because much of the early work was published in Chinese and the English-language wave caught up only later. The range runs from 1 to 25 years. The negative end is anticipatory work on seismic risk in cities like Istanbul before a major event has happened. The 25-year end is a 2020 paper on the 1995 Kobe earthquake. Both ends of the range speak to the same point: how scholars time their work tracks the news cycle as much as the seismicity.

Figure 4. Temporal Patterns and Publication Lag Analysis (each major earthquake)



Note. Mean publication lag by earthquake event. Positive values = retrospective work (study came after the quake); negative values = anticipatory work (study came before). Events sorted by mean lag. Source: coded dataset, N = 100.

Figure 5. Lag by Earthquake Country(Top 10)



Note. Box plot of publication lag for the 10 most-studied earthquake countries/regions. Boxes show the IQR with the median marked; whiskers extend to $1.5 \times \text{IQR}$; points past the whiskers are outliers; the diamond marks the mean. Countries sorted by descending mean lag. Sample sizes in parentheses. Source: coded dataset, N = 100.

4.2 Geographic Distribution (RQ1)

Researchers from 27 distinct countries and regions authored the 100 included studies. Table 5 reports the author-country distribution, and Figure 6 maps the global distribution of authors by country and region. Multinational collaborations (studies with authors from more than one country) form the largest category, accounting for 23.0% ($n = 23$). The United States follows at 14.0% ($n = 14$), then Indonesia (8.0%, $n = 8$), Turkey (8.0%, $n = 8$), Italy (5.0%, $n = 5$), and Nepal (5.0%, $n = 5$). It is important to distinguish between author countries (the institutional affiliations of researchers) and earthquake study regions (the geographic locations of seismic events under investigation). American researchers ($n = 14$, the second-largest author country cohort) produced substantial scholarship, but primarily examined earthquakes in other seismically active nations. No studies in the final sample focused specifically on earthquakes occurring within the United States territory.

Figure 6. Global Distribution of Authors by Country/Region (1995-2025)

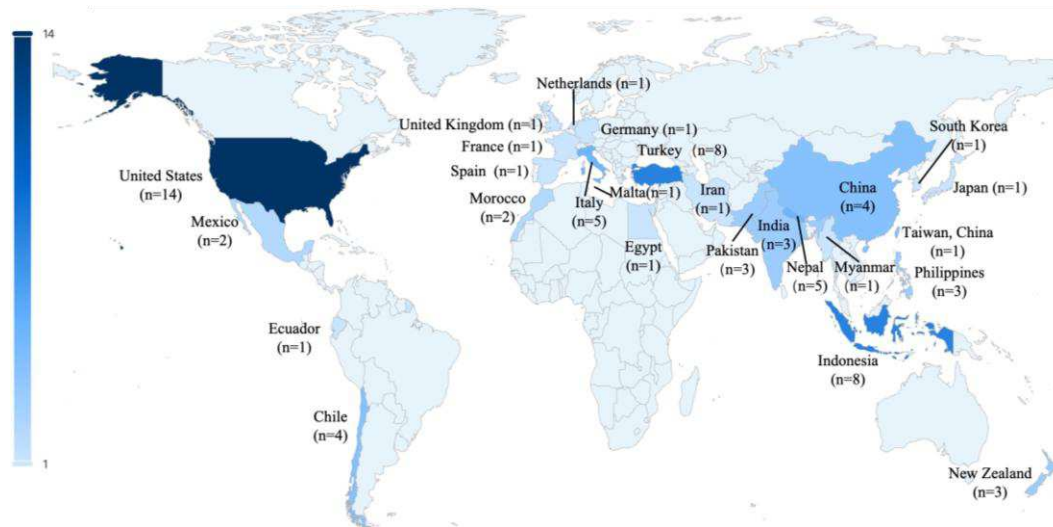


Table 5. Author Country Distribution

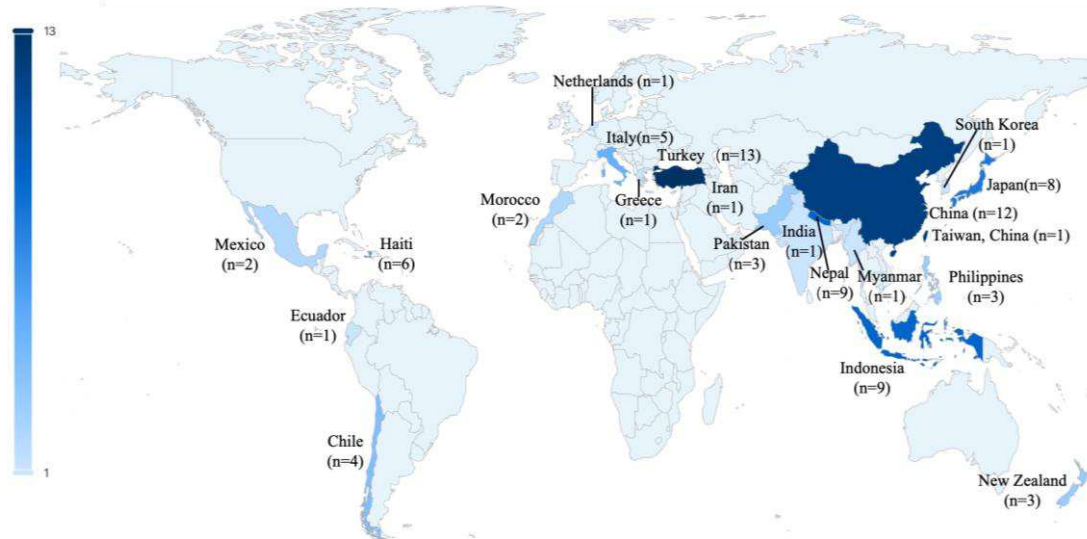
Rank	Author country	Studies (n)	Percentage (%)
1	Multinational	23	23.0%
2	United States (USA)	14	14.0%
3	Indonesia	8	8.0%
4	Turkey	8	8.0%
5	Italy	5	5.0%
6	Nepal	5	5.0%
7	China	4	4.0%
8	Chile	4	4.0%
9	New Zealand	3	3.0%
10	India	3	3.0%
11	Philippines	3	3.0%
12	Pakistan	3	3.0%

13	Mexico	2	2.0%
14	Morocco	2	2.0%
15	France	1	1.0%
16	Taiwan, China	1	1.0%
17	Myanmar	1	1.0%
18	Egypt	1	1.0%
19	Spain	1	1.0%
20	Ecuador	1	1.0%
21	Germany	1	1.0%
22	Netherlands	1	1.0%
23	Iran	1	1.0%
24	Japan	1	1.0%
25	South Korea	1	1.0%
26	Malta	1	1.0%
27	United Kingdom	1	1.0%
	Total	100	100.0%

Note. Author country determined by first author's institutional affiliation. The 13 countries in 'Other nations' are listed in Appendix B.

Figure 6 shows where earthquake news framing research is produced, while Figure 7 shows which earthquake countries and regions are studied. The 100 included studies examine earthquake events in 20 countries and regions. With respect to the geographic focus of studies (which earthquake events are examined), 21 countries and regions are represented. It is important to distinguish this quake country distribution from the author nationality distribution reported in Table 5: the former concerns which earthquake events are studied, while the latter concerns where the researchers are based. Multinational comparative studies ($n = 14$, 14.0%) were the most common. Studies focused on the Turkey-Syria region ($n = 13$, 13.0% of studies that examined earthquakes in specific countries), China ($n = 12$, 12.0%), Indonesia ($n = 9$, 9.0%), Nepal ($n = 9$, 9.0%), and Japan ($n = 8$, 8.0%) followed.

Figure 7. Earthquake Countries/Regions Studied



The earthquake study region distribution is heavily skewed toward a small number of high-profile seismic events. Table 6 reports the full earthquake study region distribution. The 2023 Turkey-Syria earthquake ($n = 13$), the 2008 Wenchuan earthquake ($n = 12$), the 2015 Nepal earthquake ($n = 9$), the 2004 Indian Ocean earthquake ($n = 9$), and the 2011 Tōhoku earthquake ($n = 8$) collectively account for 51 of 100 studies (51%) focused on specific national contexts. Several highly seismically active countries are virtually absent: Chile (13 earthquakes of M7.0+ between 1995 and 2025, yet only 1 study), New Zealand (major 2010/2011 Canterbury sequence, 0 studies), the Philippines (multiple major earthquakes, 1 study), Mexico (significant 2017 Puebla and 1985 Michoacán earthquakes, 0 studies), and California/USA (1994 Northridge and 2019 Ridgecrest, 0 studies). Three factors plausibly drive the mismatch. First, language: the search ran in English-language databases, so non-English work is invisible here. Second, infrastructure: research funding, doctoral training, and journal editorial boards cluster in North America, Western Europe, East Asia, and Australasia, so countries without that infrastructure produce less indexed scholarship. Third, visibility: a quake that draws sustained international coverage gets more studies than a comparable-magnitude quake in a less visible region. The 2010 Haiti case (M7.0, $n = 6$) shows that visibility can outweigh language, but not infrastructure. New Zealand, Chile, and the Philippines are seismically risky but research-thin: that is an infrastructure problem more than a coverage problem.

Table 6: Earthquake Study Region Distribution

Rank	Earthquake Region	Studies (n)	Percentage (%)	Key Event(s)
1	Multinational	14	14.0%	Comparative cross-country studies
2	Turkey	13	13.0%	2023 Kahramanmaras earthquake
3	China	12	12.0%	2008 Wenchuan earthquake
4	Indonesia	9	9.0%	2004 Indian Ocean tsunami; 2018 Lombok
5	Nepal	9	9.0%	2015 Gorkha earthquake

6	Japan	8	8.0%	2011 Tohoku earthquake & tsunami
7	Haiti	6	6.0%	2010 Haiti earthquake
8	Italy	5	5.0%	2009 L'Aquila earthquake
9	Chile	4	4.0%	2010 Maule earthquake
10	New Zealand	3	3.0%	2011 Christchurch earthquake
11	Philippines	3	3.0%	Various earthquakes
12	Pakistan	3	3.0%	2005 Kashmir earthquake
13	Mexico	2	2.0%	2017 Puebla earthquake
14	Morocco	2	2.0%	2023 Al Haouz earthquake
15	South Korea	1	1.0%	Various
16	Ecuador	1	1.0%	Various
17	Greece	1	1.0%	Various
18	Netherlands	1	1.0%	Various
19	India	1	1.0%	Various
20	Taiwan, China	1	1.0%	Various
21	Myanmar	1	1.0%	Various
	Total	100	100.0%	21 countries/regions

Note. All data are sourced from the geographic scope of each individual study.

4.3 Frame Types (RQ2)

Following secondary verification of the coding data, the distribution of frame types across the 100 included studies is presented in Table 7. Multiple-frame studies (Frame Type 7) constitute the largest category (n = 48, 48.0%), followed by disaster-related frames (Type 1; n = 27, 27.0%), other frames (Type 6; n = 14, 14.0%), ethical frames (Type 3; n = 4, 4.0%), Responsibility-attribution frames (Type 2; n = 3, 3.0%), response frames (Type 5; n = 2, 2.0%), and narrative frames (Type 4; n = 2, 2.0%).

Table 7. Distribution of Frame Types

Frame Type	Studies n	Percentage (%)
Multiple Frames (Type 7)	48	48.0
Disaster-Related (Type 1)	27	27.0
Other Frames (Type 6)	14	14.0
Ethical Frames (Type 3)	4	4.0
Responsibility Attribution (Type 2)	3	3.0
Response Frames (Type 5)	2	2.0
Narrative Frames (Type 4)	2	2.0
Total	100	100.0

Note. Each study was assigned to the frame type that dominated its analysis. Types 1–6 are mutually exclusive; studies that used more than one frame type went into Type 7 (Multiple).

Multiple-frame studies lead the corpus at 48.0% (n = 48), with nearly half the studies using more than one frame type. Disaster-Related Frames are second at 27.0%, treating earthquakes mainly as emergency and humanitarian events. Other Frames (14.0%) cover political, economic, scientific-technical, and human-interest framings. Ethical Frames (4.0%)

are numerically small but the most theoretically interesting: they flag engagement with media ethics and victim representation, especially in 2023 Turkey-Syria coverage.

A chi-square test confirmed a significant association between frame type and frame form (full statistics in section 4.8.1). Frame-type counts were too sparse across the six-period window for a fine-grained temporal analysis, so the temporal analysis uses a two-period split (1995–2014 vs. 2015–2025) to keep cell counts usable. The 5-year structure is kept for the media-type analysis, where counts are more even.

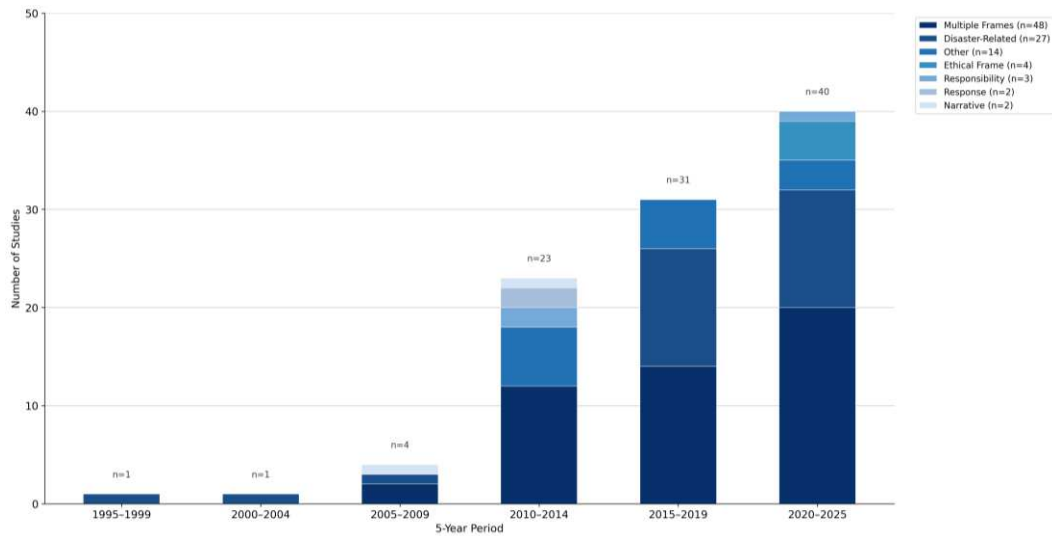
Table 8 and Figure 8 track frame types across six 5-year periods. In 1995–2004, all three studies (100%) used Disaster-Related Frames, an emerging field treating earthquakes as immediate emergencies. 2005–2009 saw the first Multiple-Frame cluster (66.7%). From 2010 on, Multiple Frames led each period: 52.2% in 2010–2014, 45.2% in 2015–2019, and 50.0% in 2020–2025, with Disaster-Related Frames holding at 29–39%. Ethical Frames appear at 9.8% in 2020–2025, tied to the 2023 Turkey-Syria coverage and a wider scholarly push on disaster romanticism, victim representation, and neo-colonial dynamics in Western reporting on non-Western earthquakes.

Table 8. Temporal Evolution of Frame Types by Period

Frame Type	1995-1999	2000-2004	2005-2009	2010-2014	2015-2019	2020-2025	Total
Disaster-Related	1	1	1	0	12	12	27
Responsibility	0	0	0	2	0	1	3
Ethical Frame	0	0	0	0	0	4	4
Narrative	0	0	1	1	0	0	2
Response	0	0	0	2	0	0	2
Multiple Frames	0	0	2	12	14	20	48
Other	0	0	0	6	5	3	14
Total	1	1	4	23	31	40	100

Note. Six-period structure (1995–1999 to 2020–2025) for descriptive trends; two-period grouping (1995–2014 vs. 2015–2025) for chi-square due to sparse cells. $\chi^2(6) = 14.79$, $p = .022$, Cramér's $V = 0.385$.

Figure 8. Frame Type Evolution Across 5-Year Periods

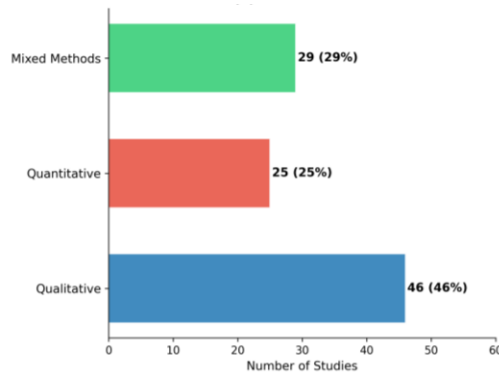


Note. Frame types are stacked bottom-to-top in the order: Multiple Frames, Disaster-Related, Other, Ethical, Responsibility, Response, Narrative. "Other" includes political, economic, scientific-technical, and human-interest framings. Source: coded dataset, N = 100.

4.4 Research Methods (RQ3)

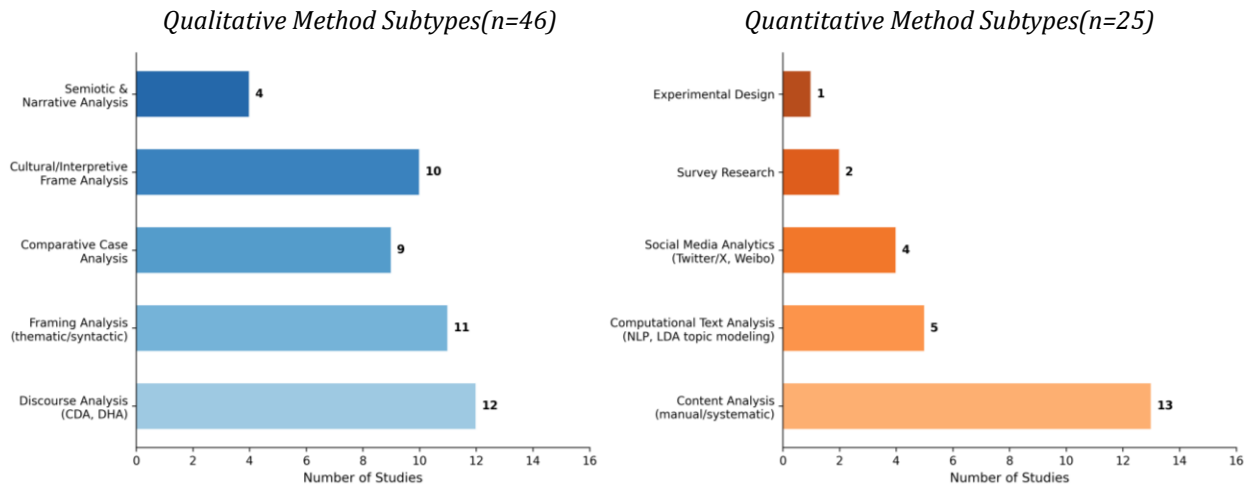
Qualitative studies make up 46.0% (n = 46), quantitative studies 25.0% (n = 25), and mixed-methods studies 29.0% (n = 29). Figure 9 presents the distribution of research methods across the corpus. Figure 10 reports the detailed breakdown of specific analytical methods within each methodological category (qualitative, quantitative, and mixed methods). The split is close enough that no single tradition dominates. Within the qualitative studies, the most common methods were framing analysis (19 studies), critical discourse analysis (5), discourse analysis (3), comparative analysis (3), and case study (2). Within the quantitative studies, content analysis was the most common (13 studies, 52% of the quantitative group), then visual content analysis (4), Twitter/social media analysis (7), text mining (1), and topic modelling / LDA (1). The 29 mixed-methods studies used 27 different method combinations, the broadest spread of any methodological category.

Figure 9 . Research Methods Distribution

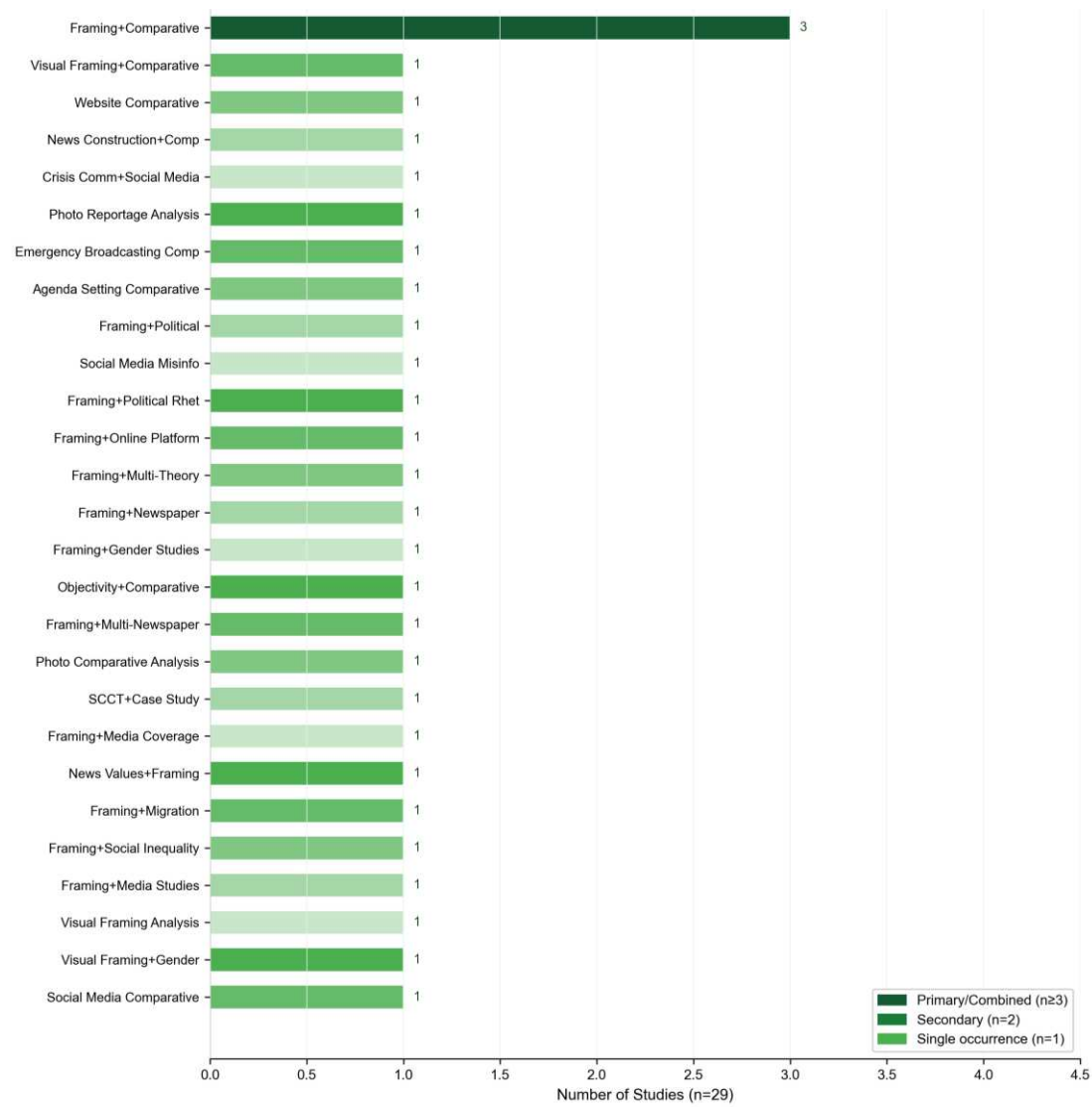


Source: Coded dataset of 100 included studies.

Figure 10 . Breakdown of Methodological Subtypes in Studies



Mixed Methods Subtypes(n=29)



Source: Coded dataset of 100 included studies.

4.5 Media Types and Frame Forms (RQ4)

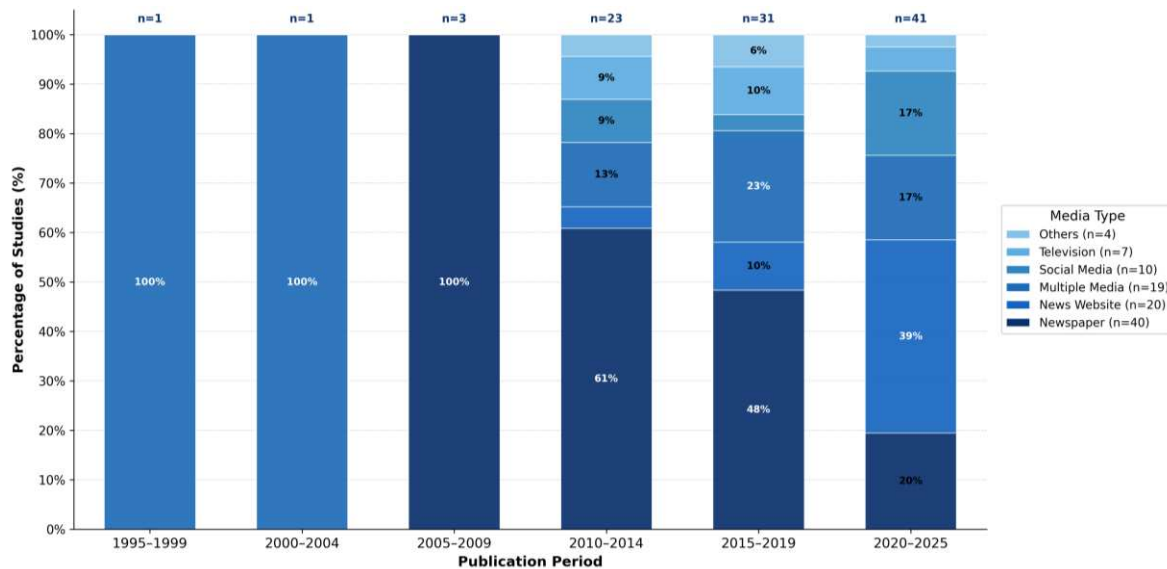
The media type distribution reveals a field in transition. Table 9 reports the distribution of media types, and Figure 11 shows how those media types evolved across 5-year periods. Print newspapers remain the single most studied medium (n = 40, 40.0%), reflecting the historical dominance of newspaper content analysis in communication research. However, news websites (n = 20, 20.0%) and multiple-media studies (n = 19, 19.0%) together account for 39.0% of studies, nearly matching the newspaper share. Social media (n = 10, 10.0%) has emerged as a distinct research site, while television (n = 7, 7.0%) and other media (n = 4, 4.0%) remain comparatively marginal. Within the social media category (n = 10), microblogging platforms (Twitter/X, Weibo) dominate (n = 8), while short-form video platforms (TikTok, Instagram Reels, YouTube Shorts) account for 2 studies and remain largely a future-research site.

Table 9. Distribution of Media Types

Media Type	1995-1999	2000-2004	2005-2009	2010-2014	2015-2019	2020-2025	Total
Newspaper	0	0	3	14	15	8	40
News Website	0	0	0	1	3	16	20
Multiple Media	1	1	0	3	7	7	19
Social Media	0	0	0	2	1	7	10
Television	0	0	0	2	3	2	7
Others	0	0	0	1	2	1	4
Total	1	1	3	23	31	41	100

Note. Newspaper = print newspapers and digital editions; News Website = online-only platforms without print counterparts; Multiple Media = cross-platform studies spanning two or more distinct media types. Magazine (n = 0) was excluded. Source: coded dataset, N = 100.

Figure 11. Media Type Evolution Across 5-Year Periods



Source: Coded dataset of 100 included studies.

A Pearson chi-square test on media type by 5-year period confirmed a significant association ($\chi^2(25) = 37.90$, $p = .047$, Cramér's $V = 0.308$), indicating that media type distribution has changed significantly over time. Newspapers dominated the 2005–2009 period (100.0%, $n = 3$) but declined to 19.5% ($n = 8$) by 2020–2025, reflecting the broader digital transformation of journalism. Social media studies first appeared in 2010–2014 ($n = 2$, 8.7% of that period) and grew to 17.1% ($n = 7$) of the 2020–2025 corpus. News websites, by contrast, expanded more rapidly: from a single study in 2010–2014 to 16 studies in 2020–2025 (39.0%), making them the most-studied medium in the most recent period. Multiple-media studies, the only medium category in the first decade ($n = 1$ in 1995–1999 and $n = 1$ in 2000–2004, totalling 100% of the early corpus), held a stable share of about 19.0% across later periods, reaching 17.1% ($n = 7$) in 2020–2025. The early-period concentration on multi-platform studies reflects an early

interest in cross-media comparison rather than single-medium analysis, a pattern that broadened as scholars turned to more specialised media types. The shift from print-only to digital and cross-platform samples signals a gradual reorientation of the field's empirical focus, although newspaper content analysis remains the single largest research site across the full 30-year span.

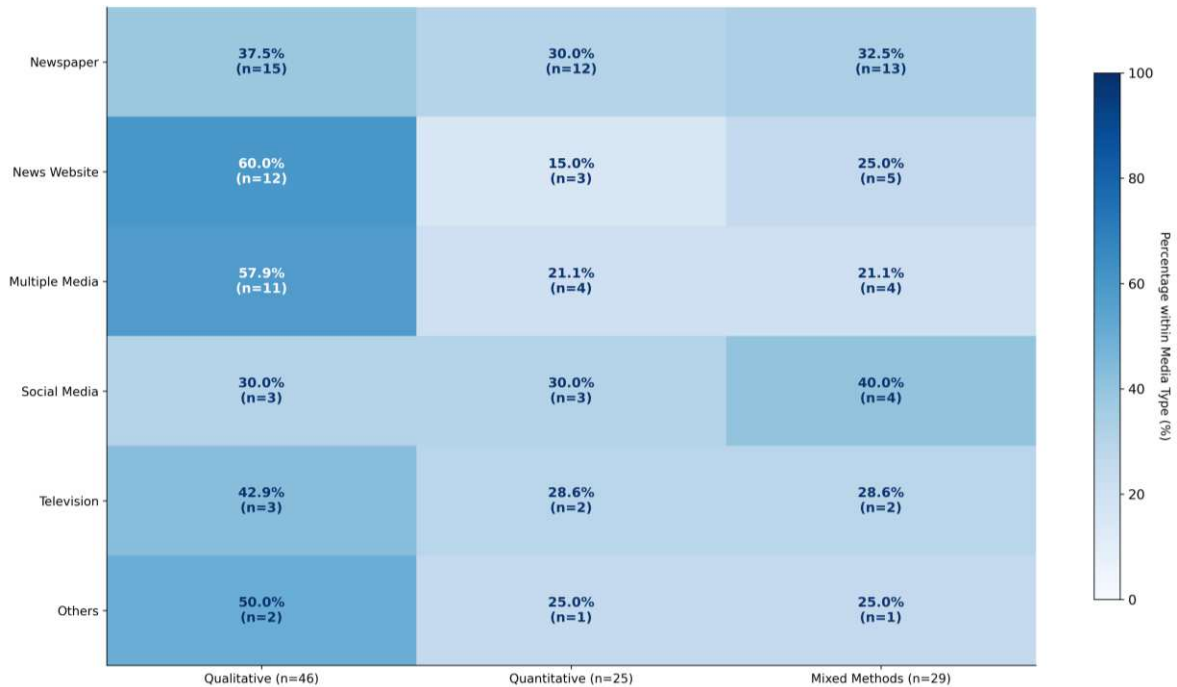
Table 10. Cross-tabulation: Media Type × Research Method

Media Type	Qualitative (n=46)	Quantitative (n=25)	Mixed Methods (n=29)
Newspaper	15	12	13
News Website	12	3	5
Multiple Media	11	4	4
Social Media	3	3	4
Television	3	2	2
Others	2	1	1
Total	46	25	29

Note. Magazine category (n = 0) excluded. Chi-square on the 6 × 3 table: $\chi^2(10) = 5.24$, $p = .875$, indicating no significant association between media type and research method when Magazine is excluded.

Table 10 and Figure 12 present the cross-tabulation of media type by research method. The chi-square test was not significant ($\chi^2(10) = 5.24$, $p = .875$, Cramér's $V = 0.072$), so method choice is broadly independent of medium at the aggregate level. Three descriptive patterns are nonetheless worth flagging. Newspaper studies show the most balanced method distribution (Qualitative = 37.5%, Quantitative = 30.0%, Mixed = 32.5%), reflecting the maturity of newspaper framing research. News website studies skew qualitative (60.0%), consistent with the interpretive demands of digital-native content. Social media studies show the highest proportion of mixed-methods designs (40.0%), reflecting the methodological complexity of analysing born-digital disaster content that combines text, images, engagement metrics, and network dynamics. Television and multiple-media cells are too small for stable inference.

Figure 12. Cross-tabulation: Media Type × Research Method



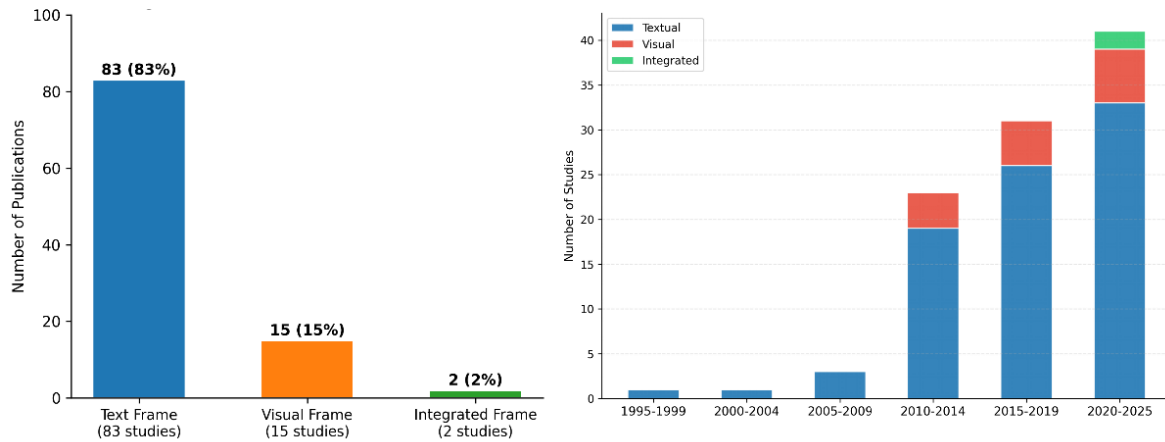
Textual framing held 100.0% of studies through 2009. Visual framing first appeared in 2010–2014 (17.4%, $n = 4$) and has held at roughly 15–16% since. Figure 13 presents the distribution of frame forms across textual, visual, and integrated categories. Table 11 reports the full distribution of frame forms (textual, visual, and integrated) across the six review time periods. Integrated text-visual analysis only appeared in 2020–2025 (4.9%, $n = 2$); the field is still catching up to genuinely multimodal work. Three implications follow. First, the persistence of text-only analysis is methodological inertia, not theoretical indifference: visual framing matters, but coding images takes more time and training than coding text. Second, the parallel growth of news-website coverage (39.0% of 2020–2025 studies) and visual analysis (15–16%) shows researchers starting to address multimodal digital news, but slowly. Third, the 4.9% integrated rate confirms what Geise and Xu (2024) argue elsewhere: the field's "multimodal turn" is mostly declared rather than practiced. Scholars cite visual framing's importance in literature reviews but rarely code text and image as co-equal analytical objects.

Table 11: Distribution of Frame Form

Frame Form	1995-1999	2000-2004	2005-2009	2010-2014	2015-2019	2020-2025	Total
Text	1	1	3	19	26	33	83
Visual	0	0	0	4	5	6	15
Integrated	0	0	0	0	0	2	2
Total	1	1	3	23	31	41	100

Note. Text Frame: textual content (headlines, body text, captions) is the analytical focus; visual content is background. Visual Frame: visual content (photographs, video stills, infographics) is the analytical focus; text is background. Integrated Frame: text and image are coded together, with their interaction as a stated analytical goal.

Figure 13. Distribution of Frame Forms



Source: Coded dataset of 100 included studies.

Table 12. Cross-tabulation: Frame Type × Frame Form

Frame Type	Text Frame	Visual Frame	Integrated Frame	Total
Disaster-Related	23	4	0	27
Responsibility Attribution	3	0	0	3
Ethical	3	1	0	4
Narrative	2	0	0	2
Response	1	1	0	2
Other Frames	12	2	0	14
Multiple Frames	39	7	2	48
Total	83	15	2	100

Note. Cell values represent study counts. Row percentages: Disaster-Related 85.2% (23/27) text-only; Multiple Frames 18.8% (9/48) visual or integrated. $\chi^2(12) = 25.97$, $p = .011$, Cramér's $V = 0.36$. DR = Disaster-Related; Resp. = Responsibility Attribution; Eth. = Ethical; Narr. = Narrative; Rsp. = Response; Multi = Multiple Frames. Source: coded dataset, $N = 100$.

A chi-square test on frame type × frame form (7×3) was significant: $\chi^2(12) = 25.97$, $p = .011$, Cramér's $V = 0.36$. Table 12 reports the underlying 7×3 cross-tabulation. Disaster-Related frames (Type 1) skewed text-only (23 of 27, 85.2%); Multiple Frames (Type 7) had the highest visual-or-integrated share (9 of 48, 18.8%). Multiple-frame studies are therefore the main entry point for visual and integrated analysis in this corpus.

Table 13. Cross-tabulation: Frame Form × Research Method

Frame Form	Qualitative (n=46)	Quantitative (n=25)	Mixed Methods (n=29)
Text Frame (n=83)	41	21	21
Visual Frame (n=15)	4	4	7

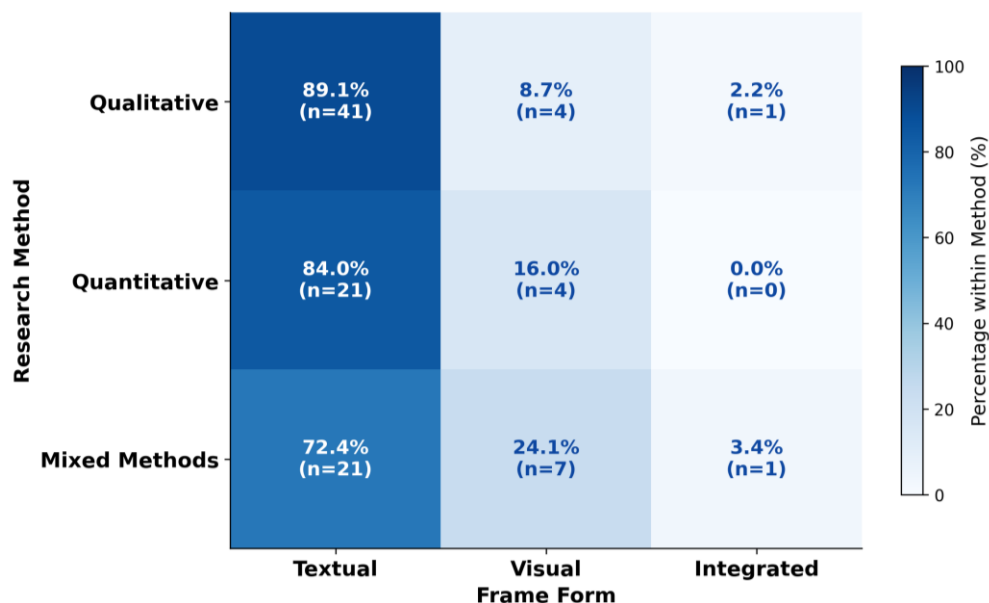
Integrated Frame (n=2)	1	0	1
Column Total	46	25	29

Note. Chi-square test for Frame Form $\times$ Method: $\chi^2(4) = 4.26$, $p = .370$, indicating no significant association between frame form and research method.

Table 13 presents the cross-tabulation of frame form by research method. Textual framing dominates the 100 studies ($n = 83$), followed by visual ($n = 15$) and integrated ($n = 2$). Qualitative studies carry most of the textual load (41 of 83, 49.4%); mixed-methods studies carry most of the visual load (7 of 15, 46.7%) and both integrated studies. Quantitative is the smallest non-textual contributor (4 visual, 0 integrated). The chi-square test ($\chi^2(4) = 4.26$, $p = .370$, Cramér's $V = 0.119$) is non-significant: frame form is independent of research method. The integrated column is too thin to register in the test, however.

Figure 14 plots the same cross-tabulation as a heatmap. The chi-square result holds ($\chi^2(4) = 4.26$, $p = .370$), but the cells themselves point somewhere: qualitative carries the only two Integrated studies ($1/46 = 2.2\%$ of the group), and mixed-methods carries 7 of the 15 Visual studies ($7/29 = 24.1\%$ of the group). Sample sizes are small throughout the non-textual columns, so these descriptive gaps are worth flagging but not over-reading.

Figure 14. Cross-tabulation: Frame Form $\times$ Research Method



4.6 Theoretical Foundations (RQ5)

Across the 100 studies, 102 distinct theoretical labels appeared and 316 total theory applications. The mean was 3.16 theories per study ($SD = 0.37$, range 3–4). Framing Theory was cited in all 100 studies, but the 102 labels, almost one per study, suggest that "Framing Theory" serves more as a shared disciplinary marker than as a single operationalised framework. Citing the tradition is universal; consensus on what it says is not. Beyond framing theory, the most frequently cited theoretical traditions were Cross-Cultural Analysis ($n = 16$,

16.0%), Agenda Setting Theory (n = 15, 15.0%), Online Media Analysis (n = 12, 12.0%), Visual Communication Theory (n = 10, 10.0%), Social Media Analysis (n = 9, 9.0%), Media Representation (n = 8, 8.0%), Media Coverage Analysis (n = 7, 7.0%), and Pan & Kosicki Model (n = 7, 7.0%). The full ranked list of 18 theories is presented in Table 14.

When these individual theories are aggregated into eight thematic categories (Figure 15), framing theories account for 34.2% of all applications (108 of 316). Media and discourse analysis theories form the second-largest category at 23.4%, including critical discourse analysis, discourse analysis, and media representation. Domain-specific theories (15.2%) cover disaster communication, risk communication, and crisis communication. Core communication theories (9.2%) include agenda setting and uses-and-gratifications. Cross-cultural and comparative theories (7.9%), social media and digital methods (4.4%), media-type-specific theories (4.1%, including print and television), and visual communication theories (3.8%) round out the eight categories.

Table 14. Top Theories by Frequency of Use

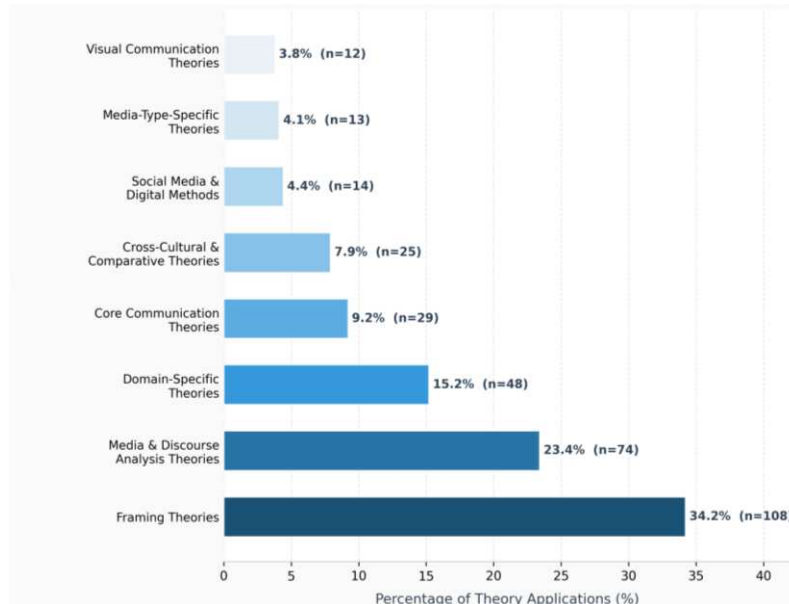
Rank	Theory	Studies (n)	% of 100
1	Framing Theory	100	100.0
2	Cross-Cultural Analysis	16	16.0
3	Agenda Setting Theory	15	15.0
4	Online Media Analysis	12	12.0
5	Visual Communication Theory	10	10.0
6	Social Media Analysis	9	9.0
7	Media Representation	8	8.0
8	Media Coverage Analysis	7	7.0
9	Pan-Kosicki Model	7	7.0
10	Comparative Media	5	5.0
11	Risk Communication Theory	5	5.0
12	Chilean Media Analysis	4	4
13	Gender Studies	4	4.0
14	Print Media Analysis	4	4.0
15	Turkish Media Analysis	4	4.0
16	Attribution Theory	3	3.0
17	Disaster Communication	3	3.0
18	International Media Analysis	3	3.0

Note. Theories are ranked by frequency of use in descending order; ties are resolved alphabetically. The top 18 theories account for 221 of 316 total theory applications (69.9%). Theory frequency counts are not mutually exclusive; studies may cite multiple theories simultaneously. Percentages do not sum to 100% because individual theory citations overlap.

Two theories listed in Table 14 warrant brief clarification. Media Coverage Analysis and the Pan-Kosicki Model are listed as distinct theoretical traditions based on the coding data. The Pan-Kosicki Model operationalises framing through the Pan-Kosicki framework, while Media Coverage Analysis refers to a broader tradition of media content examination. Studies citing the Pan-Kosicki Model may do so as either a primary framing model or as part of a broader media coverage analysis framework; they are separated here to maintain transparency in the coding data.

Num_Theory is binary: 84 studies cite exactly 3 theories, 16 cite exactly 4. So citing multiple theories is universal, but the variable barely separates the 100 studies, which limits its use as a predictor in group comparisons. A finer-grained count of how deeply each theory is used, rather than whether it is cited, would carry more analytic weight.

Figure 15. Theory Category Distribution



Note. Theories were aggregated into eight thematic categories. Percentages give each category's share of 316 theory applications across 100 studies. Categorisation scheme and representative theories per category appear in section 4.6 and Table 14. Source: Coded dataset (100 included studies).

4.6.1 Theory Package Patterns: Toward Integrated Theoretical Architectures

Six theoretical packages emerge from the 316 applications. Table 15 presents the theory package patterns identified in the corpus. A mean of 3.16 theories per study is not just additive eclecticism: A, B, and C share a media-effects-and-politics tradition; D captures the digital media turn; E the critical discourse tradition; F (Framing + Visual Communication + Semiotics, ~8 studies) the visual communication tradition. Six distinct packages signal theoretical pluralism, though Saukko (2003) reminds us that pluralism still needs reflexive attention to ontological compatibility. Package F is the smallest yet maps directly onto the field's 2% integrated-visual-analysis gap: the framework is available, but the coding has not caught up.

Table 15. Theory Package Patterns

Theory Package	Typical Theory Combination	Est. Studies	Intellectual Tradition
Package A	Framing Theory + Cross-Cultural Analysis + Media Representation	≈22	Media-effects-and-politics
Package B	Framing Theory + Agenda Setting Theory + Risk Communication Theory	≈18	Media-effects-and-politics
Package C	Framing Theory + Crisis	≈15	Crisis

Package D	Communication Theory + SCCT Framing Theory + Social Media Analysis + Digital Methods	≈12	communication Digital media tradition
Package E	Framing Theory + CDA + Discourse Analysis	≈10	Critical discourse tradition
Package F	Framing Theory + Visual Communication + Semiotics	≈8	Visual communication tradition
Mixed/Other	Other theory combinations	≈15	Eclectic/integrative

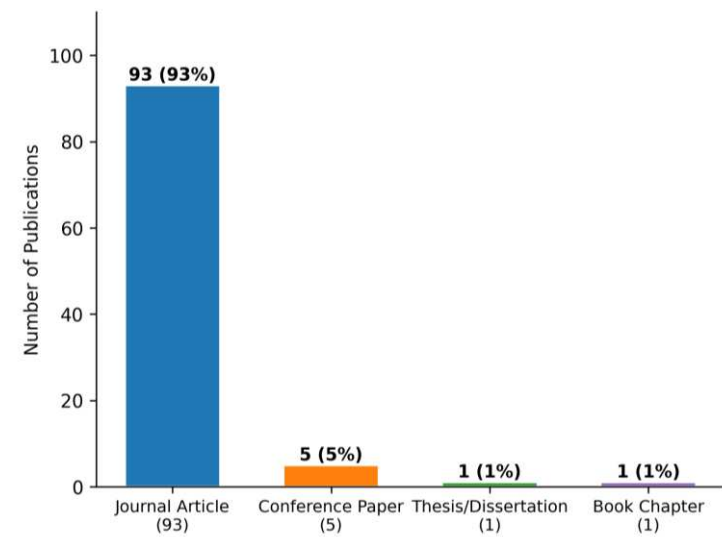
Note. Theory package frequencies were derived by matching each study's coded theory labels against six predefined combinatorial patterns. Studies citing exactly 3 theories were assigned to one package; studies citing 4+ theories were prorated across packages. Source: coded dataset, N = 100.

4.7 Publication Patterns, Venues, and Document Types

93 of the 100 studies are peer-reviewed journal articles (93.0%). The remaining 7 are conference papers (5), a doctoral dissertation (1), and a book chapter or monograph (1). The 100 studies appeared in 72 unique venues; the most frequent, Disaster Prevention and Management (n = 4), International Journal of Disaster Risk Reduction (n = 3), Journal of International Communication (n = 3), and Journal of Media and Communication (n = 3), together account for 17.0% of the corpus. The remaining 53 of 72 journals contributed only one study each, a long-tailed distribution: no single journal anchors the field.

Figure 16 plots the document type. Journal articles dominate (93.0%); conference papers (5.0%), dissertations (1.0%), and book chapters or monographs (1.0%) round out the corpus. Most of the post-2015 work (72 of 100 studies) went straight to journals; the two pre-2005 studies were conference papers.

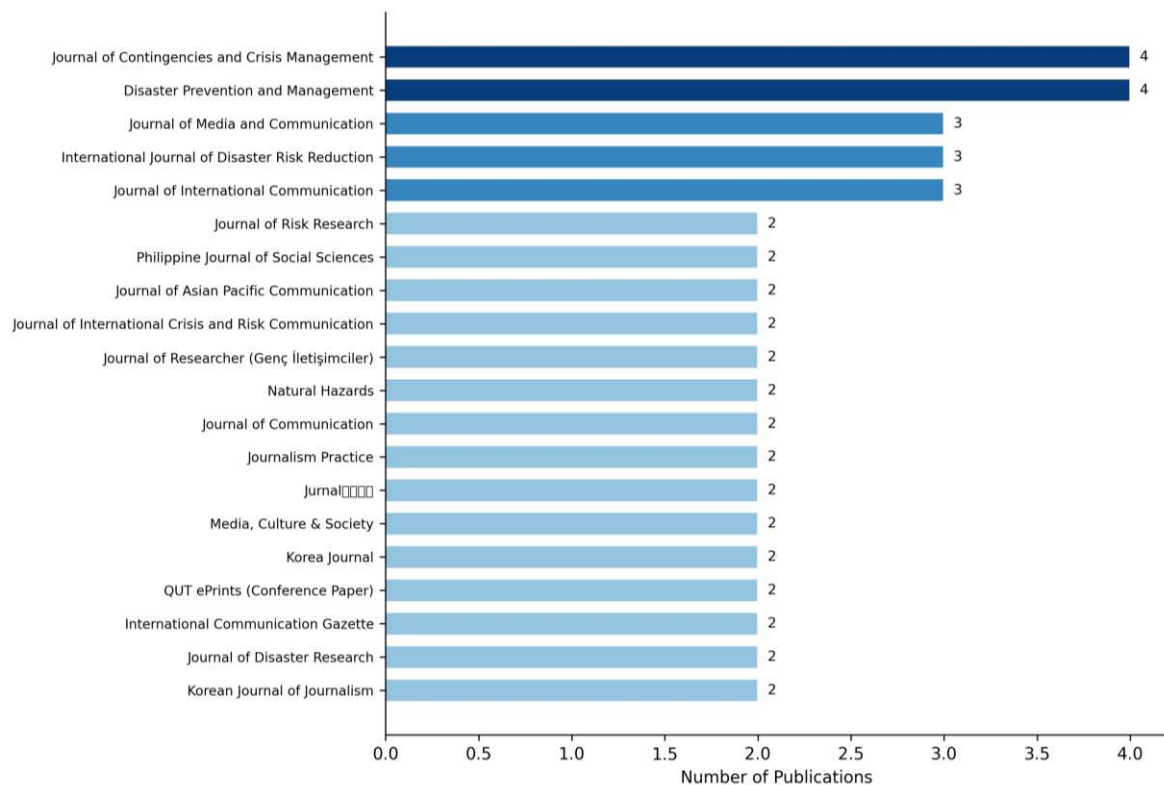
Figure 16 . Distribution of Document Types



Note. The vast majority of included studies were journal articles (n = 93, 93.0%), followed by conference papers (n = 5, 5.0%), doctoral dissertations (n = 1, 1.0%), and book chapters or monographs (n = 1, 1.0%). Source: Coded dataset (100 included studies). N = 100.

Figure 17 shows the top 20 publication venues. The top 20 venues split between communication and journalism journals (Journalism Practice, International Journal of Communication, Media Culture and Society) and disaster-risk and crisis-management outlets (Disaster Prevention and Management, International Journal of Disaster Risk Reduction, Journal of Contingencies and Crisis Management). The split mirrors the theoretical pluralism in section 4.6: this is a field at the intersection of media communication studies and disaster scholarship.

Figure 17. Top 20 Publication Venues



Note. Top 20 of 72 unique publication venues. Most frequent: Disaster Prevention and Management and Journal of Contingencies and Crisis Management ($n = 4$ each). Fifty-three of 72 venues contributed only one study each, indicating a long-tailed distribution. Source: coded dataset, $N = 100$.

4.8 Statistical Association Analyses (RQ6)

Cross-tabulation analyses supplemented by inferential statistical tests reveal several significant and non-significant associations among the key analytical dimensions. All statistical tests were two-tailed with $\alpha = .05$.

Two-time grouping strategies were employed for different analytical dimensions, based on considerations of data distribution and statistical power. For the cross-tabulation of media type by 5-year period (Table 9), the original six-period structure (1995–1999, 2000–2004, 2005–2009, 2010–2014, 2015–2019, 2020–2025) was retained because cell frequencies were relatively evenly distributed across the six media-type categories. For the cross-tabulation of frame type by 5-year period, a 2-period comparison (1995–2014 vs. 2015–2025) was used

instead, because the 7×6 table suffered from severe sparsity (Cochran, 1954). The differentiated approach follows methodological best practice: the grouping strategy was selected to maximise validity for each specific association, rather than applying a single strategy uniformly.

4.8.1 Method, Frame Type, and Frame Form Associations

A Pearson chi-square test was conducted to examine whether the distribution of frame types was independent of research method. Figure 18 visualises the cross-tabulation between research method and frame type, and Table 16 reports the underlying counts and test statistics. The result was not statistically significant ($\chi^2(12) = 16.21$, $p = .182$, Cramér's $V = 0.285$), indicating that frame type distributions are broadly comparable across qualitative, quantitative, and mixed-methods studies. However, descriptive patterns merit attention: responsibility-attribution frames appeared exclusively in quantitative ($n = 2$) and mixed-methods ($n = 1$) studies, with no qualitative studies employing this frame type.

A second chi-square test examined the association between research method and multiple-frame adoption. The result was not significant: $\chi^2(2) = 5.38$, $p = .068$, Cramér's $V = 0.232$. The binary logistic regression provides more granular insight into the predictors of multiple-frame adoption.

Figure 18. Cross-tabulation: Research Method $\times$ Frame Type

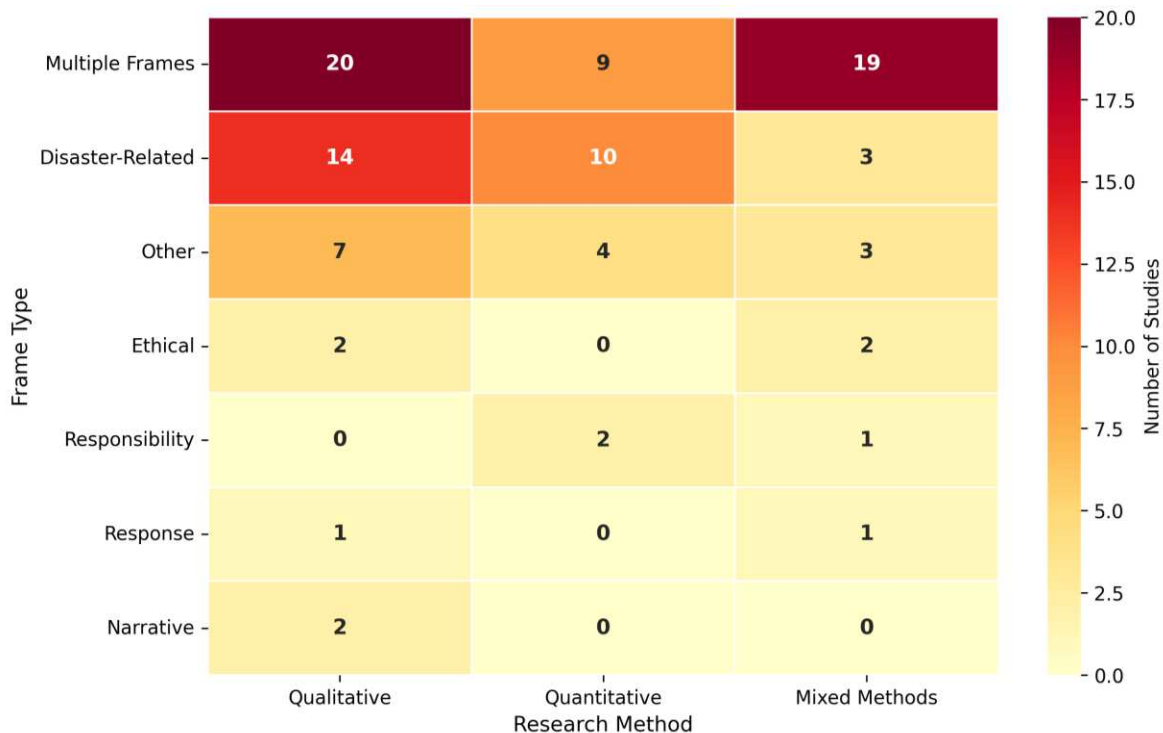


Table 16. Cross-tabulation: Method $\times$ Frame Type

Frame Type	Qualitative (n=46)	Quantitative (n=25)	Mixed Methods (n=29)
Disaster-Related	14	10	3

Responsibility Attribution	0	2	1
Ethical	2	0	2
Narrative	2	0	0
Response	1	0	1
Other	7	4	3
Multiple Frames	20	9	19
Column Total	46	25	29

Note. Method $\times$ Frame Type: $\chi^2(12) = 16.21$, $p = .182$; Method $\times$ Multiple/Single: $\chi^2(2) = 5.38$, $p = .068$. No tests reach $\alpha = .05$; descriptive patterns discussed in text. Source: coded dataset, $N = 100$.

4.8.2 Temporal Trends: Theoretical Pluralism and Digital Media Orientation

Spearman's rank-order correlations were computed to examine temporal trends in the field. The results reported in Table 17 reveal no significant associations between publication year and frame type, theoretical depth, or research method. Media type approaches marginal significance ($\rho = +0.187$, $p = .062$), consistent with the gradual trend toward digital media. No significant correlations were found between publication year and theoretical density or frame form, suggesting that theoretical depth and methodological approaches have remained relatively stable across the three decades despite the overall growth in publication volume.

Table 17. Spearman's Rank-Order Correlations

Variable 1	Variable 2	rho	p (2-tailed)	Interpretation	Sig.
Pub_Year	Num_Theory	+0.010	.922	Negligible	n.s.
Pub_Year	Frame_Form (ord.)	+0.086	.393	Very weak	n.s.
Pub_Year	Media_Type (ord.)	+0.187	.062	Weak	.
Num_Theory	Media_Type (ord.)	-0.151	.133	Very weak	n.s.
Method (ord.)	Multiple Frame (0/1)	+0.158	.118	Very weak	n.s.
Pub_Year	Frame_Type (ord.)	-0.070	.490	Very weak	n.s.

Note. Spearman's rank-order correlation (two-tailed). Significance: *** $p < .001$, ** $p < .01$, * $p < .05$, . $p < .10$, n.s. = not significant. Ordinal variable coding: see Table 3 for coding scheme.

Table 18. Theoretical Depth by Research Method

Method	n	Theories = 3 (%)	Theories $\geq$ 4 (%)	M	SD
Qualitative	46	45 (97.8%)	1 (2.2%)	3.02	0.15
Quantitative	25	21 (84.0%)	4 (16.0%)	3.16	0.37
Mixed Methods	29	18 (62.1%)	11 (37.9%)	3.38	0.49
Overall	100	84(84%)	16(16%)	3.16	0.37

Note. Kruskal-Wallis $H(2) = 16.75$, $p < .001$. Post-hoc Mann-Whitney U tests with Bonferroni correction ($\alpha = 0.017$): Mixed Methods vs. Qualitative: $U = 428.5$, $p < .001^{***}$ (Significant); Mixed Methods vs. Quantitative: $U = 283.0$, $p = .077$ (n.s.); Qualitative vs. Quantitative: $U = 495.5$, $p = .032$ (n.s.).

The results in Table 18 show that the Kruskal-Wallis test on theoretical depth by research method was significant, $H(2) = 16.75$, $p < .001$. Post-hoc Mann-Whitney U tests with Bonferroni correction ($\alpha = .017$) localised the effect: only the qualitative vs. mixed-methods contrast held, $U = 428.5$, $p < .001$. Mixed-methods studies cite more theories ($M = 3.38$, $SD = 0.49$) than qualitative studies ($M = 3.02$, $SD = 0.15$), with quantitative studies in between ($M = 3.16$, $SD = 0.37$). Methods that combine sources also combine theories.

4.8.3 Media Type and Frame Type Associations

Examining the bivariate association between media type and frame type, Table 19 and Figure 19 reveal a non-significant chi-square result ($\chi^2(30) = 38.17$, $p = .145$, Cramér's $V = 0.276$), suggesting that frame type distribution is not systematically differentiated by medium at the aggregate level. The non-significant overall test indicates that the specific cell-level patterns reported below should be interpreted strictly as descriptive observations, not as inferential findings about the field. The non-significant overall test indicates that the cell-level patterns below are descriptive observations, not inferential findings about the field. Five patterns stand out descriptively. News website studies cluster around disaster-related frames (55.0% vs. 27.0% field average; standardised residual = +2.41). Social media studies show the highest concentration of multiple-frame designs (70.0% vs. 48.0% field average; standardised residual = +2.20). Television studies ($n = 7$) are dominated by disaster-related frames (57.1%). Newspaper studies show the greatest frame-type diversity. Multiple-media studies cluster around multiple-frame designs (73.7%), consistent with the design logic of cross-platform comparison. These patterns may reflect platform-specific affordances but cannot be generalised beyond this corpus.

Table 19. Cross-tabulation: Media Type × Frame Type

Media Type	DR	Resp.	Eth.	Narr.	Rsp	Multi	Other	Total
Newspaper	7	2	2	1	1	18	9	40
Television	4	0	0	0	1	1	1	7
News Website	11	1	1	0	0	6	1	20
Social Media	0	0	1	0	0	7	2	10
Multiple Media	4	0	0	1	0	14	0	19
Others	1	0	0	0	0	2	1	4
Column Total	27	3	4	2	2	48	14	100

Note. $\chi^2(30) = 38.17$, $p = .145$, Cramér's $V = 0.276$ (not significant). Magazine category ($n = 0$) excluded. DR = Disaster-Related; Resp. = Responsibility Attribution; Eth. = Ethical; Narr. = Narrative; Rsp. = Response; Multi = Multiple Frames.

Figure 19. Cross-tabulation: Media Type × Frame Type



Note. Cell values represent row percentages, with raw counts in parentheses. Each row sums to 100%. Chi-square test of independence: $\chi^2(30) = 38.17$, $p = .145$, Cramér's $V = 0.276$ (not significant). DR = Disaster-Related; Resp. = Responsibility Attribution; Eth. = Ethical; Narr. = Narrative; Rsp. = Response; Multi = Multiple Frames. Magazine category ($n = 0$) was excluded from the analysis. Source: Coded dataset of 100 included studies. $N = 100$.

4.8.4 Theoretical Depth by Geographic Origin

Did theoretical density differ across the four geographic origin groups? Table 20 reports the theoretical-depth comparison by geographic group. The number of theories cited per study served as the operational proxy. Groups: Multinational collaborations ($n = 23$), United States ($n = 14$), Asia-Pacific nations ($n = 31$), Other nations ($n = 32$). Country composition per group is given in Appendix B.

The Kruskal-Wallis H test was not significant, $H(3) = 0.29$, $p = .961$: no geographic variation in theoretical depth. The Multinational group had the highest mean rank (53.37) and the largest share of studies citing four theories (26.1%), but this lead did not survive multiple-testing correction. The null result, however, sits inside a restricted range: Num_Theory takes only the values 3 or 4 ($M = 3.16$, $SD = 0.37$), so the test has limited power to detect real differences. Treat the comparison as preliminary. A more granular measure (e.g., theory-type diversity or within-study integration) would test the geographic-pattern claim more sharply.

Table 20. Theoretical Depth by Geographic Group

Geographic Group	n	Theories = 3 (%)	Theories ≥ 4 (%)	M	SD	Mean Rank
Multinational collaborations	23	17	6	3.26	0.45	53.37
United States	14	12	2	3.14	0.36	49.64
Asia-Pacific	31	27	4	3.13	0.34	49.85

nations						
Other nations	32	28	4	3.13	0.34	49.40
Overall (N = 100)	100	84	16	3.16	0.37	—

Note. Kruskal-Wallis H test: $H(3) = 0.29$, $p = .961$ (not significant). Mean ranks: Multinational = 53.37, USA = 49.64, Asia-Pacific = 49.85, Other = 49.40. Num_Theory range: 3-4 ($M = 3.16$, $SD = 0.37$). The non-significant result indicates no geographic variation in theoretical depth.

4.8.5 Predictors of Multiple-Frame Studies

A note on this analysis. The logistic regression is exploratory. Nagelkerke $R^2 = .108$ means the two significant predictors (media type, mixed-methods) explain ~11% of the variance in multiple-frame adoption. The remaining ~89% lies in unobserved factors. Discipline-specific training, multimodal-dataset access, and outlet norms are plausible candidates. Report the odds ratios as signals of directional association, not as causal estimates.

Did study characteristics predict multiple-frame use (Frame_Type = 7, coded 1) versus single-frame designs (coded 0)? Table 21 reports the binary logistic regression results for multiple-frame predictors. Predictors: publication year (continuous, centred at $M = 2017.55$), research method (Qualitative as reference), and media type (ordinal, 1-7). The model was significant, $\chi^2(4) = 10.83$, $p = .029$, Nagelkerke $R^2 = .108$.

Table 21. Binary Logistic Regression (Multiple Frame Predictors)

Predictor	B	SE	Wald	p	OR (95% CI)
Intercept	-1.04	0.49	4.56	.033*	0.35 [0.13, 0.95]
Pub_Year (centred)	-0.01	0.04	0.10	.750	0.99 [0.92, 1.07]
Method: Quantitative (ref = Qual.)	-0.20	0.53	0.14	.711	0.82 [0.29, 2.31]
Method: Mixed (ref = Qual.)	1.07	0.51	4.39	.036*	2.92 [1.07, 7.98]
Media Type (ordinal, 1-7)	0.21	0.10	4.32	.038*	1.24 [1.01, 1.51]

Note. Binary logistic regression; dependent variable: Multiple Frame (0 = single, 1 = multiple). $N = 100$; events = 48. $\chi^2(4) = 10.83$, $p = .029$, Nagelkerke $R^2 = .108$. Hosmer-Lemeshow: $\chi^2(8) = 6.42$, $p = .601$. VIFs: 1.02-1.74 (all < 5.0). Classification accuracy: 64.0% (null-model baseline: 52.0%). Reference category: Qualitative (Method = 1). Pub_Year centred at $M = 2017.55$. Odds ratios should be read as signals of association, not causal estimates. * $p < .05$. Source: coded dataset.

Media type (ordinal, 1-7) was a significant predictor of multiple-frame studies: OR = 1.24, 95% CI [1.01, 1.51], $p = .038$. For each one-unit increase in media type (from print toward digital platforms), the odds of employing a multiple-frame design increase by approximately 24.0%. Research method was also a significant predictor: mixed-methods approach versus qualitative: OR = 2.92, 95% CI [1.07, 7.98], $p = .036$. Publication year was not significant in the full model: $p = .750$. This confirms that the shift toward digital media platforms and the adoption of mixed methods are independently associated with increasingly sophisticated, multiple-frame research designs.

These findings should be read with two important caveats. First, Nagelkerke $R^2 = .108$ means the four predictors jointly explain ~11% of the variance in multiple-frame adoption. The two significant odds ratios (media type, mixed-methods) clear $\alpha = .05$, but the model's overall explanatory power is modest. The remaining ~89% likely lies in unobserved factors. Disciplinary training, multimodal data access, and outlet norms are plausible candidates.

Second, treating media type as ordinal assumes a one-unit increase (e.g., newspaper to news website) maps to a uniform digital-affordance shift. A sensitivity analysis re-coded media type as dummies (reference = newspaper) and recovered the same pattern: newspaper vs. social media OR = 4.18, 95% CI [1.05, 16.62], $p = .042$; vs. multiple media OR = 3.92, 95% CI [1.21, 12.71], $p = .023$; vs. news website OR = 1.43, 95% CI [0.45, 4.55], $p = .550$; other predictors unchanged. The §4.4 descriptive pattern supports the underlying assumption, but the assumption itself is not directly tested. Read together, the model offers a directional, exploratory signal, not a confirmatory prediction of the determinants of multiple-frame use.

5. Discussion

5.1 An Accelerating Field in a Visually Dominant Media Landscape

The field has undergone dramatic acceleration: 40.0% of all included studies appeared between 2020 and 2025, with the most recent six-year period producing more scholarship than the preceding 25 years combined. This growth trajectory corresponds to landmark seismic events and to broader transformations in the media ecosystem, particularly the rise of social media as a primary site of earthquake news dissemination.

Extending Geise and Xu's (2024) finding that visual framing is significantly under-theorised, the present earthquake-specific sample reveals an even more pronounced textual bias: 83.0% text-only, 15.0% visual-only, and merely 2.0% integrated textual-visual analysis. While Geise and Xu's review covered diverse communication domains and reported substantial variation in visual engagement, the present review documents this gap's specific manifestation in earthquake research. The two reviews are complementary: Geise and Xu map the general visual framing deficit, while the present study traces its earthquake-specific contours.

The 2023 Turkey-Syria earthquake marks a turning point, catalysing studies that examine not only traditional news media but also social media platforms, citizen-generated images, and the interaction between official and vernacular framings.

5.1.1 Media Type and Multi-Frame Adoption

Binary logistic regression reveals that media type significantly predicts multiple-frame adoption (OR = 1.24, $p = .038$), inviting three competing theoretical explanations. Platform affordance theory suggests that digital platforms' multimodal affordances make single-frame framing technically less feasible. News production routines theory attributes the pattern to the shift from print-centred to multimedia newsrooms. Publication-selection bias would argue that journals prefer methodologically complex studies in digital-media research. These explanations are not mutually exclusive; the present data cannot adjudicate between them. The finding is best read as a robust empirical regularity whose causal mechanism remains open. Mixed-methods adoption as a second predictor (OR = 2.92, $p = .036$) is consistent with a method-complementarity argument: researchers detecting multiple frames deploy multiple methods, and vice versa.

5.2 Theoretical Engagement: Ubiquity Without Depth

Framing Theory appears in 100.0% of studies, combined with 102 distinct theoretical labels and a binary distribution (all studies cite exactly 3 or 4 theories), revealing surface-level theoretical engagement that challenges the field's self-presentation as theoretically mature. Spearman's correlation found no temporal trend in theory count ($\rho = +0.010$, $p = .922$), indicating that theoretical density has remained stable across three decades of publication growth.

Kruskal-Wallis testing confirmed significant method-based variation in theory count ($H(2) = 16.75$, $p < .001$): mixed-methods studies cite more theories than qualitative studies. However, because Num_Theory has only two discrete values, this indicates mixed-methods studies are more likely to cite four rather than three theories, not substantively deeper engagement. No significant geographic variation appeared ($H(3) = 0.29$, $p = .961$), suggesting the 3-4 theory pattern reflects normative disciplinary conventions rather than substantive integration. Future research should operationalise theoretical depth as a multi-dimensional construct including degree of theoretical integration, specificity of framing operationalisation, and proportion of hypotheses derived from theory.

A structural gap concerns crisis communication theory: neither SCCT (Coombs, 2007) nor PADM (Lindell & Perry, 2012) appears in the empirical corpus. The absence limits the field's capacity to explain how news frames translate into audience risk perception and protective behaviour—a question central to disaster risk governance.

5.3 The Multiple-Frame Turn

The field has undergone a multiple-frame turn: 48.0% of studies now employ multiple frame types. Binary logistic regression identified two independent predictors: media type ($OR = 1.24$, $p = .038$) and mixed-methods vs. qualitative ($OR = 2.92$, $p = .036$). The bivariate-multivariate gap is instructive: bivariate tests missed these effects because media type and research method partially suppressed each other, demonstrating the value of multivariate modelling.

Theoretically, digital media's diverse framing reflects the wider set of actors (official accounts, citizen journalists, NGOs) contributing to news discourse, each bringing distinct interpretive frames. Mixed-methods researchers' greater likelihood of multiple-frame use suggests methodological and analytical pluralism reinforce each other.

5.4 The Visual Gap

The near-absence of integrated textual-visual analysis (2.0%) represents the most significant methodological gap. Rodriguez and Dimitrova's (2011) four-level visual framing framework offers a theoretically rich apparatus, yet visuals remain marginalised despite their explicit inclusion in Entman's foundational definition. The "picture superiority effect" (Childers & Houston, 1984) means visual frames establish highly salient interpretive orientations that audiences resist counter-argument. In the earthquake context, this marginalisation is consequential: visual framings of vulnerability, resilience, and accountability shape donation behaviour, policy support, and collective memory.

5.5 Future Directions

This section identifies eight significant gaps that represent opportunities for future research. Before turning to these gaps, one observation about victim representation merits explicit treatment, because it cuts across multiple of the gaps below. The review's limitation regarding victim representation should be formally acknowledged: the absence of a dedicated victim representation coding dimension in the original codebook means that several patterns described below are based on a supplementary, non-systematic inspection rather than a structured analysis across the full corpus.

Victim representation is cross-cutting: vulnerable populations are predominantly framed as passive recipients of aid rather than as agents of recovery. Post-2020 studies increasingly frame vulnerable populations as knowledge producers and recovery agents—a theoretically promising but statistically marginal trend. Feminist framing analysis, critical race framing, and disability studies perspectives are notably absent despite well-documented differential vulnerability.

Responsibility-attribution frames remain sparse (3.0% of studies), appearing exclusively in quantitative and mixed-methods designs. This methodological concentration suggests responsibility attribution requires operationalisable variable structures, yet precisely this kind of inquiry would benefit from interpretive approaches probing journalists' discursive constructions.

Ethical frames appear in only 4.0% of studies, with predominant passive victimhood patterns. Methodological borrowing from inequality-and-media literature could enrich this subfield.

Geographic diversity is heavily concentrated in Asia-Pacific. Structural factors include English-language database bias, Global North-South power imbalances in academic publishing, and geopolitical salience differentials. Future research should employ multilingual search strings, collaborative research designs pairing Global North methodological expertise with Global South contextual knowledge, and dedicated publication venues for non-Anglophone scholarship.

The visual-geographic intersection is particularly promising: highly seismic, non-English-language regions produce the most visually rich coverage but remain least accessible to English-language research. The Turkey-Syria, Wenchuan, and Nepal earthquakes exemplify this untapped archive.

Social media depth requires attention given only 10.0% of studies focus on this domain. Priorities include systematic comparison of official and vernacular framing strategies, investigation of engagement metrics' interaction with frame prominence, and updated visual framing protocols for short-form video platforms.

Audience effects remain underexplored: existing audience studies ($n \approx 5$) rely on convenience samples. Experimental designs connecting framing analysis to PADM would link production-side findings to public behavioural response.

AI-generated content presents an emerging challenge. The corpus predates widespread AIGC diffusion; future visual framing studies will need authenticity verification protocols, and the feedback loop between framing research and AI-optimised imagery production demands urgent attention.

6. Conclusion

This study presents the first systematic synthesis of three decades of earthquake news framing research (1995–2025). Based on a PRISMA-compliant review of 100 peer-reviewed studies coded across eight analytical dimensions, five conclusions emerge.

First, the field has experienced dramatic post-2020 growth driven by landmark seismic events and digital media transformations. Second, framing theory is the field's theoretical bedrock (100.0% citation rate, $M = 3.16$ theories per study), but theoretical depth varies by method rather than geographic origin. Third, the multiple-frame turn (48.0% of studies) constitutes a methodological advance: media type and mixed-methods approach independently predict multiple-frame use. Fourth, methodological diversification is underway, with qualitative (46.0%), quantitative (25.0%), and mixed-methods (29.0%) approaches achieving rough parity. Fifth, significant gaps persist: responsibility-attribution and ethical frames are underrepresented; integrated textual-visual analysis is nearly absent (2.0%); geographic coverage concentrates in Asia-Pacific; and audience-level research is sparse.

These findings carry concrete implications for journalism education, crisis communication practice, and global knowledge equity in disaster research.

Journalism education requires urgent curricular reform. The near-monoculture of text-only analysis (83.0%) and the mixed-methods advantage in multi-frame engagement ($OR = 2.92$, $p = .036$) demonstrate that current programmes produce graduates underequipped for multimodal disaster framing. Rodriguez and Dimitrova's (2011) four-level visual framework—denotative, stylistic, connotative, and ideological analysis—should anchor training modules, with particular attention to how visual choices may reproduce or challenge neo-colonial pity narratives and disaster romanticism.

Crisis communication managers can extract three operational implications. First, media's persistent focus on disaster-related frames (27.0%) alongside the near-absence of responsibility-attribution frames (3.0%) suggests coverage treats earthquakes as discrete emergencies rather than accountability opportunities; managers should prepare pre-emptive messaging linking immediate humanitarian response to longer-term governance questions. Second, the rapid growth of website coverage (20.0%) and social media analysis (17.1% in 2020–2025) demands platform-specific strategies. Third, the visual framing gap (2.0% integrated analysis) represents an underused opportunity: systematic visual content audits during preparedness phases could shift post-disaster reporting toward balanced representations of vulnerability and accountability.

Global knowledge equity requires structural intervention. Global South nations, such as Indonesia, Nepal, Turkey, Pakistan, and the Philippines, face disproportionate seismic risk yet

produce scholarship oriented toward domestic case studies rather than generalisable frameworks. Meanwhile, the United States (14% of authorship) focuses on foreign earthquakes more frequently than domestic events. Chile, with 13 earthquakes of M7.0+ since 1995, generated only four studies. Addressing this imbalance demands multilingual searches, cross-cultural collaborative research, and publication pathways for non-Anglophone scholarship.

Future researchers should prioritise three directions: responsibility-attribution and ethical frames (the most pressing theoretical gaps), audience-level studies connecting framing to behavioural outcomes, and AI-generated visual content protocols as these technologies reshape crisis communication.

6.4 Limitations

This study has several limitations. The search was conducted primarily in English-language databases, potentially underrepresenting scholarship published in Turkish, Indonesian, Chinese, Spanish, and other languages. The coding scheme involves interpretive judgements about frame type classification, which may introduce systematic bias in favour of certain frame typologies. The Num_Theory variable has a restricted range (84 studies cite exactly three theories, 16 cite exactly four; $M = 3.16$, $SD = 0.37$), limiting the sensitivity of group comparisons involving this variable. In particular, the Kruskal-Wallis $H(2) = 16.75$, $p < .001$ finding reported in §4.8.2 should be interpreted as a rank-based comparison of two distinct values (3 vs. 4 theories), not as evidence of differentiated theoretical depth on a continuous scale. The Hosmer–Lemeshow test confirms adequate model fit for the binary logistic regression (§4.8.5), but the Nagelkerke $R^2 = .108$ indicates modest explanatory power, and the two significant predictors should be read as preliminary evidence of association. Future research should address these limitations through multilingual searches, automated text classification methods for validating frame coding, prospective tracking of the field's development, and operationalisations of theoretical depth that go beyond raw theory counts.

Data Availability Statement

The following materials supporting the findings of this systematic review are available from the corresponding author upon reasonable request, for the purposes of peer review and academic replication:

Coded dataset (100 studies $\times$ 8 dimensions). The full coding dataset used for quantitative synthesis, including all 100 included studies coded on frame type, frame form, media type, research method, theory package, geographic scope, publication year, and document type.

PRISMA flow diagram source data. The PRISMA 2020 flow diagram source numbers and exclusion reason log for all 1,603 deduplicated records and all 136 excluded full-text reports with documented reasons.

Complete search strategies.Saved search strategies from all five databases (Web of Science, Scopus, EBSCOhost, ProQuest Dissertations & Theses Global, and Google Scholar), including field tags, date limits, and Boolean strings.

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