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Case Study Related to Disasters: A Large-Scale Analysis Using Structural Topic Modeling

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Review Article

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Abstract

Introduction: Case study has been frequently conducted in disaster-related research, yet the trends and patterns of disaster-related case study are unclear. This large-scale analysis aimed at better understanding their thematic focus and reporting practices.
Methods: Based on systematic search strategy, publication metadata from 1901 to 2023 were obtained from Elsevier/Scopus and analyzed. Structural topic modeling was employed to identify the focus areas of the topics. The number of topics was determined based on content and diagnostic metrics such as held-out likelihood and semantic coherence. Hierarchical clustering was used to categorize the identified topics. The contents and reporting styles of the most-cited articles within each topic were further analyzed.
Results: This large-scale analysis included 18,782 publications, showing an increase in number. The number of topics was determined as 12. They grouped into 2 overarching categories: public health and social medicine; and earth science and environmental technology. There were variabilities in reporting.
Conclusions: This study highlighted a growing trend in the publication of disaster-related case studies across diverse thematic areas. As variabilities in reporting exist, there is a need for standardization in reporting to enhance transparency in disaster-related case study.

Introduction

Disasters pose significant challenges to global societies, leading to long-lasting environmental, economic, and health impacts.[1] The complex nature of disaster events necessitates managing risks through effective prevention, preparedness, response, and recovery.[2] Disaster-related research has been conducted at each stage before and after disasters. There is a need for in-depth analysis of each case to evaluate each management strategy and lessons learned.

Case study is a classic research method that has been used in various disciplines, such as medicine, sociology, economics, management, etc., for analyzing individuals, organizations, and communities.[3–7] In medicine, clinical case report has been popular since the time of Hippocrates.[8] Moreover, case studies have a particular importance in managing a specific organization, community, and event. Indeed, case studies have been a popular method for researching disasters in social science.[9] Disaster risks are typically defined through the combination of hazards, exposure, and vulnerability.[10] Thus, disaster-related research has been inherently linked to human subjects, either directly or indirectly. Particularly in human-related research, reporting guidelines, like those provided by EQUATOR, have shown standards for structure and content of publications.[11] There are some review articles involving disaster-related case study focusing on specific types of disaster or research areas.[9,12,13] However, there is limited information on the topics, contents, trends, and reporting structure of published case studies related to disasters.

Structural topic modeling can be conducted to understand actual publication and their spillovers in diverse research fields.[14] By analyzing publication metadata, research topics, and reporting structures, this large-scale analysis of disaster-related research aimed to capture the intellectual landscape of disaster research within multidisciplinary perspectives. This study would be beneficial in understanding the actual reporting of disaster-related research.

Methods

Search Strategy and Data Collection

This large-scale publication analysis, using structural topic modeling, was conducted referring to the PRISMA statement.[15] This study used the metadata retrieved from Elsevier/Scopus,[16]

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as this study focused on the publication trends of case studies in disaster-related literatures. The Elsevier/Scopus provides an extensive overview of global research output across science, technology, medicine, social science, and the arts and humanities, featuring 28,300 titles from more than 5,000 international publishers.[16] Scopus database includes all MEDLINE journals and enables citation analysis.[17,18]

To capture research outputs clearly stating disaster-related case study, the following search strategy was used: "case study" (Title or Keywords) OR "case studies" (Title or Keywords). As for disasters, to incorporate both natural disasters and nuclear disasters, MeSH terms "natural disasters" and "radioactive hazard release" (https://www.ncbi.nlm.nih.gov/mesh/) were referred and the following terms were used: earthquake, tsunami, tidal wave, volcanic eruption, landslide, avalanche, typhoon, hurricane, tropical storm, cyclonic storm, cyclone, flood, storm, tornado, wildfire, drought, nuclear disaster, Chernobyl, Chornobyl, Fukushima, Three Mile Island, and disaster. The search term is described in Supplementary Material 1. In deciding this search term, we also considered searching by title/abstract; however, we found that a non-negligible number of the review articles mentioned that "case studies were excluded" in a pilot search. The development of the search strategy was conducted in consultation with Mr. Takaaki Suzuki, a librarian at Nara Medical University/Cochrane Japan, as well as through discussions with the CAST-D Group (https://sites.google.com/view/jicast/contributors), which includes 17 professors and researchers from Japan, Ghana, Australia, the United Kingdom, and the United States, specializing in disaster medicine, radiation protection, public health, and related fields. All keywords used in the final searches are listed in Supplementary Material 1. As a sensitivity analysis, we expanded the included search terms to evaluate the robustness of topic classification. The results of this sensitivity analysis are provided in Supplementary Materials 2.

Search and data extraction were conducted using Scopus on 2024/4/23. The target research period was from 1901/1/1 to 2023/12/31. The following data were collected: author, year of publication, title, journal name, abstract, keywords, country of author's affiliation, and the number of citations. Article types such as conference paper, book, book chapter, conference review, abstract report, and erratum were excluded after extraction.

Analytical Methods

Descriptive analysis

Items were aggregated and descriptively analyzed. The number of publications by year was presented. Additionally, the top 10 countries of first authors and the top 10 journals were described.

Structural topic modeling

Structural topic modeling of abstracts was conducted using the R package stm (v1.3.6).[19] The number of topics was determined using the following diagnostic values: held-out likelihood, semantic coherence, residuals, and lower bound, through the discussion between YN and MM, and approved by all the authors. Held-out likelihood measures a model's ability to predict unseen data, with higher values indicating better performance. Semantic coherence assesses the interpretability of topics generated by the model, with higher coherence suggesting that the topics make intuitive sense. Residuals indicate the difference between observed and predicted values, where lower residuals reflect more accurate predictions. The lower bound, used in probabilistic models, is ideally higher to show a better approximation of the model's parameters and accuracy. High probability words in each topic were described in the study.

Hierarchical clustering of identified topics

To perform hierarchical clustering of identified topics, we first constructed an adjacency matrix based on Pearson correlation, applying a threshold of 0.08. Using the Ward's method for average-linkage clustering, we generated a dendrogram to illustrate the groupings. We then divided the topics into 5 distinct clusters.

Temporal analysis of each topic

To highlight the dynamic evolution of thematic content within the dataset, a cubic (third-dimension) polynomial regression was used to model the effect of time (measured in years) on topic prevalence. Each topic's expected relative proportion over time was plotted with 95% confidence intervals.

Sensitivity analysis

Using expanded search terms in the sensitivity analysis, we also examined annual publication trends, performed structural topic modeling, conducted hierarchical clustering of topics, and temporal analysis of each topic (Supplementary Materials 2).

Citation analysis

The number of citations was descriptively summarised. In this study, 2 authors (YN and MM) independently reviewed the top 5 most-cited papers for each topic and evaluated the validity of each paper as a disaster-related case study. Both have been engaged in disaster research, including case study. YN specializes in clinical oncology, health informatics, and public health, while MM's areas of expertise include risk science, environmental science, and public health. The agreement rate and kappa coefficient were calculated. If there were any disagreements regarding the validity of a paper, other co-authors were consulted to facilitate a discussion and reach a consensus. Through this process, three papers for each topic were selected to present. For each topic, the 3 most-cited references were retained. The content of these articles was summarized by group and topic.

Evaluation of disaster-related case studies

The 3 highly cited papers from each topic were evaluated for their reporting structure. This evaluation considered whether the papers followed the IMRaD structure,[20,21] included geographical information (map) and temporal information, and used the term "case study" or "case studies" in the title/abstract/keywords. Two independent reviewers conducted the evaluation. YN evaluated all the articles, and KU, YM, or MM independently reviewed them. The agreement rate and kappa coefficient were calculated. In cases of discrepancies, they resolved them through discussion and reached consensus.

Software

These analyses were performed using R version 4.22.

Results

Overviewing Publication of Case Studies Related to Disasters

A total of 25,914 records were extracted from Elsevier/Scopus. From these, 446 entries without abstracts were excluded. Additionally, 6,686 articles of the following document types were excluded: conference papers, books, book chapters, conference reviews, abstract reports, and errata. In total, 18,782 articles were included in the analysis. Figure 1 shows a steady increase in the number of case study publications over time. Beginning in the 1990s, there was a gradual rise, which became more noticeable around the 2000s.

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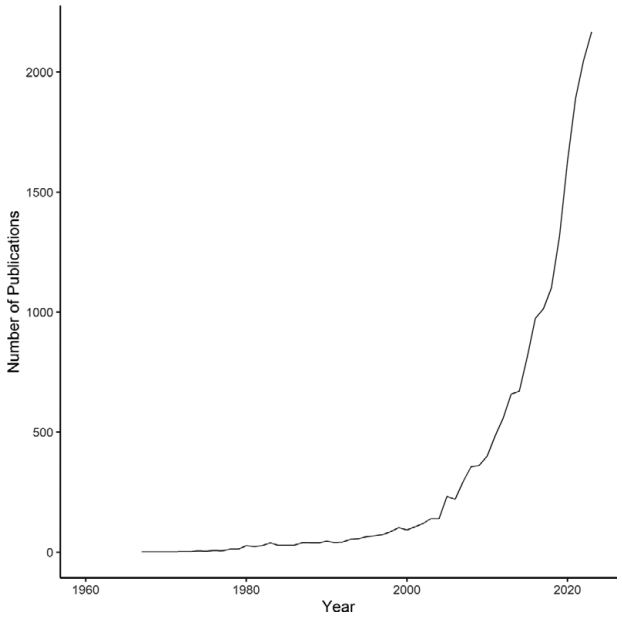


Figure 1. Number of publications.

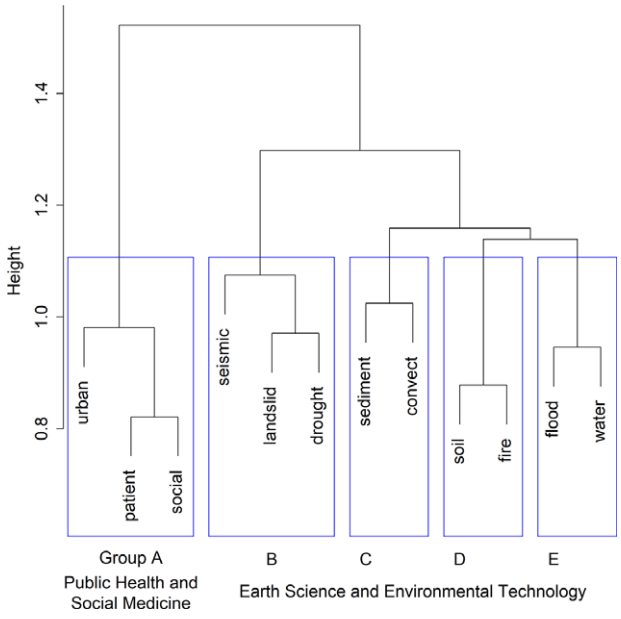


Figure 2. Hierarchical clustering dendrogram.

This trend continued into the 2020s, reflecting a growing use of case studies in research.

We analyzed the top 10 countries with the highest number of case study publications. China led with 3,500 publications, followed by the United States with 1,544. Other notable countries included Italy (689), Iran (531), India (525), and Japan (513) (Supplementary Material 1).

The top 10 journals publishing disaster-related case study articles were shown in Supplementary Material 1. "Water (Switzerland)" led with 469 publications, followed by "Natural Hazards" with 413, "Sustainability (Switzerland)" with 366, and "International Journal of Disaster Risk Reduction" with 290. These journals were key sources for case study publications across various fields.

Determination of Number of Topics and Clustering of Topics

To determine the number of topics, the diagnostic values were evaluated as the topic number increased from 5 to 50 in increments of 5. Based on the diagnostic values of held-out likelihood, semantic coherence, residuals, and lower bound, the topic numbers from 5 to 15 were carefully examined. Considering coherence, exclusivity, and actual interpretability by authors, the topic number was decided to be 12 (Supplementary Material 1). After 18 iterations, the topic model reached convergence. The topic model included 12 topics, 18,782 documents, and a 20,954-word dictionary. The emerged 12 topics with high-frequency terms, FREX terms, and high-score terms were shown in Supplementary Material 1. The hierarchical cluster analysis results were shown in Figure 2. When divided into two clusters, "Public Health and Social Medicine" was distinguished from a combined "Earth Science and Environmental Technology." Further clustering results showed five clusters as follows: "Group A: Public Health and Social Medicine" included topics Urban, Patient, and Social. The cluster "Group B: Geological Hazards" comprised topics Seismic, Landslide, and Drought. Other clusters showed "Group C: Atmospheric and Sedimentary Processes" with topics Sediment and Convect; "Group D: Soil and Climate Change" with topics Soil and Fire; and "Group E: Hydrology" with Flood and Water. High probability words for each topic were shown in Figure 3.

Publication Trends for Each Topic

Figure 4 illustrates the trends in topic proportions over time. Topics like landslide, drought, and fire showed a steady increase, indicating that interest or research in these relatively new areas had grown. In contrast, floods and water initially experienced a decline but have since maintained a steady level, suggesting they were once prevalent and continued to retain interest. Topics like urban, patient, social, and convect exhibited fluctuations, which might have reflected ongoing shifts in research focus despite their long-standing presence.

Sensitivity Analysis With Expanded Search Terms

Supplementary Materials 2 showed the result with expanded search terms. A total of 29,939 records were extracted from Elsevier/Scopus. After excluding 1,020 entries without abstracts and 7,038 records classified as conference papers, books, book chapters, conference reviews, abstract reports, or errata, 21,881 articles were included in the analysis. The results of the sensitivity analysis, as shown in Supplementary Materials 2, were largely consistent with the primary analysis. The overall topic structure, the highest probability terms for each topic, and the trends in topic proportions remained similar. Diagnostic values by the number of topics also showed comparable patterns.

Citation Analysis and Characteristics of Each Topic Group

The included articles received a total of 330,819 citations, with a mean of 17.6 citations per document and a standard deviation of 34.5. For each of the 12 topics, the top 5 most-cited papers were reviewed by YN and MM. Out of a total of 60 papers examined, there were 3 papers with initial discrepancies (agreement rate 0.95 and kappa 0.74). Through discussion, consensus was reached with a 100% agreement rate. Finally, 7 papers were determined not to be disaster-related case studies and were excluded. Six of the excluded papers mentioned "disaster" or "case" as part of their background or objectives, but they were not primarily focused on a

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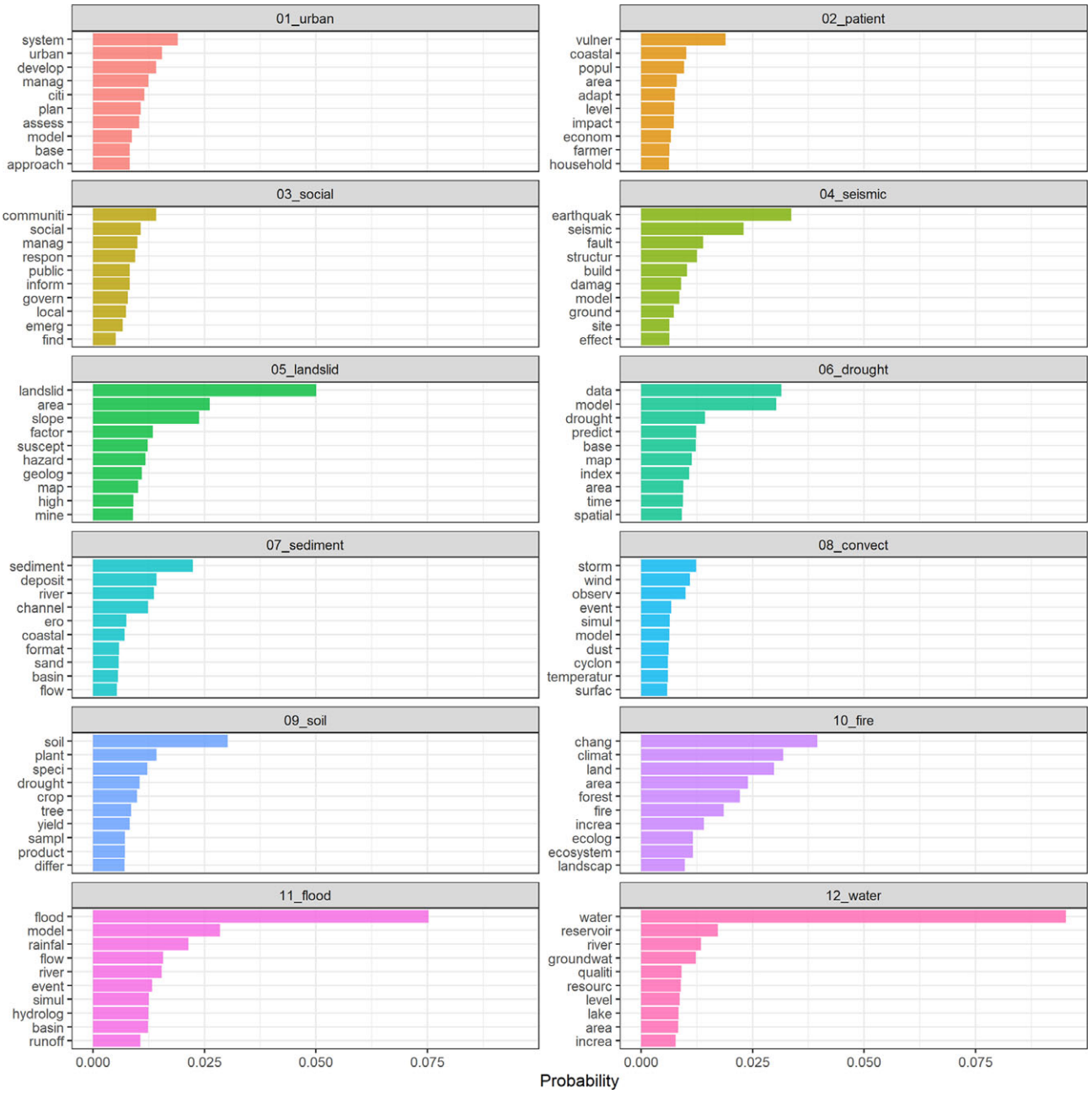


Figure 3. Highest probability terms for each topic.

disaster-related case study, leading to their exclusion. One paper was excluded because it contained an unrelated publication. The remaining top three papers for each topic were shown in Table 1 and described below. Detailed information were shown in Supplementary Material 1.

Major Group and Group A: Public Health and Social Medicine

- **Urban**: This topic included public health and urban management, focusing on development and resilience planning. Turner II B.L. et al. presented coupled human-environment systems, underscoring their implications for urban health services.[22] Govindan K. et al. tackled demand management in health care logistics amid COVID-19, vital for urban health planning.[23] Scholten K. et al. explored supply chain resilience, crucial in ensuring uninterrupted health care delivery in urban environments.[24]
- **Patient**: This public health-focused topic addresses vulnerabilities and health care challenges within climate-affected populations. Cutter S.L. et al. revealed vulnerabilities in Georgetown County, essential for health care accessibility plans.[25] Hahn M.B. et al. introduced a Livelihood Vulnerability Index in Mozambique, offering a public health perspective on climate risk assessments.[26] Brouwer R. et al. analyzed socioeconomic vulnerabilities to environmental risks, such as flooding in Bangladesh, highlighting impacts on health infrastructures.[27]

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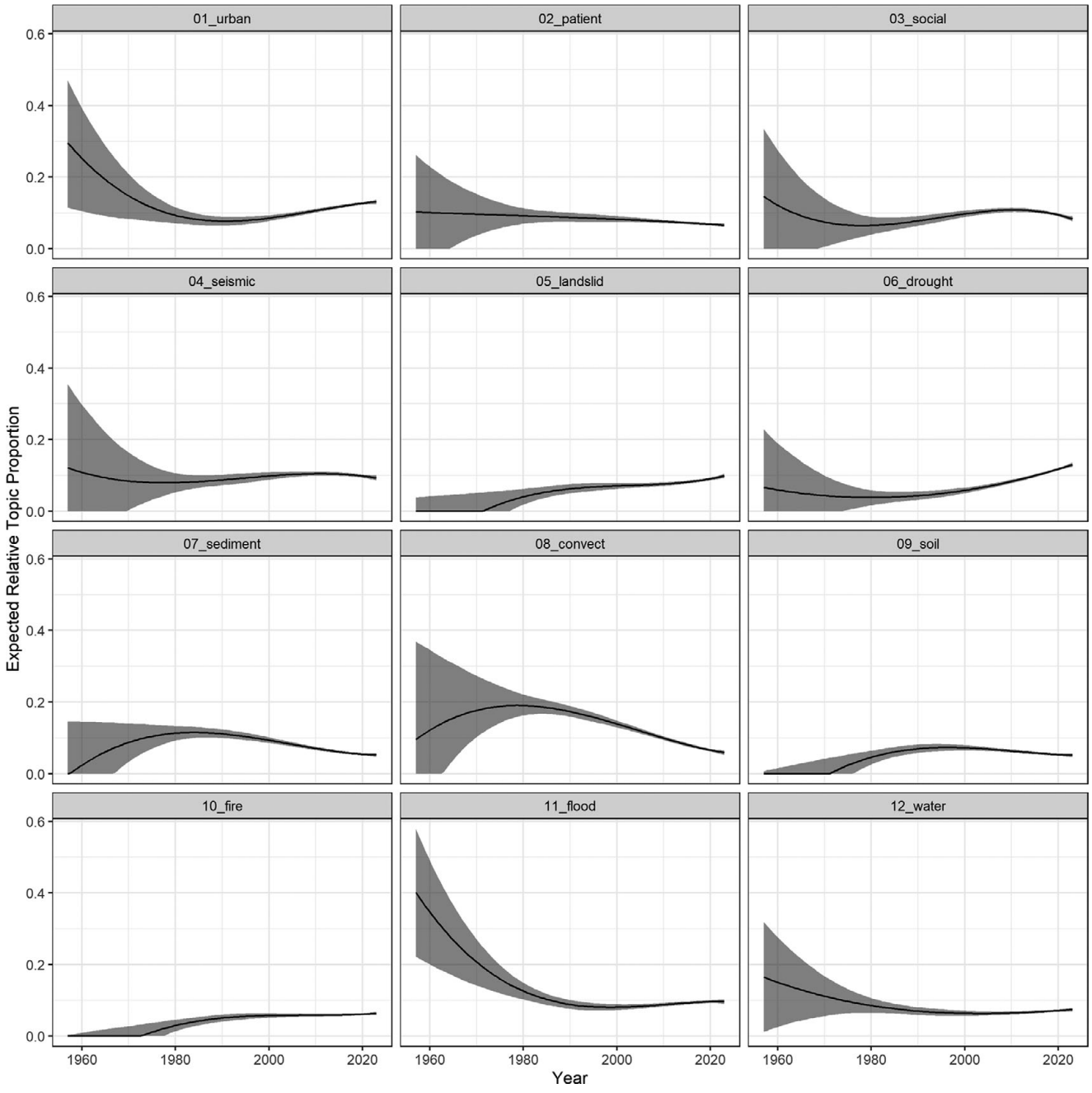


Figure 4. Trends of topic proportion for each topic.

- **Social**: This topic intersects public health and social medicine, focusing on community resilience and disaster response. Rufat S. et al. reviewed social vulnerability to floods, impacting public health and community resilience.[12] Burton C.G. validated resilience metrics post-Hurricane Katrina, highlighting social capital's role in health recovery.[28] Tomasini R.M. et al. discussed humanitarian logistics partnerships, underscoring cooperative strategies for health and disaster management.[29]

Major Group: Earth Science and Environmental Technology

Group B: Geological Hazards

- **Seismic**: Focusing on seismic activities, this topic analyzes fault dynamics and structural impacts. Watts P. et al. used simulation models for landslide-tsunami interactions, enhancing seismic risk assessments.[30] Schrott L. et al. applied geophysical field methods, advancing seismic evaluation techniques.[31] Savage M.K. investigated crustal anisotropy effects, crucial for understanding seismic wave behavior.[32]
- **Landslide**: This topic explored landslide mechanisms and risk mitigation. Huggel C. et al. assessed glacial lake outburst hazards via remote sensing, showcasing environmental techniques in landslide prevention.[33] Akgun A. highlighted innovative methods for landslide susceptibility mapping, vital for environmental planning.[34] Canals M. analyzes submarine landslides, focusing on dynamics and triggers.[35]
- **Drought**: Examining drought prediction and management, this topic utilized simulations and data analytics for effective

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Table 1. Group, topic, and key content of highly cited articles in each topic

Group	Topic	Key studies/highlights
Public Health and Social Medicine	Urban	Turner II B.L. et al.[22]: Human-environment systems. Govindan K. et al.[23]: Health care logistics amid COVID–19. Scholten K. et al.[24]: Supply chain resilience.
	Patient	Cutter S.L. et al.[25]: Vulnerabilities in Georgetown County. Hahn M.B. et al.[26]: Livelihood Vulnerability Index in Mozambique. Brouwer R. et al.[27]: Socioeconomic vulnerabilities in Bangladesh.
	Social	Rufat S. et al.[12]: Social vulnerability to floods. Burton C.G.[28]: Resilience metrics post-Katrina. Tomasini R.M. et al.[29]: Humanitarian logistics partnerships.
Geological Hazards	Seismic	Watts P. et al.[30]: Landslide-tsunami interactions. Schrott L. et al.[31]: Geophysical methods. Savage M.K.[32]: Crustal anisotropy effects.
	Landslide	Huggel C. et al.[33]: Glacial lake outburst hazards. Akgun A.[34]: Landslide susceptibility mapping. Canals M et al.[35] Submarine landslides, focusing on dynamics and triggers.
	Drought	Yilmaz I.[36]: Machine learning models. Yao X. et al.[37]: Natural slope risk assessment. Pham B.T. et al.[38]: Environmental risk assessments.
Atmospheric and Sedimentary Processes	Sediment	Church M.[39]: Geomorphic responses to regulated river flows. Moreno P.I. et al.[40]: Climate impacts on sediment in Chile. Aitken J.F. et al.[41]: High-resolution stratigraphy.
	Convect	Liu X.G. et al.[42]: Haze evolution in Beijing. Marks D. et al.[43]: Snowmelt during storms. Wu D. et al.[44]: Low visibility events modeling.
Soil and Climate Change	Soil	Niemi G.J. et al.[45]: Soil quality and aquatic recovery. Tuberosa R. et al.[46]: Genetic factors in maize. Haregeweyn N. et al.[47]: Soil conservation in watersheds.
	Fire	Muis S. et al.[48]: Flood risk adaptation under climate change. Chandler R.E. et al.[49]: Rainfall variability modeling. Poelmans L. et al.[50]: Urban sprawl and fire susceptibility.
Hydrology	Flood	Ouma Y.O. et al.[51]: Urban flood mapping. Delrieu G. et al.[52]: 2002 Gard region flash-flood. Knebl M.R. et al.[53]: GIS and rainfall modeling.
	Water	Gude V.G.[54]: Desalination process critique. Tabbal D.F. et al.[55]: Irrigation strategies. Ying X. et al.[56]: Environmental quality assessments.

forecasting. Yilmaz I. compared machine learning models for susceptibility mapping, advancing drought impact predictions.[36] Yao X. et al. applied advanced machine learning in natural slope risk assessment, enhancing predictive modeling capabilities.[37] Pham B.T. et al. evaluated models for accuracy in environmental risk assessments.[38]

Group C: Atmospheric and Sedimentary Processes

- **Sediment**: This topic included sediment deposition and erosion processes within riverine and coastal contexts, an area of earth sciences. Church M. examined geomorphic responses to regulated river flows, providing insights into sediment transport mechanisms.[39] Moreno P.I. et al. discussed abrupt climate impacts on sediment in the Chilean Lake District, linking environmental change to sediment dynamics.[40] Aitken J.F. et al. utilized high-resolution sequence stratigraphy to enhance our understanding of sediment distribution in fluvial systems.[41]
- **Convect**: This topic examined convective weather patterns, incorporating simulations and models for better understanding. Liu X.G. et al. investigated haze evolution in Beijing, utilizing atmospheric modeling techniques.[42] Marks D. et al. focused on snowmelt processes during storm events, employing simulation tools to analyze climate interactions.[43] Wu D. et al. described low visibility events, leveraging models to understand convective influences.[44]

Group D: Soil and Climate Change

- **Soil**: This topic focused on soil as a critical resource for ecosystem and agricultural stability under stress conditions. Niemi G.J. et al. linked soil quality with aquatic system recovery, emphasizing conservation.[45]. Tuberosa R. et al. identified genetic factors affecting drought-stricken maize, relevant for ecological resilience.[46] Haregeweyn N. et al. stressed soil conservation in erosion-prone watersheds, crucial for sustainable land use.[47]
- **Fire**: Addressing wildfire impacts, this topic explored interactions between land use and climate change with simulations. Muis S. et al. examined flood risk adaptation amid urban expansion, paralleling fire risk management approaches.[48] Chandler R.E. et al. modeled rainfall variability, applicable to predicting fire conditions.[49] Poelmans L. et al. analyzed urban sprawl, correlating landscape changes with fire susceptibility.[50]

Group E: Hydrology

- **Flood**: This topic showed flood dynamics, employing simulation and modeling for risk assessment. Ouma Y.O. et al. used AHP and GIS for urban flood mapping, enhancing flood simulation methodologies.[51] Delrieu G. et al. documented the 2002 Gard region flash-flood using hydrometeorological models.[52] Knebl M.R. et al. integrated GIS and rainfall data to model regional floods, highlighting technological advancements in flood management.[53]
- **Water**: This topic covered water resource sustainability, addressing quality and management practices. Gude V.G. critiqued desalination processes, critical for sustainable water solutions.[54] Tabbal D.F. et al. explored irrigation strategies in rice cultivation, improving water usage efficiencies.[55] Ying X. et al. used AHP and GIS for environmental quality assessments, integrating water considerations into ecological modeling.[56]

Table 2 shows the structural and content evaluation of case studies in each topic group. For each of the 12 topics, the top 3 most-cited

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Table 2. Evaluation of reporting structure of highly cited case studies related to disasters

	Introduction	Methods	Results	Discussion	Geographical information	Temporal information	Case study in title/ abstract/keywords	Total number of articles
(A) Public Health and Social Medicine	7 (77.8%)	4 (44.4%)	4 (44.4%)	6 (66.7%)	5 (55.6%)	3 (33.3%)	9 (100%)	9
(B) Geological Hazards	9 (100%)	4 (44.4%)	0 (0%)	4 (44.4%)	8 (88.9%)	5 (55.6%)	9 (100%)	9
(C) Atmospheric and Sedimentary Processes	6 (100%)	2 (33.3%)	2 (33.3%)	3 (50%)	6 (100%)	4 (66.7%)	6 (100%)	6
(D) Soil and Climate Change	6 (100%)	2 (33.3%)	4 (66.7%)	5 (83.3%)	5 (83.3%)	3 (50%)	6 (100%)	6
(E) Hydrology	5 (83.3%)	3 (50%)	5 (83.3%)	4 (66.7%)	5 (83.3%)	4 (66.7%)	6 (100%)	6

papers were evaluated by 2 authors. While there were some discrepancies in the initial evaluation (with an agreement rate of 0.90 and a kappa coefficient of 0.77), all discrepancies were resolved through discussion. The Introduction section consistently had high inclusion rates, reaching 100% in Groups B, C, and D. The Methods section was reported less frequently, with Group E leading at 50%. In the Results section, Groups D and E were well-documented, whereas the Discussion section was generally better described than Methods or Results. Geographical Information and Temporal Information were less exhibited in Group A, while other groups showed better inclusion. The use of the term "Case Study" in the title, abstract, or keywords maintained high consistency across all groups, as it was used as a search term in this study.

Discussion

This study analyzed large-scale publication metadata of disaster-related case studies indexed in Elsevier/Scopus. Overall, the presented data underscored the spread of disaster-related case study methodology in various disciplines, particularly in the fields of public health, social medicine, earth science, and environmental technology. The substantial number of publications and the geographic diversity of contributors highlight the broad applicability and value of case study investigations in advancing knowledge and addressing global challenges toward disasters.

Structural topic modeling identified 12 topics, which were categorized into 5 clusters: public health and social medicine, geological hazards, atmospheric and sedimentary processes, soil and climate change, and hydrology. Some topics corresponded to specific types of disasters, such as landslides, droughts, and wildfires, which were also included in the search terms. It should be noted that public health and social medicine can form an independent cluster separate from the earth science and environmental technology groups.

Temporal change analysis highlighted the increase of climate change-related articles, like topics named landslide, drought, and fire. Still, all the topics showed some proportions. This result provided insight into how each topic has shifted over the evaluated period. Nonetheless, the recurrence of topics related to public health and medicine underscored the active publication landscape in disaster-related case studies.

Variability was observed in the positioning of the case in each article. This variability can be attributed to the submission guidelines of different journals, which reflect the diverse disciplines of the selected literature. From a research methods perspective, several issues were identified. In topics like convect, seismic, flood, and fire within the fields of earth science and environmental technology, simulations or predictions have been incorporated based on the circumstances presented as case studies.[30,44,48–53] In these instances, the case study is embedded as part of a simulation rather than as a comprehensive case study, often focusing on specific regions or circumstances. This underscores the importance of clearly reporting whether a study is entirely or partially a case study. In medicine, when focusing on individuals, "case report" is more commonly used than "case study."[57] It should be noted that publications referred to as "case studies" often target meso (institutional or community) levels, macro (national or global) levels, or both. The positioning and level of the case within the study can vary and are important to consider.

There were considerable variabilities in the structures and content of the articles. While variations in structure might be unavoidable, the boundaries between human-centric research and fields like the humanities, environmental technology, and sociology are becoming less distinct. This indicates a need for ongoing discussion, particularly from an ethical standpoint. The IMRAD format is a frequently used structure in scientific research[20]; however, many publications deviate from this style. Structural variations may be more influenced by the submission guidelines than by content similarity. Additionally, it should be noted that geographical and temporal information were less frequently reported in the public health and social medicine group compared to others. The term "case study" was included in the articles because it was part of the search term in this study. Ideally, it should be included in their titles, abstracts, or keywords to enhance discoverability in literature searches, similar to other research types.[15,58] This point should be noted for disaster-related research, where the dominance of case studies has been reported.[9] Deciding on essential items for reporting case studies in public health and medicine is crucial for accumulating and synthesizing future lessons learned.

This study has several limitations. First, it relied solely on the Elsevier/Scopus database due to the necessity of using standardized publication metadata for this analysis. However, all the MEDLINE articles and other multidisciplinary articles were indexed in Scopus, allowing us to adequately assess the dynamics of research publications on case studies. Second, highly cited case studies may not necessarily reflect high-quality research, and less cited case studies are not always indicative of lower quality. Nevertheless, the number of citations serves as an objective and reasonable criterion for selecting articles from a vast pool of work. Third, while structural topic modeling offers a systematic approach to large-scale

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classification, it may not fully capture certain important but less frequently reported disaster types. Sensitivity analysis with additional search terms yielded more records; however, the overall topic structure was consistent with the primary analysis. Even with the expanded search, topics such as "subsidence," "avalanche," "freezing rain," and "lahar" did not emerge, likely due to their low frequency in the literature. Still, structural topic modeling would be a reasonable method to capture the patterns of document data.[14,19] Fourth, this study used search terms related to general disaster terminology, as well as terms specific to natural and nuclear disasters, and included case studies focusing on these types of events. Therefore, it may not fully represent the diversity of disaster-related case studies, particularly those involving man-made events such as terrorism, war, conflict, or explosions.[59,60] Nevertheless, it would be emphasized that this study was a large-scale bibliometric analysis that provided an overview of case studies on natural and nuclear disasters. Lastly, case studies that did not include "case study" in their titles or keywords were not considered, potentially omitting relevant studies from the analysis. However, this approach remained an acceptable method for bibliometric analysis of disaster-related case studies because it is not feasible to manually determine whether all the publications are case studies.

In conclusion, this study showed a global increase in the number of case studies. Structural topic modeling analysis identified 12 topics, indicating their distribution across various fields, with public health and social medicine being a major domain. Variability was observed in the structure and content of disaster-related case studies within public health and medicine. This study highlighted the need to itemize essential contents when reporting disaster-related case studies in public health and medicine to enhance knowledge synthesis.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/dmp.2025.10279.

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