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Review

Exploring the science of evacuation behavior and decision-making during large scale community evacuations: A scientometrics analysis and scoping review

Chamika Kannangara [a,b], Erica Kuligowski [a], Chandana Siriwardana [c,*], Guomin Zhang [a], Varuna Adikariwattage [b], Paboda Jayawardane [b]

[a] School of Engineering, Royal Melbourne Institute of Technology (RMIT) University, Melbourne, VIC 3001, Australia
[b] Department of Civil Engineering, University of Moratuwa, Moratuwa 10400, Sri Lanka
[c] School of Built Environment, Massey University, Albany, Auckland 0632, New Zealand

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ABSTRACT

Understanding how people behave during large-scale community evacuations is important as it can reveal key decision-making gaps which can be addressed to improve emergency planning and to keep communities safer. This study examines the critical gaps in existing research on evacuation behavior and decision-making during disasters by holistically exploring the research domain of evacuation behavior. A total of 667 articles and their references were analyzed using scientometrics methods. This study employs a novel approach to the analysis called overlay networks in CiteSpace. The findings highlight gaps in our understanding of human behavior during the evacuation, such as the stay-or-go decision and travel-related behavior, including destination, mode, route, and return-entry choices, in the context of earthquakes, floods, tsunamis, volcanic hazards, and wildfires. Evacuations triggered by technological disasters are explicitly excluded from this review. It also emphasizes that tourist evacuations remain an underexplored area. Also, the current study reveals that established theories, such as the Protective Action Decision Model (PADM) and the Theory of Planned Behavior (TPB), remain underutilized in research on evacuation behavior during hazards like earthquakes, tsunamis, and volcanic eruptions. This research supports the findings of previous studies in emphasizing the need for interdisciplinary approaches to evacuation research. It also underscores the importance of integrating existing behavioral evidence into evacuation models, alongside efforts to collect additional data. Also, the study emphasizes the importance of strengthening research collaborations with scholars in Asia and Africa. This approach seeks to address the disparity in research conducted across different regions of the world.

1. Introduction

Worldwide, disasters have caused devastating impacts on human life and property. According to the Emergency Event Data Base (EM-DAT), in 2024, 393 disasters resulting from natural hazards occurred (CRED, 2024). According to EM-DAT, this number of disasters is above the average number of annual catastrophic events (371) that occurred between the years 2004 and 2023. Overall, in 2024, these disasters resulted in 16,753 fatalities, impacted 167.2 million people (CRED, 2024). Also, compared to the annual average economic loss (US$ 209.6B) from disasters during the period from 2004 to 2023, in 2024, the economic loss is comparatively high (US$ 242B) (CRED, 2024). This reflects the fact that disasters and their impacts have been increasing in number in recent years. Floods, storms, and extreme temperature events were the most prominent examples of these devastating events. Early warning systems, emergency response plans, and effective evacuation protocols during disasters all play a significant role in mitigating the impacts of a disaster (Hosseini & Izadkhah, 2020; Trogrlić et al., 2022).

Sudden-onset disasters are among the most critical events that at-risk communities find difficult to cope with. Geophysical hazards like earthquakes, tsunamis, and volcanic eruptions; meteorological hazards, including tropical cyclones and hurricanes; and hydrological hazards,

* Corresponding author.
E-mail addresses: s3957718@student.rmit.edu.au (C. Kannangara), erica.kuligowski@rmit.edu.au (E. Kuligowski), C.Siriwardana@massey.ac.nz (C. Siriwardana), kevin.zhang@rmit.edu.au (G. Zhang), varunaa@uom.lk (V. Adikariwattage), jayawardanejmpm.19@uom.lk (P. Jayawardane).

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including coastal floods and mudflows, are considered as sudden-onset disasters (UNHCR, 2019). However, with technological advancements, most of the meteorological hazards can be predicted with a sufficient lead time, allowing at-risk communities to take protective actions in time (Golding, 2022). In contrast, this is not the case for geophysical hazards. Hence, at-risk communities should be well prepared to cope with these sudden-onset events.

According to the literature, the behavior of at-risk communities can be considered as a significant factor that puts them in high-risk situations (Mumuni et al., 2022). For most disasters, evacuation to a safer place would be the safest protective action for exposed populations. However, literature shows that at-risk communities engage in many tasks before initiating evacuation, which may delay their movement to safety (Vaiciulyte et al., 2021). Additionally, attitude towards the threat itself can influence response times, often causing further delays in evacuation (Strahan et al., 2018). Moreover, the choices made by evacuees can make the evacuation process more complicated. Given that a significant number of casualties are still caused by disasters despite improvements in disaster response capacities over time, it is important to examine evacuation procedures during disasters comprehensively. Therefore, over the years, researchers have been evaluating human behavior during different disasters and developing multiple frameworks to assess the evacuation behavior of at-risk communities.

The current body of knowledge contains several review articles. For instance, Drabek (1986) attempted to examine the evolution of evacuation behavior research and brought findings from empirical studies on disaster evacuations. Most review articles on evacuation focus on one specific hazard, e.g., hurricanes (Ahsan et al., 2016a,b; Huang et al., 2016; Islam et al., 2023; Pel et al., 2012; Tanim et al., 2022; Karaye et al., 2022), wildfires (Batdorf & McGee, 2023; Beyki et al., 2023; Folk et al., 2019; Haghani et al., 2022; Haghani et al., 2024; Kuligowski, 2021; McLennan et al., 2019; Strahan & Gilbert, 2021a, 2021b, 2021c), tsunamis (Doocy et al., 2013; Makinoshima et al., 2020; Mls et al., 2023), or floods (Hamilton et al., 2020; Kellens et al., 2013). Notably, comprehensive reviews addressing multiple hazards do exist such as (Drabek, 1986; Lindell et al., 2019; Lindell & Perry, 1992; Quarantelli, 1980). Furthermore, Thompson et al. (2017) uniquely cover multiple disasters in the review article, yet it refrains from mapping the knowledge domain in evacuation behavioral research over the years. Additional reviews are available in the current literature focusing on specific evacuation-related topics, such as human-animal interactions (Kaur & Kaur, 2022; Travers et al., 2017; Wu et al., 2023), and gender (Pérez-Gañán et al., 2023) and evacuation modeling approaches (Bakhshian & Martinez-Pastor, 2023). Other evacuation-related reviews have been developed that focus less on behavioral research and household decision-making and more on emergency management (Feng & Cui, 2021) and evacuation simulation (Liu et al., 2020).

While numerous reviews are available in the literature, this paper uniquely explores the intellectual structure of evacuation behavior research across various disasters through scientific mapping. The term intellectual structure refers to the interconnected network of themes, concepts, and scholarly contributions within a field, revealed via citation patterns, which enables researchers to identify key themes, knowledge gaps, and influential works. Unlike traditional reviews, the scientometrics approach provides a holistic analysis of the domain, offering a robust foundation to map the current research landscape and its knowledge areas. This review addresses a critical gap in evacuation behavior literature by encompassing multiple hazards, which often lack such comprehensive coverage. Ultimately, the article presents a comparative analysis of accomplishments across disaster contexts and proposes future research directions. These objectives are achieved through systematic exploration of the existing body of knowledge.

Accordingly, this paper contributes to the field in three ways. First, it provides a systematic, multi-hazard analysis of evacuation behavior research, offering a broader perspective than single-hazard reviews. Second, it uses scientometrics techniques to map the intellectual structure of the field, revealing the current research landscape and the knowledge areas within the evacuation research domain, especially introducing the overlay network technique for the first time in the scientometrics review article. An overlay network in CiteSpace is a visualization that superimposes a set of nodes and links, derived from a particular subset of data (e.g., hazard-specific articles) onto an existing baseline network. This approach allows researchers to identify how specific topics, like hurricane evacuation, intersect with broader research areas (disaster evacuation). Third, this study proposes future research directions for the domain.

This paper outlines the research methodology, discusses the document co-citation network generated by CiteSpace, identifies research gaps, and concludes with future research directions for disaster evacuation behavior research.

2. Methodology

This study employed scientometrics methods to examine research on disaster evacuation behavior up to September 2024. To collect a substantial number of formally published articles, we did not limit the review to a specific timeframe. Instead, the dataset was obtained through keyword and title searches, which yielded articles dating back to 1952. Although the authors attempted to manually search for relevant articles published prior to 1952, this effort proved unsuccessful due to the lack of comprehensive records for such publications (i.e., full records include key information about the article, such as cited references, which are essential for the analysis). The research methodology consisted of several stages, including formulating key search terms, extracting relevant articles from the Web of Science (WoS) database, utilizing scientometrics approaches to analyze the data, and ultimately discussing the main research areas, identifying knowledge gaps, and providing recommendations for future research. This study employed the science mapping tool CiteSpace to map research articles published in journals until September 2024. Science mapping tools utilize bibliographic records of a particular research field to produce a comprehensive overview of the underlying knowledge domain. Examples of such tools include CiteSpace and VOSviewer. Researchers have successfully employed CiteSpace to conduct systematic reviews across diverse fields, including regenerative medicine (Chen et al., 2012), disaster research (Shen et al., 2018), green construction research (Luo et al., 2022), subskills research (Aryadoust, 2020), etc.

Initially, a search query was formed so that the multiple disasters and their evacuation behavior-related studies could be incorporated into the review. Fig. 1 depicts the search setting and the overall methodology.

As the next step, a document co-citation network was derived using CiteSpace software. The document co-citation network was derived based on the citation patterns of 667 articles, with cited references as nodes and co-citations (of cited references) represented by connecting lines. Once the network is clustered and labeled based on the keywords of the citing articles (667), the document co-citation network shows the different clusters that contributed to the research domain. CiteSpace also generated a table summarizing cluster details, such as citation counts of cited references (frequencies), DOIs, and publication years, which we used to manually review article titles within each cluster. We identified the titles and abstracts of frequently cited articles (within the network) to provide objective descriptions of the clusters and conduct a scoping review. This helped us identify existing research across various disaster contexts. When we mention a 'manual review,' it refers to our detailed examination of research titles and abstracts within this network.

The entire network was further analyzed using hazard-specific overlay networks, which were overlaid on the original document co-citation network. The hazard overlay networks were derived in a similar way to document co-citation networks. The only difference is that, rather than using all the 667 articles we collected, here we use a subset of the collected articles (i.e. earthquake research, flood research,

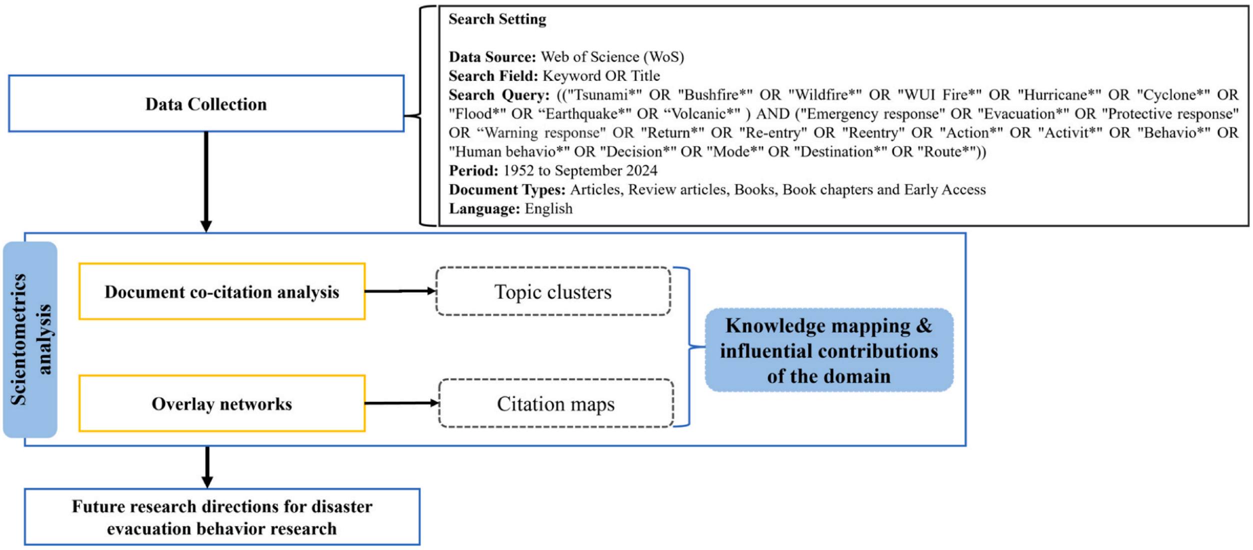

Fig. 1. Overall research methodology.

hurricane research). We manually sorted these subsets by reviewing the titles and abstracts of all collected articles (667 initial article sets) and classifying them into newly created hazard-specific datasets. This classification was validated with a Python script that sorted articles based on author keywords, further examining those without explicit hazard names in the keywords. Once the CiteSpace analysis was conducted on a particular hazard-specific article set, the cited references of that network can be obtained. Within this network, articles with a degree of two or more were stored separately within a node list. A degree of two or more indicates that a node (cited reference) has been co-cited with at least two other nodes (references) within the network. It reflects that the node (or cited reference) has a higher relevance to the research field. This node list was then re-imported into the base network to create an overlay that displays only those higher-degree nodes and their co-citation links. The resulting map highlights where citation ties are dense or sparse, allowing us to see which topical clusters a particular hazard-specific studies cited most heavily (see Chen (2006) for a more detailed explanation of how document co-citation links are generated in CiteSpace). This study created six distinct overlay networks, each focusing on different hazards: earthquakes, floods, hurricanes, tsunamis, volcanic hazards, and wildfires. This approach, combined with the manual review of the document co-citation network, provides a clearer understanding of how hazard-specific research explores knowledge areas from various clusters within the base network. Further details about the parameters used for the visualization are discussed in Section 2.2.

Finally, to assess global contributions to the knowledge domain, we conducted a co-authorship analysis by country using Vosviewer. This analysis identified the countries that have contributed significantly to evacuation behavior research. The results were further evaluated against worldwide disaster impacts to propose future research directions. These findings highlight the need for future research to prioritize addressing these knowledge gaps. By doing so, the review identified areas in upcoming research that should focus on each disaster context.

2.1. Search setting

The following search query was used to find the relevant articles from the WoS database.

The keyword and Title fields were set as ((Tsunami* OR Bushfire* OR Wildfire* OR "WUI Fire*" OR Hurricane* OR Cyclone* OR Flood* OR Earthquake* OR Volcanic*) AND ("Emergency response" OR "Evacuation" OR "Protective response" OR "Warning response" OR Return* OR "Re-entry" OR "Reentry" OR Action* OR Activit* OR Behavio* OR "Human behavio*" OR Decision* OR Mode* OR Destination* OR Route*)).

We decided on the search query based on our need to cover multiple disasters and the scope of this review. This study excludes technological disasters (e.g., toxic chemical or radiological releases) and human-caused disasters, focusing primarily on those caused by natural hazards. We were interested in examining articles that explored people's activities and their evacuation behavior, which is initiated through logical decision-making processes. We searched for articles, review articles, books, book chapters, and early access articles to ensure reliable data and a comprehensive review process. Specifically, we searched for articles and reviews published until September 2024. This approach excluded conference papers, which typically undergo less rigorous peer review (Santos et al., 2017). More than 38,000 unique articles were obtained from the WoS database. In utilizing the WoS for data collection, our rationale was to mitigate the likelihood of collecting duplicate records and to leverage the compatibility of WoS data with CiteSpace. From 38,074 articles, we first filtered articles based on their titles and then considered their relevance to our domain based on the abstracts. Furthermore, we searched for articles manually by reviewing the reference sections of the initially collected articles. Finally, we obtained 667 articles. This study presents a scientometrics analysis based on these articles, which were considered the primary dataset for the review. The selection of 667 articles from WoS was done meticulously to ensure that we collected articles relevant to the scope of our study. We kept articles that investigated evacuation behavior during disasters, modeled evacuation decisions and behavior, discussed evacuation planning and policies that incorporated human behavior during disasters, conducted traffic assessments incorporating human behavior and evacuation decisions, and utilized agent-based simulations for evacuation behavior simulations. The detailed method explaining the selection of the final set of articles is presented in Fig. 2.

2.2. Data visualization

The bibliometric networks utilized in this study were generated through the utilization of version 6.4.R1 of the CiteSpace software. Specifically, a document co-citation network was generated through the application of CiteSpace. The document co-citation network shows a visualization of articles (cited references of the articles we collected) that were co-cited together. We set the time-slicing interval to 1 slice per year. This means that CiteSpace divides the dataset into one-year intervals, which makes it possible to gain different insights into academic

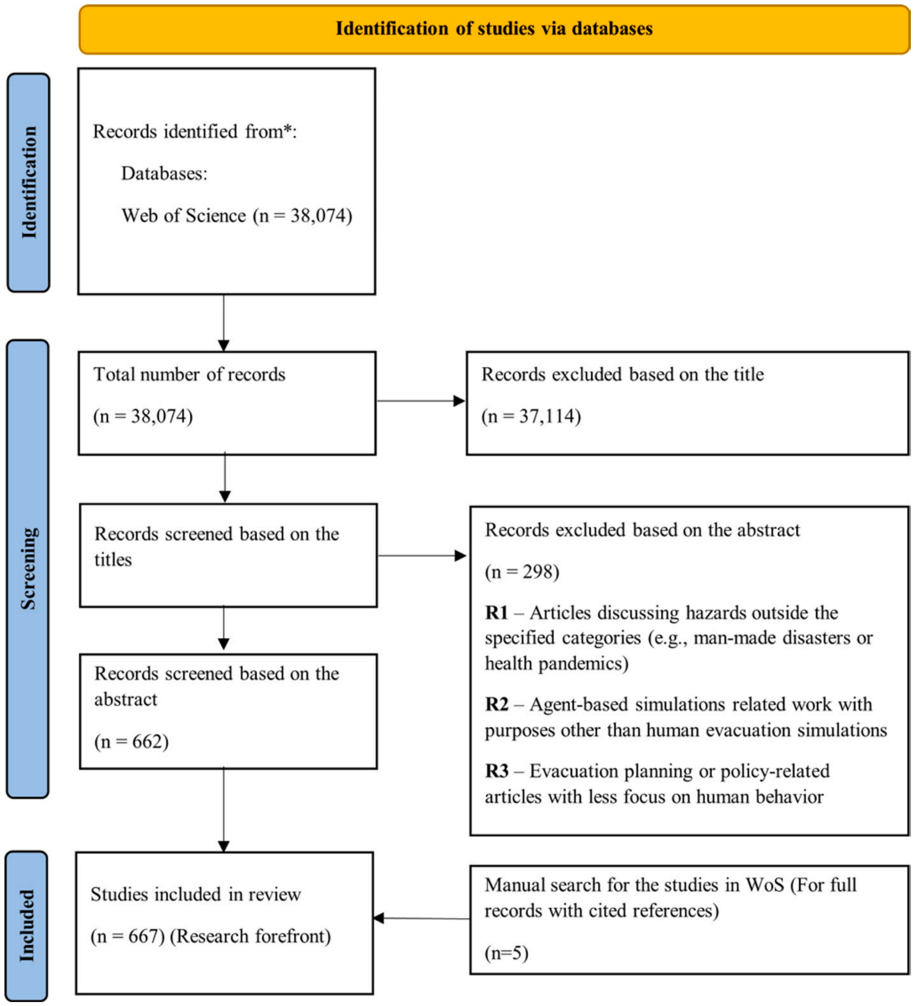

Fig. 2. Selection of articles for the analysis.

literature trends and progressions. The link retaining factor was set to −1 to allow any number of links between nodes in the network. We kept all links since we had only 667 articles. The look-back years factor was also set to −1 to include all documents in the cited reference (Intellectual base) in our network regardless of the date they were published.

The process of analyzing using CiteSpace is not straightforward. Different parameters can be used to generate the co-citation networks. For example, "Top N" or "Top N%" functions, or "g index" with different k values, are commonly used methods in CiteSpace (Chen & Morris, 2003). Therefore, we attempted to check several networks first. Ultimately, we concluded on a network that provides more meaningful clusters. We relied on the "Top 700" cited items (references) per slice for document co-citation analysis. The clusters were labeled based on the keywords of citing articles of the cluster. The research forefront was determined by the citing papers (667), while the intellectual base was represented by the cited papers within each cluster.

The results section is structured as follows: we present the document co-citation network in section 3, wherein we identify clusters based on relevant keywords with a concise introduction to each cluster. In the following section (Section 4), we present the scoping review, which consists of two main sub-sections. Section 4.1 discusses the overlay networks used to identify research gaps within the field. Section 4.2 focuses on the foundational research and highlights key influential articles published between 1952 and September 2024, based on citation bursts. Citation Bursts is a metric in CiteSpace that reflects a notable increase in attention towards a specific term, article, or even a keyword in relation to the citations it accumulates over time or frequency of occurrence of a term in the network. The analysis in Section 4.2, not only underscores pivotal works that shaped the domain's trajectory but also curates a selection of readings for scholars seeking to engage with foundational social science research and its interdisciplinary connections. The resulting synthesis serves as a guided entry point for newcomers and a reflective resource for established researchers revisiting the field's intellectual roots.

3. Document co-citation network and clusters

Document co-citation analysis is a commonly used method for exploring the intellectual structure of a specific field of study. This approach involves identifying the most frequently cited documents in the literature and analyzing the co-citation patterns between them. By applying this technique, researchers can generate a comprehensive overview of the citation and co-citation patterns present within the scientific literature, providing valuable insights into the key topics and themes that are most relevant to the field of study (Chen, 2006). The co-citation network stems from how our initial set of citing articles (667 in total) referenced existing research articles. This process forms an intellectual dataset known as cited references, drawn from the reference lists of these 667 citing articles. These cited reference articles could be any item from the reference lists of our initially collected articles. The approach distinguished sets of referenced papers that have been frequently cited together while identifying the citing articles responsible for creating these clusters. The clusters can be categorized based on the title of the articles, keywords, or subject (of citing articles). We discovered that keyword-based titles offer more meaningful cluster labels that result in good clustering.

Fig. 3 shows the document co-citation network generated under the above-mentioned methodology. CiteSpace forms a network of two groups of articles: the citing article group and the cited reference group. The approach assumes that articles citing a reference of interest are likely to be relevant (Chen, 2015). This facilitates the identification of relevant articles and can be useful in exploring interconnections and relationships within a field of study. The document co-citation network generated using the collected articles had a modularity index of Q = 0.8225 and a mean silhouette of S = 0.9905. The modularity index represents the ability to divide a network into smaller components further. Thus, a higher modularity index implies that the network has few inter-cluster overlaps. On the other hand, the mean silhouette score measures the homogeneity of clusters. Therefore, it is ideal to have a higher mean silhouette score (~1) and cluster silhouette scores that ensure the quality of the clusters.

Furthermore, for each cluster, CiteSpace provides the top keywords since this network was labeled based on keywords of the citing articles. The Log-Likelihood Ratio (LLR) is used in CiteSpace to identify the most representative terms or references for each cluster. A higher LLR value for a term or reference would indicate that it is more representative of the theme or topic of the documents within that cluster.

Table A1, annexed in Appendix A, provides detailed information about the clusters and their keywords and top five cited references in the clusters in terms of citation frequency and top five citing articles in terms of the citation coverage of each article within its respective cluster. The citation coverage indicates the number of references a citing article has cited within the respective cluster. This detailed information sheds light on the methodology behind the formulation of these clusters within CiteSpace.

The clusters with the same labels are generated due to the varying citation patterns of the initially collected citing articles. For instance, the clusters labeled "agent-based modeling" are formed from two distinct sets of citing articles. Cluster 6 primarily consists of tsunami-related articles, while cluster 13 includes articles related to multiple hazards. The citation patterns can be examined in Section 4.1 of this article, which is used to identify the research gaps identified in this study.

In the following section, we provide a brief introduction to each cluster identified in Fig. 3.

While CiteSpace's cluster labeling algorithm provides an objective way of describing the research clusters, it may not always provide an adequate description of the cluster content. Also, CiteSpace generated clusters can include some members which may not relate to the conceptual relevance of the clusters as the algorithm relies on the co-citation patterns. To compensate for this, we manually examined the cited references in each cluster and removed such outliers. The remaining papers were reviewed to determine the thematic focus of each cluster. In the following sections of this article, when we refer to "citing articles," we mean the articles that contributed to the formation of a specific cluster. In contrast, when we mention "cluster members" or "cited references," we refer to the articles that have been cited and are included within that cluster.

Cluster 0: This is the largest cluster of the network, containing 1,604 articles with a Silhouette (S) value of 0.962, indicating a high level of homogeneity within the cluster. (The S value ranges from 0 to 1, with higher values reflecting greater homogeneity.) The average publication year for the articles in this cluster is 2002. This cluster primarily focuses on hurricane evacuation and covers several topics in hurricane evacuation research, including decision-making during evacuation (Hasan et al., 2011; Lindell et al., 2005), risk perception during hurricanes (Meyer et al., 2014; Peacock et al., 2005), and significant contributions such as review articles on evacuation transportation modeling (Murray-Tuite & Wolshon, 2013). The cluster also addresses hurricane evacuation and return-entry issues (Siebeneck & Cova, 2008, 2012). When it comes to research on evacuation decision-making during hurricanes, the cluster includes both hypothetical event studies and studies focused on investigating evacuation behavior during actual hurricanes (Kang et al.,

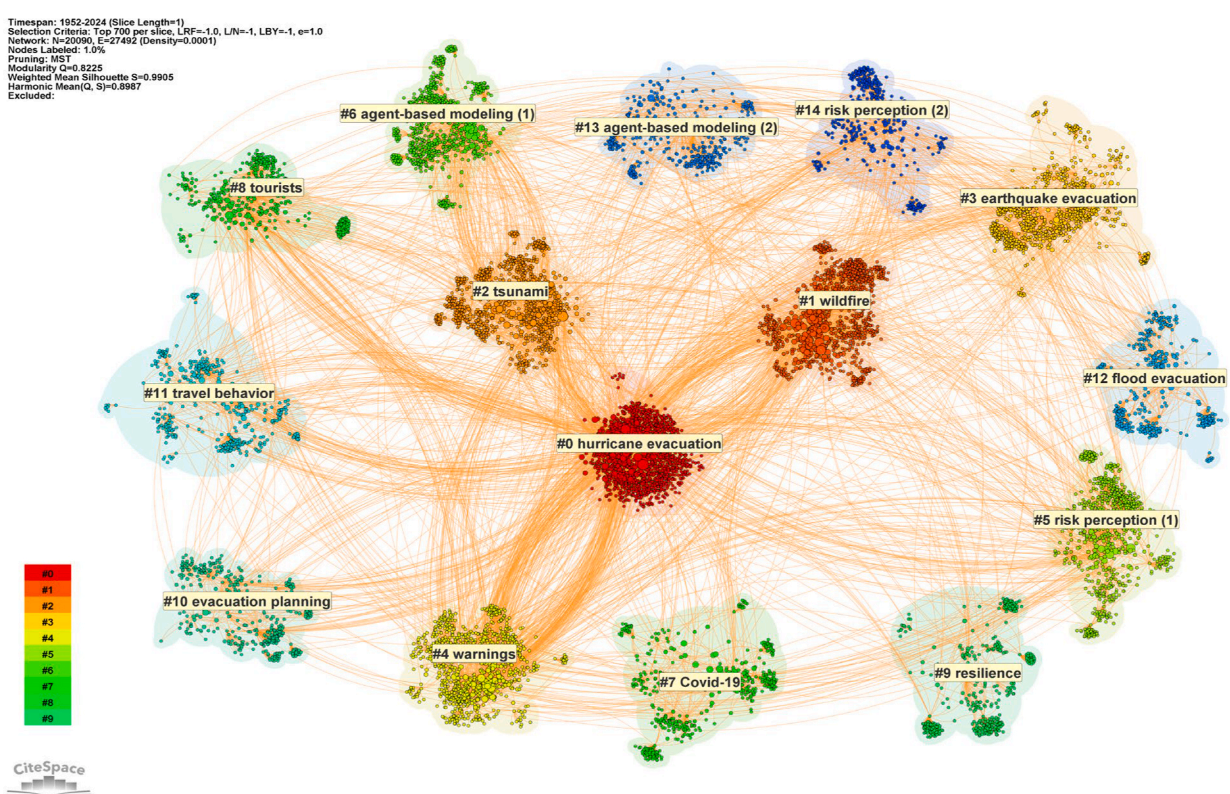

Fig. 3. Document co-citation network.

2007; Smith & McCarty, 2009). Furthermore, the cluster includes various articles related to social science, and conceptual frameworks designed to explain human behavior during emergencies (Drabek & Boggs, 1968; Lindell & Perry, 2012; Rogers, 1975).

Cluster 1: Cluster 1 includes articles related to wildfire evacuation. This cluster contains a total of 1,164 articles, with a Silhouette score of 0.978. The average publication year of these articles is 2007. Many articles in the cluster investigated the evacuation decision (stay or go decision) of individuals and households during real wildfire events (Cohn et al., 2006; McLennan et al., 2012) and hypothetical situations (Mozumder et al., 2008). Notably, there are articles on "wait and see" decisions during wildfires (McCaffrey et al., 2018). A recent review article on wait-and-see literature by Strahan and Gilbert (2021a) summarize the previous research findings and their implications for emergency managers for policy development. Even though it is limited in number, the cluster also contains articles on evacuation simulations under wildfire threats (Veeraswamy et al., 2018; Wahlqvist et al., 2021).

Cluster 2: Cluster 2 primarily includes articles related to tsunami evacuation studies. This cluster contains 1,022 articles with a Silhouette value of 0.982. The average publication year for the articles in this cluster is 2009. Among the most frequently cited articles in the cluster, studies on evacuation behavior during actual tsunami events are found (Harnantyari et al., 2020; Lindell et al., 2015). One of the oldest articles in this cluster is the work done by (Lachman et al., 1961), which is a study on human behavior with an ambiguous warning system. Also, this cluster includes research on the evacuation intentions of people in potential tsunami events (Buylova et al., 2020; Lindell et al., 2022). Furthermore, tsunami preparedness of at-risk communities is another major area that can be observed in this cluster (Esteban et al., 2013).

Cluster 3: Cluster 3 consists of 1003 articles with a Silhouette score of 0.990. The average publication year of the articles is 2007. Cluster 3′s overall concept is about evacuation during earthquakes. However, most of its articles are on crowd evacuation. For example, among the topmost cited articles in the cluster are related to crowd evacuations in the built environment and buildings (Pelechano & Badler, 2006; Zheng et al., 2009). Another observation in this cluster is the use of the "social force model" to simulate human movements during emergencies (Helbing & Molnár, 1995; Lakoba et al., 2005). Additionally, some articles are more focused on evacuation simulations during earthquakes (D'Orazio et al., 2014b). A manual examination of cluster 3 revealed that the earthquake evacuation research has built upon theories and concepts from crowd dynamics and pedestrian movement research. The reliance on crowd dynamics and pedestrian movement research likely stems from the immediacy and localized nature of earthquake threats, which necessitate a focus on protective behavior within close proximities, an area most studies have emphasized (Bourque et al., 1994).

Cluster 4: The majority of the articles in cluster 4 focus on risk communication during emergencies. The cluster contains 954 articles with a Silhouette score of 0.984, and the average publication year of the articles is 2006. This cluster features research on various types of hazards, including hurricanes (Wu et al., 2014), wildfires (Cao et al., 2016), tsunamis (Sutton et al., 2018), earthquakes (Mileti & Darlington, 1997), and floods (Demeritt & Nobert, 2014). However, the majority of the cited references in this cluster are related to flood warning response (Fakhruddin et al., 2015; Parker et al., 2009; Sene, 2008) and hurricane risk communication (Cole & Fellows, 2008; Wei et al., 2014). Overall, the cluster advances the field by focusing on risk-information dissemination and warning response, with particular emphasis on flood-evacuation research.

Cluster 5: There are two clusters labeled as "risk perception" in the network, with cluster 5 being the more dominant one in terms of the number of articles it contains. The cluster consists of 847 articles with a Silhouette score of 0.986, with an average year of publication being 2011. This cluster primarily contributes to research on flood evacuations, which is evident from the most cited articles. For example, highly cited articles in this cluster (Kellens et al., 2011; Miceli et al., 2008; Siegrist & Gutscher, 2006) focus on how people perceive flood risk. Among the cited articles, there are studies related to hurricanes (Shao et al., 2017; Wong-Parodi & Garfin, 2022) and wildfire evacuation (Champ & Brenkert-Smith, 2016; Qin et al., 2021). The aforementioned articles in Cluster 5 highlight its contribution to evacuation research across various disaster types.

Cluster 6: Cluster 6, the first cluster labeled as "agent-based modeling", comprises 789 articles, has a Silhouette score of 0.993, and an average publication year of 2010. Most of the articles in this cluster relate to tsunami evacuation (Mas et al., 2012; Mostafizi et al., 2017; Mostafizi et al., 2019; Usman et al., 2017; Wang et al., 2016; Wang & Jia, 2021b). The cluster consists of several fundamental studies focused on microscopic simulations (An, 2012; Crooks & Heppenstall, 2012). Furthermore, cluster 6 contains review articles that explore the state of the art of agent-based simulations and tools (Abar et al., 2017), as well as the use of agent-based simulations specifically in tsunami evacuation research (Mls et al., 2023). Accordingly, cluster 6 contributes to the research domain with tsunami-specific agent-based modeling research.

Cluster 7: This cluster emerged due to studies examining hurricane evacuation behavior during the COVID-19 pandemic (citing articles) while also citing foundational research on hurricane evacuation from earlier publications. The cluster contains 487 articles, has a Silhouette score of 0.990, and the average publication year is 2014. Articles with higher cited references from this cluster include investigations into evacuation logistics during COVID-19 (Diaz et al., 2023) and risk perceptions during such compound threat situations (Sohn & Kotval-Karamchandani, 2023). When it comes to the topmost cited references, this cluster consists of previous research on hurricane evacuation decision-making (Elder et al., 2007), risk perception during hurricanes (Lachlan et al., 2009), predicting stay or go decision during hurricanes (Goldberg et al., 2020), and the impact of social network on evacuations during hurricanes (Collins et al., 2018), etc. Also, the cluster includes research on compound-threat situations, such as the spread of infectious diseases during disasters induced by natural hazards. For instance, the work by (Ivers & Ryan, 2006; Shultz et al., 2005) has been cited in recent research focusing on hurricane evacuation during COVID-19.

Cluster 8: This cluster includes articles focused on the evacuation of tourists during natural hazards, primarily hurricanes (Cahyanto et al., 2014; Matyas et al., 2011), although there is a limited number of studies addressing other types of hazards (Arce et al., 2017; Thapa et al., 2013). The cluster consists of 480 articles with a Silhouette score of 0.994, and the average year of publication is 2002. This focus is evident in the citing articles that generated this cluster, most of which examine the evacuation of tourists in the context of hurricane threats (See Appendix A). Among the earlier research on tourist evacuation during disasters, studies cover various hazards, including hurricanes (Villegas et al., 2013), tsunamis (Cheung & Law, 2006), and coastal storms (Burby & Wagner, 1996). Additionally, this cluster contains investigations into risk communication with tourists (Johnston et al., 2007), tourism-integrated disaster management (Faulkner, 2001), and information searching behavior of tourists during uncertain and risky situations (Quintal et al., 2010).

Cluster 9: Cluster 9 consists of 459 articles with a Silhouette score of 0.998 and an average year of publication in 2009. Cluster 9 is generated mostly from wildfire-related articles, particularly those focusing on wildfire evacuations in Canada (citing articles) (McGee, 2021; Mottershead et al., 2020). However, this does not imply that these articles contributed to the development of cluster 2, which is labeled as "wildfires." Our manual review indicated that cluster 9 was formed based on articles citing concepts related to community resilience. Within these citing articles, studies on wildfire evacuations in Canada were particularly prominent. Importantly, among the citing articles generated in this cluster, there exist articles related to floods (Soon et al., 2018), hurricanes (Nowlin & Wehde, 2021), and tsunamis (Moreno et al., 2019) as well. When it comes to cited references of the cluster (or cluster members), it could be observed that topics like understanding community resilience in disasters (Cutter et al., 2008; Norris et al., 2008), social and economic resilience (Maclean et al., 2014; Yohe & Tol, 2002), and disaster recovery related studies (Adams et al., 2011; Bolin & Stanford, 1998) are found. Ultimately, the cluster emphasizes the idea of community resilience and its impact on large-scale evacuations during evacuations.

Cluster 10: Cluster 10 contains 437 articles with a Silhouette score of 0.995 and an average publication year of 2012. Cluster 10 consists of a wide range of topics, with the majority of articles related to hurricanes. However, this cluster underscores the importance of areas like the impact of forecasting on evacuation decision-making (Lazo et al., 2010) and the travel demand predictions for traffic management during emergencies (Anyidoho et al., 2022; Song et al., 2014; Xu et al., 2016). Moreover, the cluster contains articles exploring the utilization of social media platforms to understand human mobilities during emergencies, particularly during hurricanes (Jurdak et al., 2015; Vieweg et al., 2010). Also, areas like evacuating with animals (Farmer & DeYoung, 2019) are cited in this cluster. Furthermore, the cluster contains articles highlighting the data requirements for evacuation planning (Rappaport, 2014). Additionally, the cluster contains articles identifying factors associated with evacuation decisions (Karaye et al., 2022). Overall, this cluster addresses important aspects of evacuation planning for large-scale community evacuations and serves as a foundation for identifying areas worth studying in the context of any disaster situation.

Cluster 11: Cluster 11 contains 432 articles with a Silhouette score of 0.997 and an average publication year of 2003. Cluster 11 consists of articles focused on travel behavior during evacuations, primarily focused on hurricanes (Cheng et al., 2013; Cheng et al., 2008). Still, there are a considerable number of articles related to floods (Lim et al., 2016) and wildfires (Toledo et al., 2018). The cluster also contains articles focused on transportation planning for emergency evacuations (Balakrishna et al., 2008; Wolshon et al., 2005). Notably, the cluster includes articles published in the 1990s that focus on transportation analysis during emergencies (Hensher & Mannering, 1994; Tweedie et al., 1986). This is the main reason why the average year of publication within this cluster is 2003.

Cluster 12: Cluster 12 consists of 428 articles with a Silhouette score of 0.996 and an average publication year of 2014. Cluster 14, labeled as flood evacuation, has been generated by a set of citing articles focused on pedestrian movement during floods (Bernardini et al., 2020; Lee et al., 2019). Research on pedestrian movement during floods is relatively new, resulting in a mean publication year of 2014 for this cluster, despite earlier studies on flood evacuation decision-making (Frieser et al., 2005; Haynes et al., 2009). However, the manual review of this cluster revealed that studies have been focused more recently on evacuation under flooding conditions, investigating the influence of flood characteristics on evacuation and walking speed and people's stability in flooding conditions (Arrighi et al., 2017; Dias et al., 2021). This finding is further supported by the presence of a review article focused on evacuation during flooding conditions in this cluster (Hamilton et al., 2020).

Cluster 13: Cluster 13 is the second cluster labeled as "agent-based modeling." The citing articles formulated cluster 13 include agent-based simulations conducted for evacuation simulation under floods (Du et al., 2017b), hurricanes (Lee et al., 2021), wildfires (Siam et al., 2022), earthquakes (Hassanpour et al., 2022) and tsunamis (Takabatake et al., 2020a). The cluster contains 415 articles with a Silhouette score of 0.991. This cluster has a mean publication year of 2007. Prior to 2007, the research was more focused on microscopic simulations of traffic in general, rather than specifically of disaster evacuations (Nagel & Schreckenberg, 1992; Treiber et al., 2000). Also, there exist articles that attempt to explain the methods of agent-based simulations (Bonabeau, 2002). Therefore, our citing articles (667 initial article set) in the domain seem to extract concepts from this cluster to study and simulate disaster evacuations at a microscopic level. Overall, the articles within Cluster 13 contribute significantly to disaster evacuation research by leveraging detailed microscopic simulations, a commonly used approach for understanding disaster evacuations. In comparison with cluster 6, the first cluster labeled as an "agent-based modeling" cluster 13, has a mean publication year of 2007 which suggests that articles in cluster 13 had preceded the articles in cluster 6. The presence of two distinct clusters with minimal cross-citations may be attributed to the more substantial body of literature on agent-based modeling in tsunami evacuation research compared to other hazard contexts. This higher concentration of agent-based models in tsunami-focused studies has led to the emergence of a separate cluster, in which articles on tsunami evacuation are predominantly cited. In contrast, studies addressing other hazards tend to reference works from both clusters. Also, earlier contributions to agent-based modeling appear distributed across these clusters, shaped by differing citation patterns.

Cluster 14: Cluster 14 contains 383 articles with a Silhouette score of 0.988 and an average publication year of 2002. Cluster 14 is the second cluster labeled as "risk perception." The citing articles responsible for generating this cluster have conducted investigations into risk perception during evacuations covering multiple disasters (Billman et al., 2023; Cerase & Cugliari, 2023; Hua et al., 2020). Out of the 24 citing articles that contributed to deriving this cluster, 8 focus explicitly on evacuation behavior during volcanic hazards. Compared to other hazard-related studies and clusters categorized by specific types of hazards, it is reasonable to label this cluster as "risk perception" rather than "volcanic hazards," given the limited number of articles on volcanic hazards (in the citing article set of the cluster). However, this cluster highlights that, although limited in number, studies on evacuation decisions during volcanic hazards exist. For example, articles on risk perception under volcanic hazards published before the mean year of publications in this article exist in this cluster (Johnston et al., 1999; Perry et al., 1982). Also, the cluster comprises non-disaster-related research on risk perception published before the mean year of publications of the cluster (Fischhoff et al., 1978; Siegrist & Cvetkovich, 2000; Weinstein & Nicolich, 1993), showing that the citing articles that generated this cluster have built upon a diverse range of disciplines but with more focus on the perception of risk. Another observation in the cluster is the sudden increase of volcanic hazard-related studies in the cluster in 2008, and there onwards continuous research on volcanic hazard-related studies in the cluster (Barberi et al., 2008; Carlino et al., 2008; Perry & Lindell, 2008).

4. Scoping review

This section aims to thoroughly investigate research on disaster evacuation behavior from a broader view by conducting a citation mapping exercise known as overlay networks, along with a manual review of the document co-citation network. As a result, the section identifies gaps in the existing literature on disaster evacuation behavior, examining the areas that hazard-specific research has less explored. Additionally, it highlights the fundamental theories and conceptual frameworks underlying evacuation behavior research. The scoping review is organized into two main sections. Section 4.1 presents the overlay networks and discusses the gaps using hazard-specific overlay networks, while the Section 4.2 examines the theoretical concepts supporting the research on evacuation behavior. Also, Section 4.2 presents a set of influential articles in the research domain based on the citation burst.

4.1. Hazard specific overlay networks

Overlay networks were created to examine hazard-specific citation maps, which can then be superimposed on the original document co-citation network. This section presents each of these networks and identifies the research gaps. The initial document co-citation network (DCN) (Fig. 3) revealed the overarching knowledge areas within the research domain. By overlaying a document co-citation network derived from a hazard-specific dataset (e.g., citing articles related to hurricane evacuation research), we can pinpoint areas that hazard-related studies have overlooked compared to broader knowledge areas in the field. To ensure that these gaps truly exist in the field, a manual review of the document co-citation network was performed. The overlay networks show which broader thematic clusters have been co-cited by hazard-specific articles (e.g., hurricane evacuation research).

Minimal co-citations between clusters in an overlay network derived from a specific sub-dataset (e.g., hurricane evacuation research) may indicate potential oversight in those knowledge areas. However, some relevant studies might still be present within the hazard-specific cluster (e.g., the hurricane evacuation cluster). Therefore, in this section, the gaps are discussed based on the overlay networks and the manual review of the document co-citation network. All the overlay networks presented in this section are structured as follows:

The co-citations in the original network appear in orange lines in the background (baseline – original document co-citation network), while the co-citations from the hazard-specific dataset are displayed in black lines. The lesser co-citations with a particular cluster through the black lines suggest that knowledge within those clusters may be an overlooked research area for that specific hazard. In this section, the overlay networks are presented along with key takeaways, starting with earthquakes, floods, hurricanes, tsunamis, volcanic hazards, and wildfires. The cluster labels were manually positioned in the image, so they do not obscure the co-citation links in the network.

Fig. 4 shows the overlay network derived from earthquake evacuation research. The network reveals limited co-citations with articles from cluster 10, clusters 11 and 9. The limited connectivity with clusters such as travel behavior does not indicate a true research gap; rather, it reflects differences in disaster response demands specific to earthquakes. For example, earthquake evacuation research has primarily treated evacuation as a post-impact phenomenon (Mikami et al., 1985), reducing the relevance of travel behavior-related concerns and evacuation planning. Even though there is lesser connectivity with cluster 9, which brings the concept of community resilience to the domain, our manual review revealed that similar studies exist in cluster 3 (Ainuddin & Routray, 2012; Ma et al., 2021). This suggests that, although the network indicates weaker links to community resilience research, the topic is not a significant gap in earthquake evacuation studies.

As shown in Fig. 5, flood evacuation research resulted less co-citations from cluster 10, which pertaining to evacuation planning. Compared to the co-citation links with other clusters, cluster 10 has a lesser number of links, implying that this area remains underexplored. This indicates that flood evacuation research may have overlooked key aspects discussed in cluster 10, such as predicting evacuation times and understanding travel demands during emergencies. Additionally, the cluster labeled 'risk perception (1)' has a higher number of internal co-citations than any other cluster in the network, suggesting that risk perception is a vastly explored research area for flood evacuation research. Flood evacuation research has primarily focused on two major areas: evacuation decision-making and human mobility during flooding. The former area (evacuation decision-making) appears to account for the stronger co-citation links among Clusters 0, 4, 5, and 11, as much of the behavior-related research in flood evacuation, often referred to as "warning response," is found in Cluster 5 (Menninger, 1952; Mileti & Beck, 1975). The latter, which involves modeling human mobility during floods (Li et al., 2024b; Quagliarini et al., 2023), resulted in Cluster 12. As shown in the overlay network, increased co-citations between Clusters 12 and 13 likely reflect growing research attention to this topic. Thus, while evacuation decision-making during floods has been studied over a longer period, research on human mobility during flooding is a more recent development in the field. Therefore, while evacuation decision-making during floods has been studied over a longer period, research on human mobility during flooding is a more recent development in the field.

As shown in Fig. 6, hurricane evacuation research exhibits co-citation patterns spanning nearly all clusters in the document co-citation network when compared with the original document co-citation. However, there are fewer co-citations with cluster 14 (flood evacuation) and cluster 6 (agent-based modeling (1) and cluster 13 (agent-based modeling (2)). The limited connectivity with cluster 14 is expected, as this cluster primarily focuses on human mobility during flood events, which is distinct from hurricane evacuation research. In contrast, the weaker connection with cluster 6 suggests that agent-based modeling has been less explored in hurricane evacuation studies. Although some co-citations exist with cluster 13 (agent-based modeling (2)), our manual review indicates that research in this area remains limited, with most relevant agent-based modeling studies being

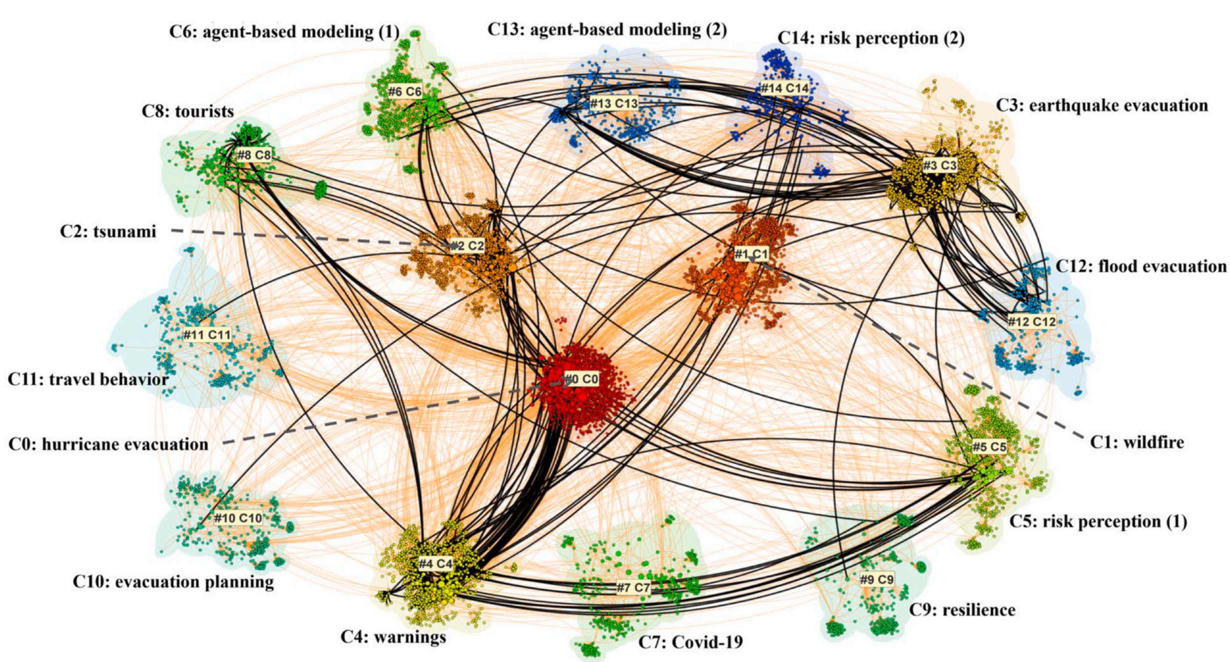

Fig. 4. Overlay network derived from earthquake evacuation research.

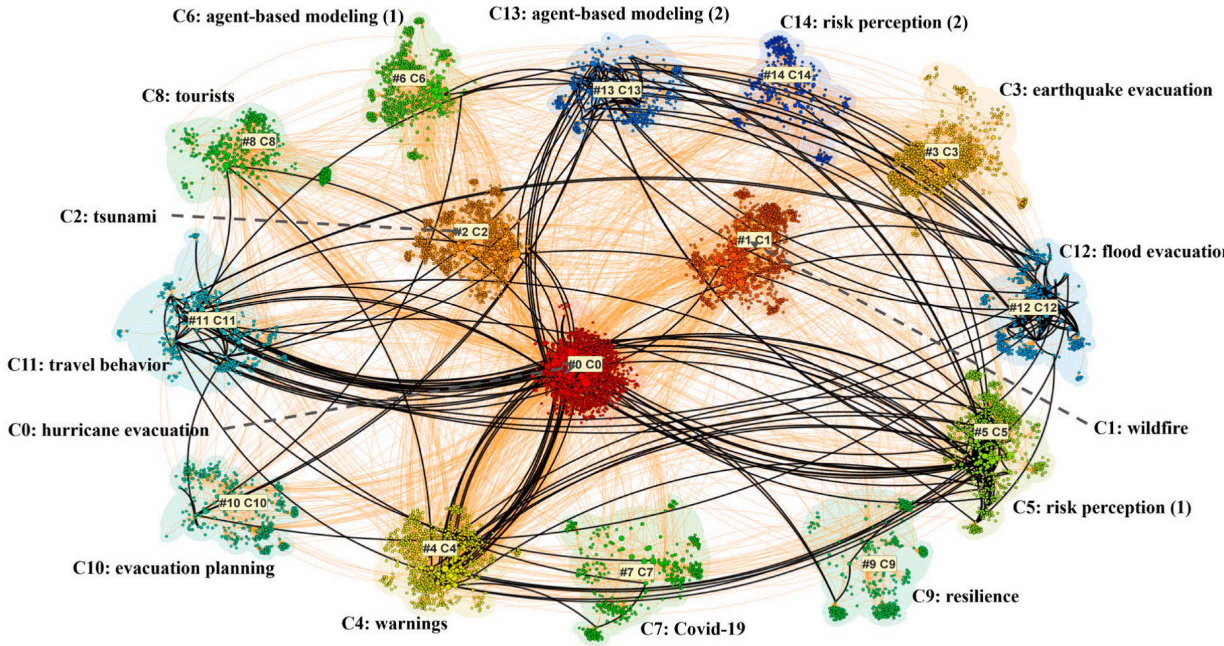

Fig. 5. Overlay network derived from flood evacuation research.

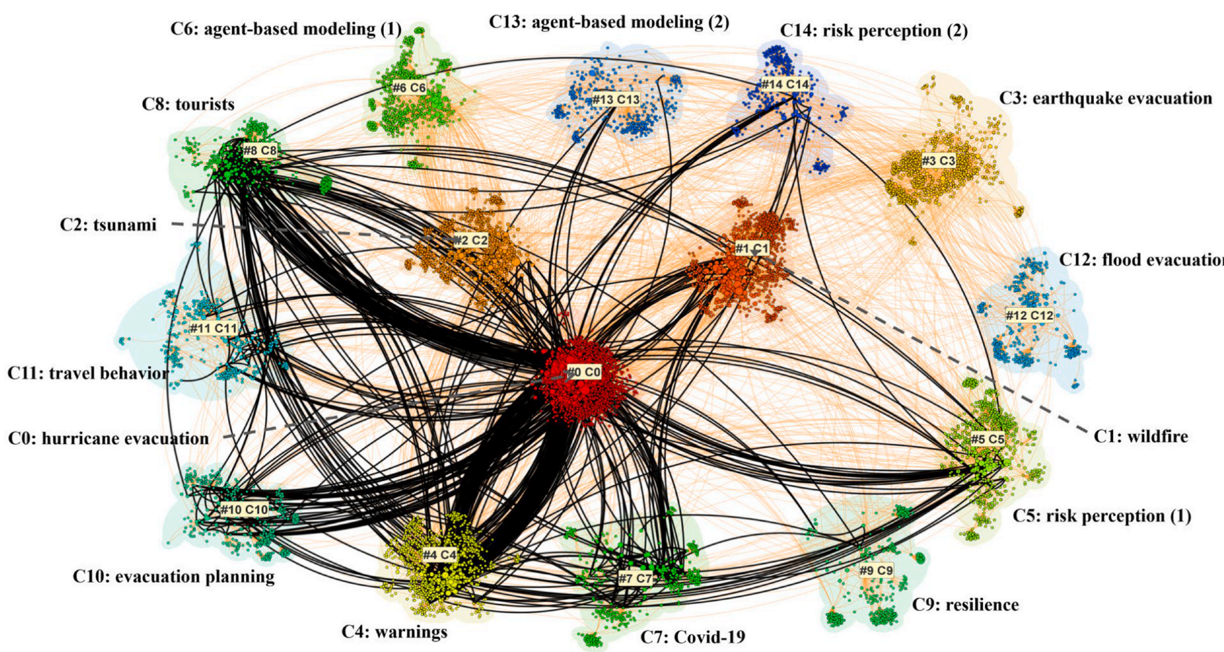

Fig. 6. Overlay network derived from hurricane evacuation research.

relatively recent (Lee et al., 2021; Watts et al., 2019). This is notable given that cluster 0, which contains the majority of hurricane evacuation studies, has a mean publication year of 2003. One reason for the limited use of ABMs may be the availability of other evacuation transportation analysis methods that have been widely applied in hurricane evacuation research. For example, Lindell et al. (2019) presents a broad range of such techniques, spanning from micro-level to macro-level simulation models. Additionally, there has been a recent trend in investigating evacuation decisions during compound hazardous situations. Cluster 7, which is labeled as COVID-19, primarily consists of articles that explore these themes. This suggests that the long-standing nature of research on hurricane evacuation behavior has led to the investigation of new areas, such as how risk perception influences evacuation decisions in compound hazards (Collins et al., 2022b; Yusuf et al., 2023).

As shown in the Fig. 7, it is clearly evident that most of the tsunami evacuation research have highly cited articles from cluster 6 (agent-based modeling (1)), and cluster 0 (hurricane evacuation) and cluster 2 (tsunami evacuation). Also, aside from clusters 0, 2, 3, 4, 5, and 6, co-citations with other clusters are limited. Although tsunami evacuation research forms the third-largest cluster in the domain, co-citations caused by tsunami evacuation research appear limited across other clusters, as shown by the black co-citation links compared to the original document co-citation network, represented by the orange links in Fig. 7. As evident from the overlay network, agent-based modeling research has significantly contributed to the development of the tsunami evacuation field. Accordingly, there are some critical areas underrepresented in the

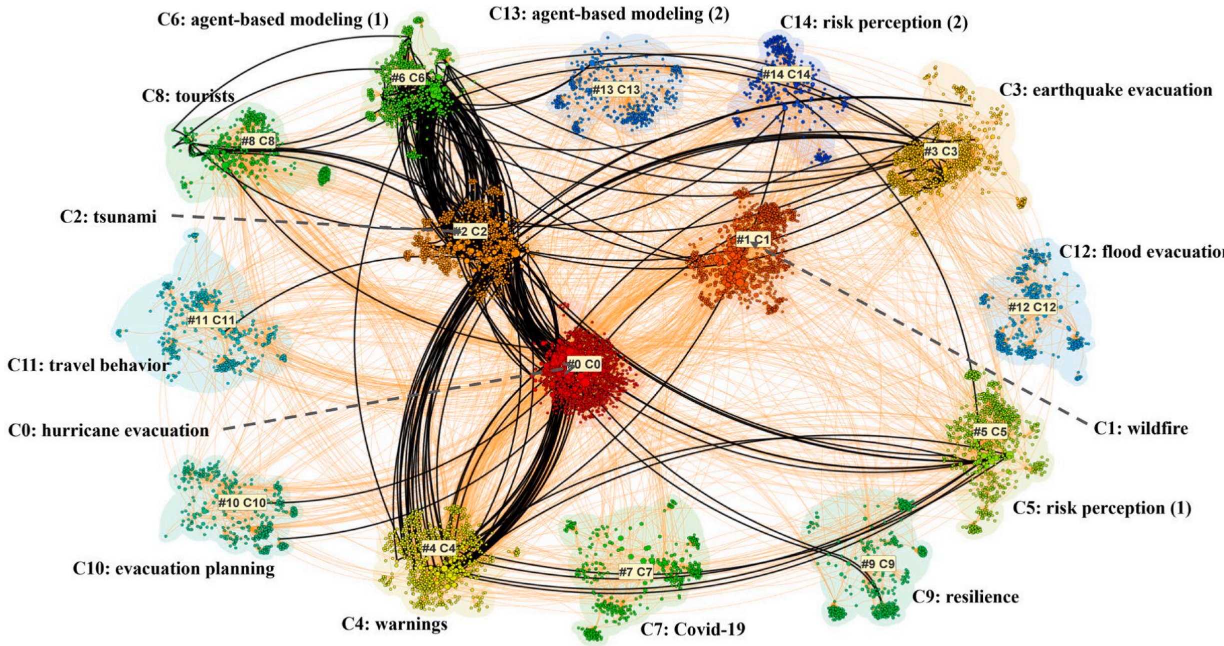

Fig. 7. Overlay network derived from tsunami evacuation research.

co-citation patterns within the tsunami overlay network. For example, there are limited co-citations with clusters such as "evacuation planning" and "travel behavior." Also, our manual review of the document co-citation network identified the most significant gap in tsunami evacuation research: a lack of understanding of human behavior during tsunamis. Key aspects such as decision-making in destination selection, transportation mode choice, route selection, and departure timing remain understudied, although some studies have attempted to address these research areas (Chen et al., 2022; Lindell et al., 2015; Lindell et al., 2022; Wang & Jia, 2022). In tsunami evacuation research, agent-based modeling is a widely utilized approach for simulating evacuation behavior. While many ABMs have traditionally been built on assumptions about human decision-making, recent studies (e.g., (Chen et al., 2023)) have begun to develop these models using empirical data. Therefore, in the context of the original document co-citation network, excluding work related to agent-based modeling, tsunami evacuation research has several knowledge areas that have received insufficient research attention, emphasizing the need for further research in these areas.

Fig. 8 shows the overlay network derived from volcanic hazard research. Despite a cluster not being labeled under the hazard name, our manual review revealed a considerable number of volcanic-hazard-related articles in the network. Thus, an overlay network was derived from volcanic hazard research as well. As the overlay network suggests, volcanic hazard evacuation research is among the least explored fields according to the overlay network in Fig. 8. The co-citation patterns

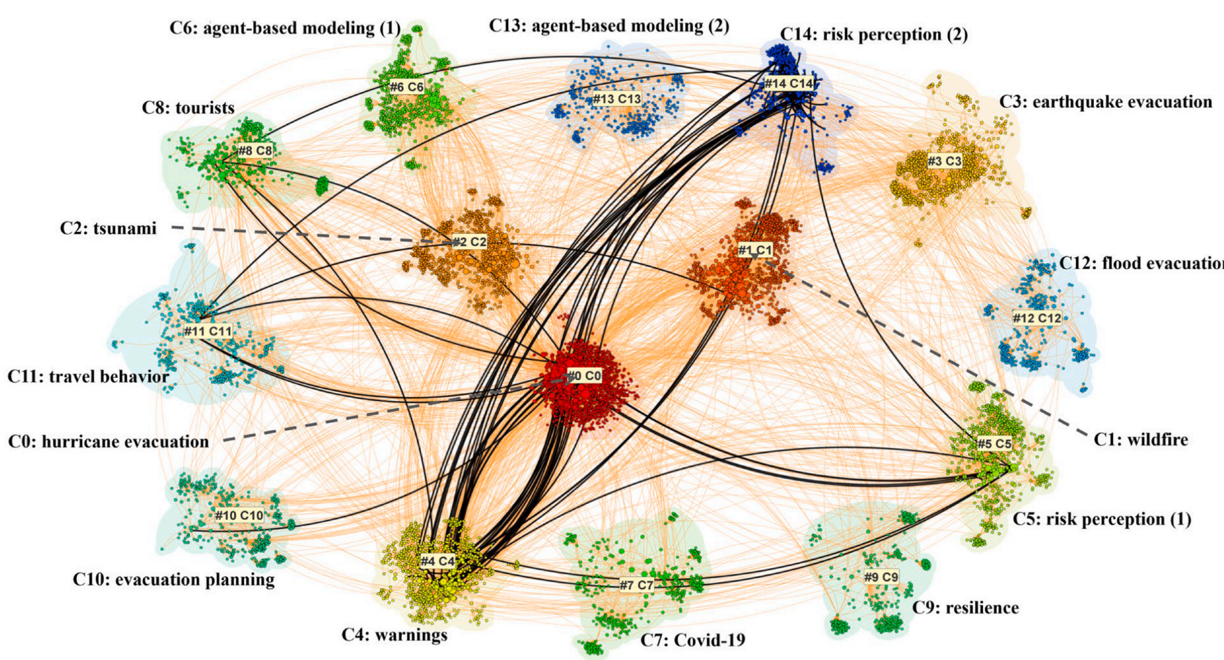

Fig. 8. Overlay network derived from volcanic hazard evacuation research.

derived from articles related to volcanic hazards reveal a notable lack of co-citations with clusters such as "evacuation planning," "tourists," and "agent-based modeling." However, our manual review identified tourism-related studies on volcanic hazards (Bird & Gísladóttir, 2020), that were not captured through co-citation links, as these studies are primarily confined to cluster 14. A majority of articles investigated risk perceptions in volcanic hazards (Njome et al., 2010; Perry et al., 1982), as depicted on the overlay network by co-citations within the cluster labeled "risk perception (2)." Additionally, limited citation links with "travel behavior" cluster suggest that key aspects of evacuation during volcanic hazards remain underexplored compared to the original document co-citation network.

Fig. 9 illustrates the overlay network resulting from research on wildfire evacuation. The co-citation patterns of wildfire evacuation articles encompass most clusters within the network, as demonstrated in Fig. 9. However, articles from certain clusters, such as "evacuation planning," "COVID-19," and "travel behavior," exhibit weaker citation connections compared to other clusters. While there are few connections with the cluster labeled "tourists," our manual investigation identified only a limited number of articles (Cohn et al., 2006; Kovačić et al., 2020; Thapa et al., 2013) that contributed to the development of cluster 8. This indicates that the topic of tourist evacuation still requires further exploration in the context of wildfires. Furthermore, the limited connectivity with the agent-based modeling cluster presents an opportunity for additional research on agent-based simulations. Existing studies suggest that the scarcity of available data may hinder the development of agent-based modeling in the field of wildfire evacuation research (Singh et al., 2021). Also, as the overlay network suggests, there can be less attention to areas like predicting evacuation demand, which is a critical component for emergency management and transportation management during emergencies.

The overlay networks analyzed indicate that the hurricane evacuation cluster is the primary contributing cluster across the entire domain. This cluster remains connected to all of the hazard-specific overlay networks, suggesting that it encompasses numerous articles that form the foundational knowledge of the evacuation research domain. For instance, highly cited articles (Drabek, 1969; Drabek & Boggs, 1968; Lindell & Perry, 2012) in the domain exist within this cluster. The cluster labeled "warnings" shows similar co-citation patterns for all the overlay networks. This suggests that research on evacuation behavior recognizes the importance of risk communication and information sharing.

4.2. Fundamental knowledge, theories, and evolution of evacuation behavior research

In this section, we present a manual review of clusters in the document co-citation network. We conducted a manual search for theoretical and conceptual works that underpinned the investigations on evacuation behavior during disasters. Through this process, we identified areas that lacked theoretical foundations or conceptual frameworks for studying evacuation behavior. The research on evacuation decision-making, particularly related to hurricanes and wildfires, has frequently cited several theoretical frameworks, such as the Theory of Planned Behavior (TPB) (Ajzen, 1991), Protection Motivation Theory (PMT) (Rogers, 1975), and Protective Action Decision Model (PADM) (Lindell & Perry, 2012). In the case of hurricane evacuation, studies have cited several theoretical concepts, including the PADM (Lindell & Perry, 2012), the initial version of the PMT (Rogers, 1975), and other works such as the one from Kasperson et al. (1988) and Bandura (1977). Similarly, for wildfires, the TPB (Ajzen, 1991) and a revised version of the PMT (Maddux & Rogers, 1983) have been cited frequently. Although these theoretical concepts did not appear in clusters related to tsunamis, volcanic hazards, and travel behavior, this does not mean they have never been cited in studies on these topics. For instance, tsunami evacuation research has incorporated the PADM (see (Chen et al., 2023; Lindell et al., 2015; Lindell et al., 2022)). However, the key observation from the manual review of the clusters is that articles in these areas have not frequently co-cited foundational or social science-related works, which has prevented these works from being included in any relevant clusters. Therefore, broader applications of these theories across different hazard contexts would strengthen theoretical integration and improve the comparability of research findings.

Additionally, we used a citation burst feature in CiteSpace to identify the most influential articles in the field of evacuation behavior research. This feature detects articles that have experienced a significant and sustained increase in citations over time. As a result, we were able to compile a list of key influential articles in the evacuation behavior research domain, which can be found in Appendix B. Therefore, it is

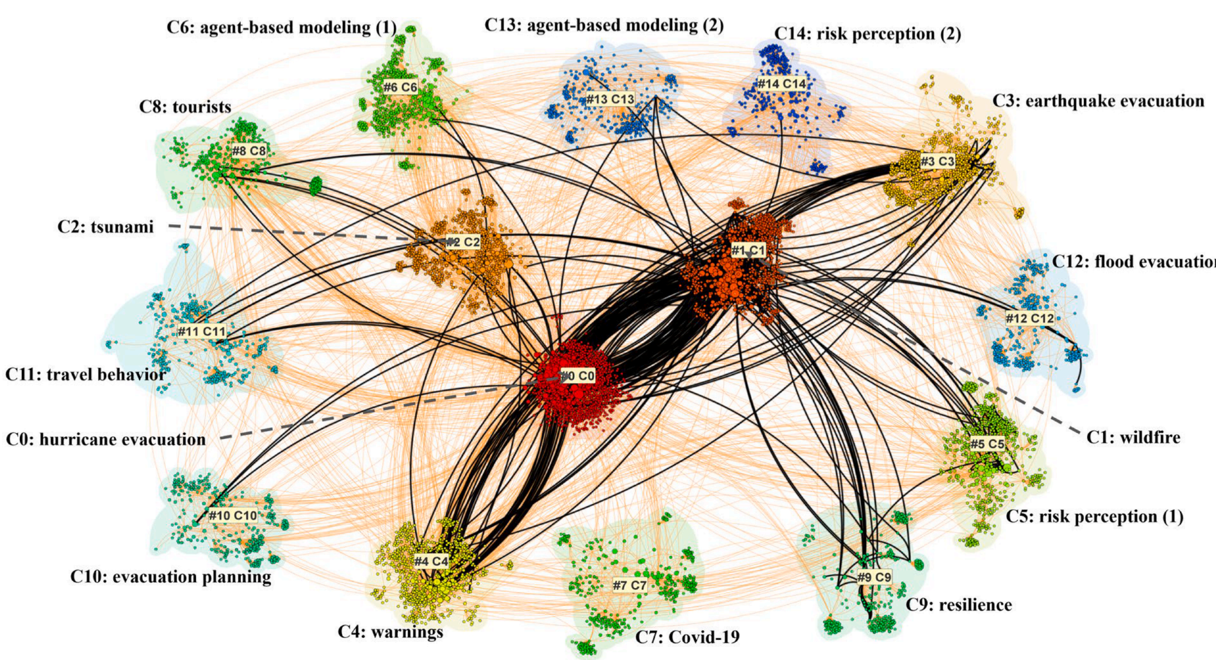

Fig. 9. Overlay network derived from wildfire evacuation research.

recommended that researchers review and incorporate these theoretical concepts and social science research into their work. Such theoretical and influential contributions can bring insights into design studies, identify underlying variables influencing evacuation decisions, and ultimately be helpful in designing surveys for investigations of evacuation behavior research.

The following sections provide a brief overview of these key theoretical concepts we identified in the document co-citation network.

4.2.1. Protective Action decision Model (PADM)

The Protective Action Decision Model (PADM) was developed by Lindell & Perry to describe the responsive behavior of at-risk communities facing disasters (Lindell, 2018; Lindell & Perry, 2012). This model was derived based on over 50 years of empirical studies on the social processes of human response to disasters (Lindell & Perry, 2012). The PADM is a model that considers inputs people receive when faced with a potential threat, such as environmental and social cues, information sources, and warning messages. It also takes into account individual characteristics that can affect decision-making. The psychological process is presented in three steps: pre-decision processes; perceptions of the threat, protective actions, and stakeholders; information search strategy, and protective action decision-making. The PADM categorizes actions into three types: information search, protective response, and emotion-focused coping. The model also considers situational facilitators and impediments that may affect decision-making and behavior. It is widely used in hazard evacuation and behavioral analysis, as well as developing community risk communication programs and hazard adjustment adaptations.

4.2.2. Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB) is another major theory that can be applied to model human behavior and decision-making during disasters. Ajzen (1991) derived this model assuming that the direct determinant of behavior is the behavioral intention, which is predicted by the attitude toward behavior, subjective norm, perceived behavioral control, and other variables. Significantly, the TPB predicts that perceived behavioral control directly influences behavior and indirectly through intention (Ajzen, 1991).

4.2.3. A protection motivation theory of fear appeals and attitude change (PMT)

In 1975, Rogers proposed a conceptual framework explaining how fear appeals influence attitudes and behaviors by outlining the cognitive processes underlying motivation to protect oneself from perceived threats (Rogers, 1975). The theory explains how two appraisals, called threat appraisal and coping appraisal, determine the adaptive or maladaptive responses to a health threat. The threat appraisal is defined as perceptions of susceptibility to and severity of a health threat. The coping appraisal is defined by the individual's self-efficacy, as well as the response efficacy and response costs of the behavioral options that might remove the threat (Floyd et al., 2000). Together, these two appraisals determine the intention of an individual to perform adaptive (protection motivation) or maladaptive responses. Protection motivation is the intention to perform health-protective behavior and avoid health-compromising behavior, with behavior being a function of intentions. The theory has undergone several revisions, and we noted various versions of it being cited in the document co-citation network we constructed in this study.

5. Future research directions and concluding remarks

This section outlines future research directions for the field, drawing on key observations from the document co-citation network and overlay networks. It begins with a comparative assessment of hazard-specific research, emphasizing the areas where certain types of hazard-related studies are most prevalent. Additionally, the discussion focuses on topics such as evacuation decision-making, evacuation planning, tourist evacuation, and agent-based modeling, which the analysis in this study identified as areas with significant gaps in the existing literature. Next, this section assesses disaster impacts worldwide, justifying the research needs discussed by considering the impacts of disasters in different regions and analyzing current publications in the domain, including a co-authorship analysis in Appendix C. Finally, future research directions are presented as research gaps in this section.

The review exposed a substantial body of research dedicated to hurricane evacuation, surpassing efforts in other disaster contexts. This extensive body of work serves as a guiding framework for the study of evacuation behavior in relation to various hazards, as evidenced by the document co-citation network and overlay networks. The manual review of the document co-citation network revealed that in comparison to evacuation behavior research in the contexts of hurricanes, wildfires, and floods, there is a notable deficiency in evacuation behavior research covering other disasters, including earthquakes, tsunamis, and volcanic hazards. In terms of earthquakes, simulation research has been more dominant. For tsunamis, the most prevalent research areas include agent-based simulations and tsunami preparedness research, with a growing accumulation of empirical evacuation studies. The review also identified some studies investigating evacuation decisions in relation to volcanic hazards (Lechner & Rouleau, 2019), however, research in this area remains limited compared to studies on hurricanes. Also, some previous review articles highlight that still, the understanding of evacuation decision-making and behavior remains less understood in the context of wildfires as well (Kuligowski, 2021).

Evacuation decisions refer to the choices individuals or households make during an emergency. Existing research has examined a broad spectrum of these decisions, including whether to stay or evacuate (Bowser & Cutter, 2015; McCaffrey et al., 2018), and travel-related decisions such as destination selection (Cheng et al., 2008; Jiang et al., 2021), transportation mode choice (Wilmot et al., 2019), route selection (Akbarzadeh & Wilmot, 2015; Robinson & Khattak, 2012), departure timing (Czajkowski, 2011), and evacuation return entry (Siebeneck & Cova, 2008). According to the document co-citation network derived in this study, it was identified that studies examining the stay or go decision during disasters like earthquakes, floods, tsunamis, and volcanic hazards are limited when compared to the extensive work done for hazards like hurricanes and wildfires. Predicting a stay-or-go decision during a disaster is a critical research area as it helps emergency officials identify what underlying factors contribute to making people comply with the official recommendations. Such studies can provide insights into how official warnings, environmental cues, and other underlying variables like risk perception and self-efficacy influence the stay-or-go decision (McCaffrey et al., 2018). The findings from these studies can inform the development of communication strategies and effective preparedness and awareness programs, ultimately enhancing public safety during disasters.

Travel behavior during evacuation is another critical component of the evacuation process, as evidenced by the existing research. While there is much research on travel behavior during hurricanes, this study reveals a significant gap in investigations of travel behavior in other disaster contexts, such as floods, tsunamis, wildfires, and volcanic hazards. While the authors of this article identified such contributions in evacuation-related studies in wildfires (Toledo et al., 2018; Wong et al., 2023), tsunamis (Makinoshima et al., 2021), floods (Lim et al., 2016) there is still a notable lack of co-citations with travel behavior cluster in all other overlay networks (except hurricane overlay network) which was recognized through the manual review of the networks as well. Consequently, there remains ample opportunity for further research on travel behavior during evacuations. Travel behavior investigations are crucial as they determine the travel patterns of people necessary for effective emergency management, enabling authorities to tailor evacuation strategies, such as targeted warnings, resource allocation, and traffic control, to specific populations, thereby reducing delays, enhancing compliance, and saving lives (Lim et al., 2019; Lim et al., 2022). The influence of travel behavior investigations on evacuation planning is partially illustrated in cluster 13, as most of the articles in this cluster originate from studies related to hurricane evacuations (Rahman & Hasan, 2023; Roy et al., 2021). Consequently, there remains a significant need for additional behavioral studies and data, particularly in travel behavior during emergencies, and further research on evacuation intentions or Virtual Reality (VR) can be encouraged to address this gap. Also, in addition to addressing the need for more behavioral data, evacuation modelers should incorporate the available behavioral data into their models (Lindell & Perry, 1992; Lindell & Prater, 2007). Therefore, future work should strongly consider integrating existing behavioral data sets into modeling efforts.

Evacuation of tourists during disasters is another area worth exploring further. It is crucial to conduct further research on tourist evacuation in other types of disasters, such as earthquakes, floods, tsunamis, volcanic hazards, and wildfires. Most existing studies have focused on hurricane evacuation, with the majority examining intended rather than actual evacuation behavior (Cahyanto et al., 2014; Choi et al., 2023). Existing research suggests that there is a moderate correlation between intended and actual behavior (Kang et al., 2007). Yet behavioral intention research could provide significant findings such as the factors influencing tourists' decision-making processes in the event of a disaster. For instance, Cahyanto et al. (2014) explained that tourist's decision-making can be influenced by various factors, including individual characteristics and travel-related attributes. Furthermore, existing research indicates that factors such as disaster awareness, information-seeking behaviors, and socio-demographic characteristics significantly influence tourists' intended evacuation behavior, which differs notably from that of local populations (Choi et al., 2023). Effective disaster management frameworks should address these gaps by integrating active strategies, such as multilingual communication, localized education, and collaborative initiatives among stakeholders, to ensure the safety of tourists and mitigate human and economic losses (Bosworth, 1996; Choi et al., 2023). Therefore, such studies can provide insights into disaster management practices integrating dynamic but vulnerable groups like tourists, as evident from the existing hurricane evacuation research (Cahyanto & Pennington-Gray, 2015). Furthermore, Cahyanto and Pennington-Gray (2015) state that currently, in the tourism literature, there is a lack of research on tourist behaviors during a crisis. A key reason for this gap is the challenge of data collection, as tourists constitute a transient population (Matyas et al., 2011). Nonetheless, there remains substantial opportunity for researchers to contribute to this field by leveraging stated preference data to build a stronger knowledge base on tourist behavior in emergencies.

Agent-based simulations are more commonly used for tsunamis compared to other hazards like hurricanes, wildfires, and floods. However, due to the limited empirical data available for tsunamis, as evident from the document co-citation network derived in this study, researchers developing these simulations may have relied on behavioral assumptions to fill knowledge gaps (although empirical tsunami-evacuation datasets are gradually accumulating (see – (Chen et al., 2022; Lindell et al., 2015; Lindell et al., 2022)), resulting in simplifying human behavior (Aldahlawi et al., 2024). Yet, research on agent-based modeling (ABM) should be encouraged for evacuation simulations due to its ability to represent human behavior during emergencies. ABMs effectively capture diverse behaviors, such as decision-making under threat, compliance with evacuation orders, and individual interactions, which are crucial for developing effective evacuation strategies (Senanayake et al., 2024). They can integrate factors like population distribution and infrastructure limitations, allowing for the simulation of various "what-if" scenarios to test evacuation plans, which is crucial for evacuation planning (Zhan & Chen, 2008). Therefore, there is an opportunity to expand the use of ABMs in other disaster contexts, particularly for floods, hurricanes, wildfires, and volcanic hazards. The relatively lower application of ABMs in these areas may be due to the widespread use of alternative evacuation modeling tools, especially in hurricane research (Lindell et al., 2019). Thus, rather than indicating a research gap, this review highlights the value and applicability of ABMs in disaster evacuation studies and encourages their broader adoption.

However, the development of ABMs is often challenged by the limited availability of behavioral data (Chen et al., 2023). Moreover, prior studies indicate that evacuation modelers often overlook the behavioral data already available (Lindell & Prater, 2007). Therefore, to address these data limitations, interdisciplinary efforts should prioritize integrating empirical behavioral data into ABMs, as suggested in the existing literature as well (Mas et al., 2015). Also, the significance of adopting interdisciplinary approaches within the evacuation research domain is documented in the existing literature (Murray-Tuite et al., 2021). Therefore, this research supports previous findings by highlighting the need for interdisciplinary approaches to evacuation research.

The investigation of evacuation behavior research and its underlying knowledge base indicates that existing theories from social science backgrounds align with studies conducted in the context of hurricanes and wildfires. For example, the PADM is widely used in research investigating evacuation behavior during hurricanes and wildfires (Ahsan et al., 2016; Arce et al., 2017; Folk et al., 2019; Lechner & Rouleau, 2019; Lindell et al., 2005; McCaffrey et al., 2018). However, a notable gap emerges in other hazard-related evacuation studies, where well-established theoretical concepts have not frequently been cited. Similarly, this deficiency in theoretical concepts being cited from research on travel behavior was observed. Considering that travel behavior plays a crucial role in the evacuation process, the absence of any theoretical support for current studies represents a significant gap. Consequently, it is strongly recommended that evacuation behavior research validate the applicability of established theories such as PADM, TPB, and PMT in other disaster contexts such as earthquakes, floods, tsunamis, and volcanic hazards. Additionally, researchers should incorporate appropriate theoretical concepts to enhance the understanding of evacuation behavior, particularly in investigations pertaining to travel behavior during evacuations.

Overall, it can be seen that hurricane-related research is more dominant in the domain. It was identified that the countries with the highest contributions to the domain (in terms of the number of articles) are the USA (338 – among the data available records), followed by Japan (108), which is less than half of the publications from the USA. This may be caused by the high frequency of occurrence of hurricanes or tropical cyclones in the Americas region and its economic impacts, according to the EM-DAT data. Another reason for the more frequent study of hurricane evacuations is that hurricanes threaten large geographical areas, making evacuation management extremely challenging (Lindell et al., 2019). Table 1 shows the data extracted from EM-DAT, including disaster events from 1952 to 2024. Data were extracted by region for the disasters studied in this article. The damage recorded in the table is reported in US$ Billion.

It is evident that the Asia region experiences a wide range of disasters, resulting in significant human losses and economic impacts.

Table 1
Disaster events from 1952 to 2024 (Delforge et al., 2024)

Disaster type		World regions				
		Africa	Americas	Asia	Europe	Oceania
Earthquakes	No of events	62	251	739	157	46
	No of Deaths	24,897	350,262	777,712	38,391	553
	Damage (US$B)	41.5	173.59	792.2	255.7	37.04
Floods	No of events	1,259	1,386	2,477	686	161
	No of Deaths	37,562	66,370	2,325,136	9,075	606
	Damage (US$B)	30.18	297.49	983.27	365.6	41.93
Hurricanes/ cyclones or storms	No of events	316	1,315	1,708	447	313
	No of Deaths	22,418	71,719	891,945	3,454	1,998
	Damage (US$B)	25.38	2,097.67	600.73	214.8	66.3
Tsunamis	No of events	1	9	15	1	8
	No of Deaths	312	7,046	252,766	11	2,637
	Damage (US$B)	0.23	59.84	324.61	NA	5.14
Volcanic hazards	No of events	18	84	105	10	30
	No of Deaths	2,234	22,656	5,621	9	184
	Damage (US$B)	1.14	8.87	2.54	0.35	0.35
Wildfires, bushfires, or forest fires	No of events	38	195	74	126	39
	No of Deaths	505	1158	899	866	413
	Damage (US$B)	1.15	144.56	25.65	25.65	9.04

Studies published in Japan primarily focus on earthquakes and tsunamis, while research on frequently occurring hazards such as floods is relatively scarce across Asian countries. A similar lack of research was observed in the African region. To further investigate this, a co-authorship analysis was conducted using VOSviewer, which is included in Appendix C. The co-authorship analysis by country highlights international research collaborations. The findings reveal that the research domain remains largely confined to a limited number of countries, including the USA, Japan, Australia, China, and Canada.

When considered the top three contributing countries in this research domain, the following figures illustrate the impacts of disasters: the USA experienced 20,552 deaths with damages totaling approximately US$2,342.7 billion; Japan had 49,597 deaths and damages amounting to US$943.96 billion; and Australia reported 1784 deaths with damages of US$92.7 billion. In contrast, when considering countries with less representation in the research, we see a significant impact from disasters in Asian nations. For example, India suffered 189,190 deaths with damages of US$225.78 billion, Bangladesh faced 621,420 deaths and damages of US$48.6 billion, and Pakistan experienced 110,140 deaths with damages totaling US$65.5 billion. These countries are highly susceptible to a wide range of disasters, resulting in substantial loss of life and economic damage. However, research collaboration on evacuation behavior in these nations remains limited. Therefore, there is a strong need for more collaborative research on various types of hazards, given the significant human and economic losses caused by disasters worldwide. International conferences offer an excellent opportunity for researchers to build collaborative relationships. Establishing joint research programs with universities in these countries can also promote sustained partnerships, with a focus on region-specific natural hazards to address the current global imbalance in evacuation behavior research.

In general, the field of evacuation behavior and decision-making during disasters is still evolving. This article aims to offer an extensive outlook on the development of research in the domain of evacuation behavior and to propose future research directions considering multiple hazards. Also, compared to other reviews, this article examines knowledge areas of the research domain and the theoretical work that supported the investigations of evacuation behavior research. By doing so, this article identifies the following key research gaps that can be presented as future research directions derived from this study.

- Further enhance the understanding of evacuation decision-making and behavior (stay or go decision), particularly in less explored disaster contexts, such as earthquakes, tsunamis, and volcanic hazards.
- Critically investigate evacuation travel behavior and related decisions. Although numerous studies have examined areas such as destination, mode, route, and return-entry choices, our understanding remains insufficient, particularly for disasters such as earthquakes, floods, tsunamis, volcanic eruptions, and wildfires, deserving further research into the determinants of these behaviors.
- Design and investigate research within well-established theoretical frameworks such as PADM, TPB, and PMT. These frameworks allow researchers to examine the role of latent constructs such as risk perception, stakeholder perception, and self-efficacy on evacuation behavior. Researchers should carefully consider which theoretical frameworks should be used for the investigation of stay-or-go decisions and which ones are most suited for travel-related decisions.
- Promote research on tourist evacuations during disasters such as earthquakes, tsunamis, and wildfires. Current literature indicates that tourists' behavior during crises is not well understood. As a dynamic and often vulnerable group, tourists are particularly at risk due to limited familiarity with their environment and potential language barriers. Further exploration of underlying factors (such as risk perception and situational awareness) influencing their evacuation behavior is needed.
- Develop agent-based models (ABMs) to investigate evacuation behavior during floods, hurricanes, wildfires, and volcanic hazards,

as current models in these contexts are less developed than those for tsunamis.
- Encourage interdisciplinary research by integrating behavioral data into evacuation modeling. Although a wide range of evacuation modeling tools exist (see – (Lindell et al., 2019), models, such as Agent-Based Models (ABMs) for tsunami evacuation, often rely on behavioral assumptions. Greater emphasis should be placed on capturing actual human behavior during disasters. Behavioral intention research and Virtual Reality (VR) studies can significantly enhance the realism and applicability of these models.
- Encourage integrating existing behavioral data for evacuation modeling in addition to collecting more behavioral data.
- Strengthen research collaborations with scholars from regions such as Asia and Africa. Given the frequent occurrence of floods and high-impact, low-occurrence disasters like tsunamis in these regions, it is important to address the disproportionate focus of studies by fostering collaborations and allocating funding for such investigations.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used Grammarly's Generative AI writing assistance feature in order to improve the clarity and the readability of the content. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

CRediT authorship contribution statement

Chamika Kannangara: Writing – review & editing, Writing – original draft, Software, Methodology, Investigation, Formal analysis, Conceptualization. **Erica Kuligowski:** Writing – review & editing, Methodology, Conceptualization. **Chandana Siriwardana:** Writing – review & editing, Methodology, Conceptualization. **Guomin Zhang:** Writing – review & editing, Conceptualization. **Varuna Adikariwattage:** Writing – review & editing, Conceptualization. **Paboda Jayawardane:** Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

The table below provides detailed information about the clusters and their keywords with LLR values and p values. It also shows the top terms (based on the author's keywords of the citing articles) identified in each cluster with their significance levels. The first column includes information such as Cluster ID, size of the cluster (S), Mean year of the cluster (MY), and Silhouette Score (SS) – a measure of cluster homogeneity. Values closer to 1 indicate high homogeneity. In addition, the table contains the most influential cited references found in the articles we gathered, along with their citation count. We have also included topmost citing articles (from 667 initial citing article set) that contributed to the formation of each cluster. The citation coverage of each article within its respective cluster is also provided.

Most-cited references and contributing citing articles for each cluster.

Cluster ID S MY SS	Cluster label and Top terms (LLR, P value)	Top cited references (Reference – Citation count)	Citing articles (Reference, Citation coverage)
ID = 0 S = 1604 MY = 2002 SS = 0.962	Hurricane evacuation Top terms: hurricane evacuation (26.85, 1.0E-4); hurricane ivan (15.21, 1.0E-4); discrete choice analysis (13.89, 0.001); behavioral model (13.73, 0.001); hurricane (12.04, 0.001)	(Lindell & Perry, 2012) – 123 (Huang et al., 2016) – 98 (Lindell et al., 2005) – 95 (Huang et al., 2012) – 90 (Hasan et al., 2011) – 85	(Elhami-Khorasani et al., 2023) – 194 (Murray-Tuite & Wolshon, 2013) – 162 (Bakhshian & Martinez-Pastor, 2023) – 154 (Diaz et al., 2023) – 133 (Iliopoulou et al., 2020) – 125
ID = 1 S = 1164 MY = 2007 SS = 0.978	Wildfires Top terms: wildfire (50.63, 1.0E-4); wui (27.15, 1.0E-4); wildfires (20.24, 1.0E-4); bushfires (14.68, 0.001); community safety (18.57, 1.0E-4)	(McCaffrey et al., 2018) – 43 (McLennan et al., 2019) – 39 (Mozumder et al., 2008) – 38 (Cohn et al., 2006) – 36 (McLennan et al., 2012) – 36	(Haghani et al., 2024) – 272 (Zehra & Wong, 2024) – 189 (Elhami-Khorasani et al., 2023) – 174 (Strahan & Gilbert, 2021b) – 116 (Ahmad et al., 2024) – 108
ID = 2 S = 1022 MY = 2009 SS = 0.982	Tsunami Top terms: tsunami (67.16, 1.0E-4); tsunami evacuation (28.36, 1.0E-4); cascadia subduction zone (13.37, 0.001); chile (10.02, 0.005); nankai trough earthquake (8.87, 0.005)	(Lindell et al., 2015) – 48 (Takabatake et al., 2017) – 31 (Buylova et al., 2020) – 21 (Makinoshima et al., 2016) – 19 (Gregg et al., 2006) – 19	(Cerase & Cugliari, 2023) – 156 (Wang et al., 2022) – 100 (Iwai, 2024) – 83 (Hall et al., 2022) – 82 (Amri et al., 2024) – 78

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Cluster ID S MY SS	Cluster label and Top terms (LLR, P value)	Top cited references (Reference – Citation count)	Citing articles (Reference, Citation coverage)
ID = 3 S = 1003 MY = 2007 SS = 0.99	Earthquake evacuation Top terms: earthquake evacuation (16.97, 1.0E-4); social force model (16.49, 1.0E-4); herd behavior (16.49, 1.0E-4); response threshold model (13.93, 0.001); post-earthquake evacuation (13.93, 0.001)	(Helbing & Molnár, 1995) – 19 (Helbing et al., 2000) – 17 (Urbanik, 2000) – 12 (D`Orazio et al., 2014b) – 12 (Yang et al., 2011) – 10	(Haghani et al., 2024) – 227 (Bakhshian & Martinez-Pastor, 2023) – 129 (D`Orazio et al., 2014a) – 108 (Quagliarini et al., 2016) – 70 (Iskandar et al., 2024) – 56
ID = 4 S = 954 MY = 2006 SS = 0.984	Warnings Top terms: warnings (10.23, 0.005); hurricanes (9.54, 0.005); floods (7.56, 0.01); risk perception (7.52, 0.01); wildland-urban interface fire (6.08, 0.01)	(Parker et al., 2009) – 29 (Mileti & Beck, 1975) – 25 (Morss et al., 2016) – 20 (Cole & Fellows, 2008) – 19 (Mileti, 1995) – 19	(Wei & Lindell, 2017) – 92 (Lindell, 2020) – 82 (Morss et al., 2016) – 80 (Morss et al., 2020) – 78 (MacPherson-Krutsky et al., 2023) – 77
ID = 5 S = 847 MY = 2011 SS = 0.986	Risk perception (1) Top terms: risk perception (20.47, 1.0E-4); black summer (11.14, 0.001); householders (11.14, 0.001); australia (10.18, 0.005); adaptation behavior (8.2, 0.005)	(Lindell & Hwang, 2008) – 34 (Grothmann & Reusswig, 2006) – 31 (Bubeck et al., 2012) – 22 (Kellens et al., 2013) – 11 (Miceli et al., 2008) – 11	(Tahesh et al., 2023) – 80 (Mahdavian et al., 2020) – 80 (Adedokun et al., 2024) – 75 (Wong-Parodi et al., 2024) – 72 (Netzel et al., 2021) – 71
ID = 6 S = 789 MY = 2010 SS = 0.993	Agent-based modeling (1) Top terms: tsunami evacuation (33.1, 1.0E-4); tsunami (21.71, 1.0E-4); agent-based model (19.41, 1.0E-4); agent-based modelling (11.55, 0.001); cascadia (10.05, 0.005)	(Wang et al., 2016) – 41 (Mostafizi et al., 2017) – 29 (Mas et al., 2015) – 28 (Mas et al., 2012) – 22 (Wood & Schmidtlein, 2013) – 19	(Takabatake et al., 2020a) – 67 (Takabatake et al., 2020b) – 58 (Wang & Jia, 2021a) – 58 (Wang & Jia, 2022) – 54 (Purbani et al., 2023) – 48
ID = 7 S = 487 MY = 2014 SS = 0.99	COVID-19 Top terms: COVID-19 (37.17, 1.0E-4); emergency preparedness (18.17, 1.0E-4); social science (13.51, 0.001); hurricanes/typhoons (9.79, 0.005); hurricane laura (7.78, 0.01)	(Collins et al., 2018) – 18 (Whytlaw et al., 2021) – 16 (Collins et al., 2021) – 15 (Pei et al., 2020) – 13 (Demuth et al., 2012) – 13	(Diaz et al., 2023) – 101 (Sohn & Kotval-Karamchandani, 2023) – 95 (Alam & Chakraborty, 2021) – 88 (Collins et al., 2022b) – 65 (Collins et al., 2022a) – 63
ID = 8 S = 480 MY = 2002 SS = 0.994	Tourists Top terms: tourists (20.1, 1.0E-4); hurricanes (15.93, 1.0E-4); florida (15.37, 1.0E-4); crisis (12.57, 0.001); risk perception (9.8, 0.005)	(Matyas et al., 2011) – 32 (Villegas et al., 2013) – 21 (Zhang et al., 2007) – 18 (Cahyanto & Pennington-Gray, 2015) – 15 (Cahyanto et al., 2014) – 15	(Pel et al., 2012) – 108 (Kovačić et al., 2020) – 103 (Cahyanto et al., 2014) – 96 (Cahyanto et al., 2016) – 86 (Martín et al., 2020) – 74
ID = 9 S = 459 MY = 2009 SS = 0.998	Resilience Top terms: indigenous peoples (13.72, 0.001); first nations (13.72, 0.001); community resilience (13.62, 0.001); communities (8.74, 0.005); fishing community (8.74, 0.005)	(Cutter et al., 2008) – 8 (Norris et al., 2008) – 6 (Scharbach & Waldram, 2016) – 5 (Davidson, 2010) – 3 (McCool et al., 2006) – 3	(Moreno et al., 2019) – 102 (Chakraborty & Chaudhuri, 2022) – 88 (Khalafzai et al., 2021) – 84 (Mottershead et al., 2020) – 60 (Nowlin & Wehde, 2021) – 29
ID = 10 S = 437 MY = 2012 SS = 0.995	Evacuation planning Top terms: hurricane (18.27, 1.0E-4); twitter (12.9, 0.001); dynamic discrete choice (9.29, 0.005); gis (9.29, 0.005); data-driven methods (7.8, 0.01)	(Lazo et al., 2010) – 18 (Xu et al., 2016) – 13 (Wolshon, 2001) – 12 (Roy & Hasan, 2021) – 9 (Yi et al., 2017) – 8	(Li et al., 2024a) – 69 (Yang et al., 2019) – 62 (Roy et al., 2021) – 55 (Ghorbanzadeh et al., 2021) – 52 (Rambha et al., 2021) – 39
ID = 11 S = 432 MY = 2003 SS = 0.997	Travel behavior Top terms: travel behavior (16.5, 1.0E-4); discrete choice (12.86, 0.001); evacuation modeling (12.26, 0.001); destination choice (11.75, 0.001); south carolina (9.36, 0.005)	(Cheng et al., 2008) – 20 (Sadri et al., 2014) – 19 (Pel et al., 2010) – 15 (Tweedie et al., 1986) – 11	(Pel et al., 2012) – 104 (Suwanno et al., 2023) – 64 (Lim et al., 2016) – 52 (Beyki et al., 2023) – 41

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Cluster ID S MY SS	Cluster label and Top terms (LLR, P value)	Top cited references (Reference – Citation count)	Citing articles (Reference, Citation coverage)
		(Lim et al., 2016) – 11	(Bian et al., 2019) – 32
ID = 12	Flood evacuation	(Bernardini et al., 2017b) – 11	(Maity & Sundar, 2022) – 74
S = 428	Top terms:	(Bernardini et al., 2020) – 10	(Li et al., 2024b) – 70
MY = 2014	flood evacuation (35.13, 1.0E-4); pedestrian behavioral model (16.41, 1.0E-4); urban flood (16.41, 1.0E-4); behavioural model (12.62, 0.001); video analysis (10.93, 0.001)	(Ishigaki et al., 2009) – 9	(Quagliarini et al., 2023) – 67
SS = 0.996		(Lee et al., 2019) – 9	(Carton et al., 2024) – 48
		(Jonkman, 2005) – 9	(Li et al., 2023) – 48
ID = 13	Agent-based modeling (2)	(Bonabeau, 2002) – 12	(Du et al., 2017a) – 71
S = 415	Top terms:	(Bernardini et al., 2017a) – 7	(Taillandier et al., 2021) – 63
MY = 2007	agent-based model (12.45, 0.001); agent-based modeling (10.47, 0.005); traffic simulation (9.97, 0.005); flood evacuation (7.92, 0.005); simulation (7.92, 0.005)	(Du et al., 2017a) – 7	(Iskandar et al., 2024) – 46
SS = 0.991		(Aerts et al., 2018) – 6	(Vicario et al., 2020) – 42
		(Du et al., 2017b) – 6	(Zhang et al., 2024) – 41
	Risk perception (2)	(Paton et al., 2008) – 12	(Cerase & Cugliari, 2023) – 144
ID = 14	Top terms:	(Haynes et al., 2008) – 8	(Lechner & Rouleau, 2019) – 86
S = 383	risk perception (11.8, 0.001); local knowledge (10.08, 0.005); second lebanon war (7.25, 0.01); attachment to place (7.25, 0.01)	(Tobin et al., 2011) – 8	(Bird et al., 2011) – 80
MY = 2002		(Perry & Lindell, 2008) – 8	(Wei & Lindell, 2017) – 68
SS = 0.988		(Carlino et al., 2008) – 8	(Favereau et al., 2020) – 62

Appendix B

CiteSpace applies the Kleinberg's burst-detection algorithm (Kleinberg, 2002) to detect citation bursts and calculate the strength of the burst. A detailed description of the original algorithm can be found in Kleinberg (2002).

The citation surge is the empirical manifestation of a burst: the period during which the article's observed citations exceed the baseline by the threshold. The magnitude of the surge is captured by strength; the duration is captured by the Begin–End interval. The begin year reported in the table indicates the first year in which the reference enters a bursty state, and end year indicates the last year of that state.

In the last column of the table, the light green line presents the duration of the analysis which is from 1952 to 2024. The line becomes darker green from the date which the article/ book was published. The line becomes red for the timeframe when the article/ book witnessed a surge in citations.

References with the longest and strongest bursts of citation in evacuation behavior research.

References	Strength	Begin	End	1952–2024
(Drabek & Boggs, 1968)	5.56	**1969**	2014	
(Drabek, 1969)	4.08	**1975**	2010	
(Baker, 1991)	6.7	**1995**	2016	
(Drabek, 1986)	5.09	**1996**	2016	
(Baker, 1979)	5.04	**1999**	2014	
(Perry et al., 1981)	4.65	**1999**	2015	
(Dow & Cutter, 1998)	11.19	**2001**	2016	
(Muller Vogt, 1991)	4.12	**2001**	2015	
(Murray-Tuite & Mahmassani, 2004)	6.45	**2006**	2015	
(Fu & Wilmot, 2004)	5.83	**2006**	2014	
(Perry et al., 2001)	4.82	**2006**	2017	
(Lindell et al., 2005)	15.84	**2007**	2018	
(Gladwin et al., 2001)	6.94	**2007**	2019	
(Lindell & Perry, 2012)	5.93	**2007**	2016	
(Gladwin & Peacock, 2012)	4.32	**2007**	2018	
(Mileti et al., 1992)	4	**2007**	2015	
(Whitehead, 2005)	4.99	**2008**	2018	
(Heath et al., 2001)	4.5	**2008**	2016	
(Dash & Gladwin, 2007)	14.88	**2009**	2017	

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References	Strength	Begin	End	1952–2024
(Elliott & Pais, 2006)	4.56	**2009**	2016	
(Fothergill, 1996)	4.49	**2009**	2018	
(Gladwin et al., 2009)	4.2	**2009**	2015	
(Arlikatti et al., 2006)	4.46	**2010**	2017	
(Whitehead et al., 2000)	5.23	**2011**	2016	
(Dash & Morrow, 2000)	4.97	**2011**	2014	
(Zhang et al., 2007)	4.42	**2011**	2019	
(Murray-Tuite & Mahmassani, 2003)	4	**2011**	2014	
(Mileti & O'Brien, 1992)	4.97	**2013**	2017	
(Dow & Cutter, 2000)	6.05	**2015**	2019	
(Riad et al., 1999)	6.46	**2016**	2017	
(Sorensen, 2000)	5.45	**2016**	2019	
(Wei et al., 2014)	4.24	**2016**	2018	
(Wang et al., 2016)	5.7	**2020**	2022	
(Lindell et al., 2019)	5.38	**2020**	2022	
(Sadri et al., 2017)	4.93	**2020**	2022	
(Mostafizi et al., 2017)	4.16	**2020**	2022	
(Folk et al., 2019)	5.63	**2021**	2022	
(Wong et al., 2020)	4.97	**2021**	2024	

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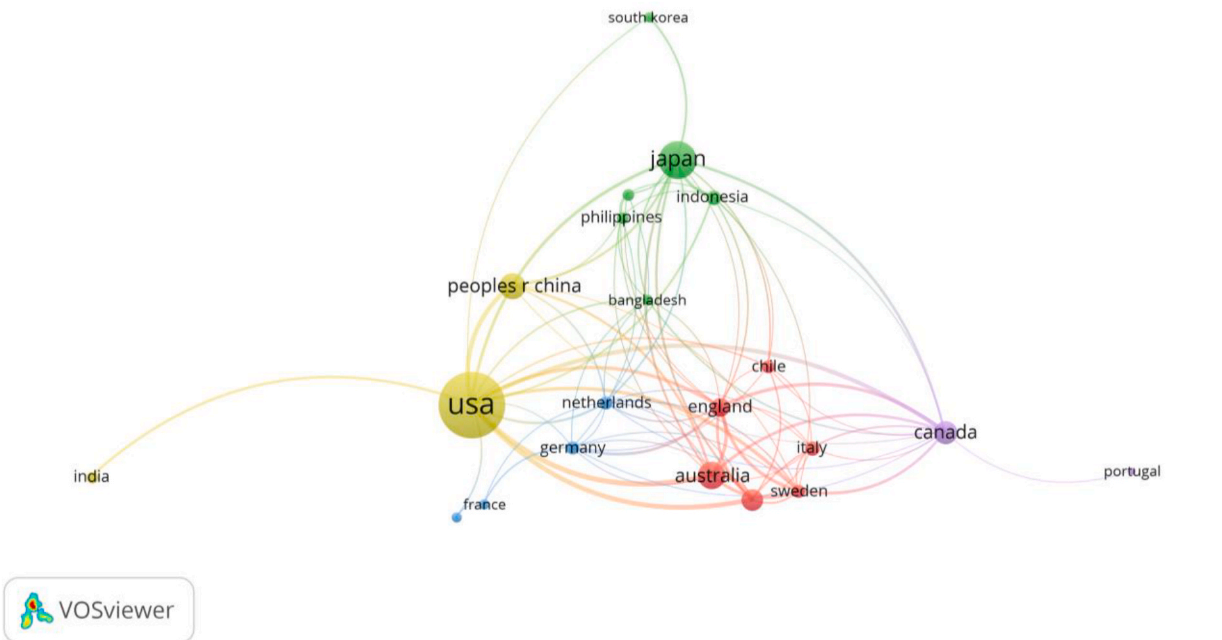
References	Strength	Begin	End	1952–2024
(Sarwar et al., 2018)	4.87	**2021**	2022	
(Goodie et al., 2019)	4.38	**2021**	2024	
(Priest et al., 2016)	4.11	**2021**	2022	
(McLennan et al., 2019)	4.06	**2021**	2024	
(Kuligowski, 2021)	5.94	**2022**	2024	
(Whytlaw et al., 2021)	4.58	**2022**	2024	
(Wahlqvist et al., 2021)	4.22	**2022**	2024	
(Buylova et al., 2020)	4.11	**2022**	2024	
(Kuligowski et al., 2022)	3.97	**2022**	2024	

Appendix C



Co-authorship network by country.

Data availability

Data will be made available on request.

References

Abar, S., Theodoropoulos, G. K., Lemarinier, P., O'Hare, G. M. P., 2017. Agent based modelling and simulation tools: a review of the state-of-art software. In: Computer Science Review, vol. 24, Elsevier Ireland Ltd, pp. 13–33.

Adams, V., Kaufman, S.R., van Hattum, T., Moody, S., 2011. Aging disaster: mortality, vulnerability, and long-term recovery among Katrina survivors. Med. Anthropol.: Cross Cult. Stud. Health Illness 30 (3). https://doi.org/10.1080/01459740.2011.560777.

Adedokun, O., Egbelakin, T., Gajendran, T., Sher, W., 2024. Incentives for self-evacuation: a panacea for bushfire fatalities in the Australian bushfire-prone areas. Int. J. Disaster Risk Reduct. 104. https://doi.org/10.1016/j.ijdrr.2024.104361.

Aerts, J.C.J.H., Botzen, W.J., Clarke, K.C., Cutter, S.L., Hall, J.W., Merz, B., Michel-Kerjan, E., Mysiak, J., Surminski, S., Kunreuther, H., 2018. Integrating human behaviour dynamics into flood disaster risk assessment. Nat. Clim. Chang. 8 (3). https://doi.org/10.1038/s41558-018-0085-1.

Ahmad, S., Ahmed, H.U., Ali, A., Yang, X., Huang, Y., Guo, M., Ren, Y., Lu, P., 2024. Evaluating driving behavior patterns during wildfire evacuations in wildland-urban interface zones using connected vehicles data. Fire Saf. J. 142. https://doi.org/10.1016/j.firesaf.2023.104015.

Ahsan, M.N., Takeuchi, K., Vink, K., Ohara, M., 2016a. A systematic review of the factors affecting the cyclone evacuation decision process in Bangladesh. In. J. Disaster Res. 11 (4). https://doi.org/10.20965/jdr.2016.p0742.

Ahsan, M.N., Takeuchi, K., Vink, K., Warner, J., 2016b. Factors affecting the evacuation decisions of coastal households during Cyclone Aila in Bangladesh. Environ. Hazards 15 (1), 16–42. https://doi.org/10.1080/17477891.2015.1114912.

Ainuddin, S., Routray, J.K., 2012. Community resilience framework for an earthquake prone area in Baluchistan. Int. J. Disaster Risk Reduct. 2 (1). https://doi.org/10.1016/j.ijdrr.2012.07.003.

Ajzen, I., 1991. The theory of planned behavior. Organ. Behav. Hum. Decis. Process. https://www.sciencedirect.com/science/article/pii/074959789190020T.

Akbarzadeh, M., Wilmot, C.G., 2015. Time-dependent route choice in hurricane evacuation. nat. Hazard. Rev. 16 (2). https://doi.org/10.1061/(asce)nh.1527-6996.0000159.

Alam, M.S., Chakraborty, T., 2021. Understanding the nexus between public risk perception of COVID-19 and evacuation behavior during cyclone Amphan in Bangladesh. Heliyon 7 (7). https://doi.org/10.1016/j.heliyon.2021.e07655.

Aldahlawi, R. Y., Akbari, V., Lawson, G., 2024. A systematic review of methodologies for human behavior modelling and routing optimization in large-scale evacuation planning. In: International Journal of Disaster Risk Reduction, vol. 110, Elsevier Ltd.

Amri, I., Giyarsih, S.R., Ruslanjari, D., 2024. Tsunami risk awareness, hazard warning knowledge, and intended evacuation behavior among beach users in Bantul, Indonesia. Int. J. Disaster Risk Reduct. 109. https://doi.org/10.1016/j.ijdrr.2024.104594.

An, L., 2012. Modeling human decisions in coupled human and natural systems: Review of agent-based models. Ecol. Model. 229. https://doi.org/10.1016/j.ecolmodel.2011.07.010.

Anyidoho, P.K., Davidson, R.A., Rambha, T., Nozick, L.K., 2022. Prediction of population behavior in hurricane evacuations. Transp. Res. A Policy Pract. 159. https://doi.org/10.1016/j.tra.2022.03.001.

Arce, R.S.C., Onuki, M., Esteban, M., Shibayama, T., 2017. Risk awareness and intended tsunami evacuation behaviour of international tourists in Kamakura City, Japan. Int. J. Disaster Risk Reduct. 23 (April), 178–192. https://doi.org/10.1016/j.ijdrr.2017.04.005.

Arlikatti, S., Lindell, M.K., Prater, C.S., Zhang, Y., 2006. Risk area accuracy and hurricane evacuation expectations of coastal residents. Environ. Behav. 38 (2), 226–247. https://doi.org/10.1177/0013916505277603.

Arrighi, C., Oumeraci, H., Castelli, F., 2017. Hydrodynamics of pedestrians' instability in floodwaters. Hydrol. Earth Syst. Sci. 21 (1). https://doi.org/10.5194/hess-21-515-2017.

Aryadoust, V., 2020. A review of comprehension subskills: a scientometrics perspective. In: System, vol. 88, Elsevier Ltd.

Baker, E., 1979. Predicting response to hurricane warnings: a reanalysis of data from four studies. Mass Emerg. 4 (1).

Baker, E.J., 1991. Hurricane evacuation behavior. Int. J. Mass Emerg. Disasters 9 (2), 287–310. https://doi.org/10.1177/028072709100900210.

Bakhshian, E., Martinez-Pastor, B., 2023. Evaluating human behaviour during a disaster evacuation process: a literature review. J. Traffic Transport. Eng. (Engl. Ed.) 10.

Balakrishna, R., Wen, Y., Ben-Akiva, M., Antoniou, C., 2008. Simulation-based framework for transportation network management in emergencies. Transport. Res. Rec. (2041). https://doi.org/10.3141/2041-09.

Bandura, A., 1977. Self-efficacy: toward a unifying theory of behavioral change. Psychol. Rev. 84 (2). https://doi.org/10.1037/0033-295X.84.2.191.

Barberi, F., Davis, M.S., Isaia, R., Nave, R., Ricci, T., 2008. Volcanic risk perception in the Vesuvius population. J. Volcanol. Geoth. Res. 172 (3–4). https://doi.org/10.1016/j.jvolgeores.2007.12.011.

Batdorf, B., McGee, T.K., 2023. Wildfire smoke and protective actions in Canadian indigenous communities. Atmos. 14.

Bernardini, G., Camilli, S., Quagliarini, E., D'Orazio, M., 2017a. Flooding risk in existing urban environment: from human behavioral patterns to a microscopic simulation model. Energy Proc.

Bernardini, G., Postacchini, M., Quagliarini, E., Brocchini, M., Cianca, C., D'Orazio, M., 2017b. A preliminary combined simulation tool for the risk assessment of pedestrians' flood-induced evacuation. Environ Model Softw. 96. https://doi.org/10.1016/j.envsoft.2017.06.007.

Bernardini, G., Quagliarini, E., D'Orazio, M., Brocchini, M., 2020. Towards the simulation of flood evacuation in urban scenarios: Experiments to estimate human motion speed in floodwaters. Saf. Sci. 123. https://doi.org/10.1016/j.ssci.2019.104563.

Beyki, S. M., Santiago, A., Laím, L., Craveiro, H. D., 2023. Evacuation simulation under threat of wildfire—an overview of research, development, and knowledge gaps. Appl. Sci. 13(17). doi: 10.3390/app13179587.

Bian, R., Wilmot, C. G., Gudishala, R., Baker, E. J., 2019. Modeling household-level hurricane evacuation mode and destination type joint choice using data from multiple post-storm behavioral surveys. Transport. Res. Part C: Emerg. Technol. 99 (March 2018), 130–143. doi: 10.1016/j.trc.2019.01.009.

Billman, M., Atoba, K., Thompson, C., Brody, S., 2023. How about now? changes in risk perception before and after Hurricane Irma. Sustainability (switzerland) 15 (9). https://doi.org/10.3390/su15097680.

Bird, D.K., Gísladóttir, G., 2020. Enhancing tourists' safety in volcanic areas: an investigation of risk communication initiatives in Iceland. Int. J. Disaster Risk Reduct. 50. https://doi.org/10.1016/j.ijdrr.2020.101896.

Bird, D.K., Gísladóttir, G., Dominey-Howes, D., 2011. Different communities, different perspectives: issues affecting residents' response to a volcanic eruption in southern Iceland. Bull. Volcanol. 73 (9). https://doi.org/10.1007/s00445-011-0464-1.

Bolin, R., Stanford, L., 1998. The Northridge earthquake: community-based approaches to unmet recovery needs. Disasters 22 (1). https://doi.org/10.1111/1467-7717.00073.

Bonabeau, E., 2002. Agent-based modeling: Methods and techniques for simulating human systems. PNAS 99 (SUPPL. 3), 7280–7287. https://doi.org/10.1073/PNAS.082080899.

Bosworth, S.L., 1996. Book review: disaster evacuation and the tourist industry. Int. J. Mass Emerg. Disasters 14 (3). https://doi.org/10.1177/028072709601400311.

Bourque, L. B., Russell, L., Goltz, J., 1994. Human behavior during and immediately after the earthquake. US Geological Survey Professional Paper B, 1553.

Bowser, G.C., Cutter, S.L., 2015. Stay or go? examining decision making and behavior in hurricane evacuations. Environ. 57 (6), 28–41. https://doi.org/10.1080/00139157.2015.1089145.

Bubeck, P., Botzen, W.J.W., Aerts, J.C.J.H., 2012. A review of risk perceptions and other factors that influence flood mitigation behavior. Risk Anal. 32 (9), 1481–1495. https://doi.org/10.1111/j.1539-6924.2011.01783.x.

Burby, R.J., Wagner, F., 1996. Protecting tourists from death and injury in coastal storms. Disasters 20 (1). https://doi.org/10.1111/j.1467-7717.1996.tb00514.x.

Buylova, A., Chen, C., Cramer, L.A., Wang, H., Cox, D.T., 2020. Household risk perceptions and evacuation intentions in earthquake and tsunami in a Cascadia Subduction Zone. Int. J. Disaster Risk Reduct. 44. https://doi.org/10.1016/j.ijdrr.2019.101442.

Cahyanto, I., Pennington-Gray, L., 2015. Communicating hurricane evacuation to tourists: gender, past experience with hurricanes, and place of residence. J. Travel Res. 54 (3). https://doi.org/10.1177/0047287513517418.

Cahyanto, I., Pennington-Gray, L., Thapa, B., Srinivasan, S., Villegas, J., Matyas, C., Kiousis, S., 2014. An empirical evaluation of the determinants of tourist's hurricane evacuation decision making. J. Destin. Mark. Manag. 2 (4). https://doi.org/10.1016/j.jdmm.2013.10.003.

Cahyanto, I., Pennington-Gray, L., Thapa, B., Srinivasan, S., Villegas, J., Matyas, C., Kiousis, S., 2016. Predicting information seeking regarding hurricane evacuation in the destination. Tour. Manag. 52. https://doi.org/10.1016/j.tourman.2015.06.014.

Cao, Y., Boruff, B.J., McNeill, I.M., 2016. Is a picture worth a thousand words? evaluating the effectiveness of maps for delivering wildfire warning information. Int. J. Disaster Risk Reduct. 19. https://doi.org/10.1016/j.ijdrr.2016.08.012.

Carlino, S., Somma, R., Mayberry, G.C., 2008. Volcanic risk perception of young people in the urban areas of Vesuvius: comparisons with other volcanic areas and implications for emergency management. J. Volcanol. Geoth. Res. 172 (3–4), 229–243. https://doi.org/10.1016/j.jvolgeores.2007.12.010.

Carton, H., Gales, J., Kennedy, E.B., 2024. Video analysis of human behaviour during wildfire evacuations. Can. J. Civ. Eng. 51 (9). https://doi.org/10.1139/cjce-2023-0450.

Cerase, A., Cugliari, L., 2023. Something still remains: factors affecting tsunami risk perception on the coasts hit by the reggio calabria-messina 1908 event (Italy). Sustainability (Switzerland) 15 (3). https://doi.org/10.3390/su15032787.

Chakraborty, S., Chaudhuri, S.K., 2022. Unfolding social learning parameters behind the selection of information sources against cyclones: a perspective of information seeking behavior research. Libr. Inf. Sci. Res. 44 (4). https://doi.org/10.1016/j.lisr.2022.101194.

Champ, P.A., Brenkert-Smith, H., 2016. Is seeing believing? perceptions of wildfire risk over time. Risk Anal. 36 (4). https://doi.org/10.1111/risa.12465.

Chen, C., 2006. CiteSpace II: detecting and visualizing emerging trends and transient patterns in scientific literature. J. Am. Soc. Inf. Sci. Technol. 57 (3), 359–377. https://doi.org/10.1002/asi.20317.

Chen, C., 2015. *How to Use CiteSpace*. http://leanpub.com/howtousecitespace.

Chen, C., Morris, S., 2003. Visualizing evolving networks: Minimum spanning trees versus Pathfinder networks. Proceedings - IEEE Symposium on Information Visualization, INFO VIS.

Chen, C., Hu, Z., Liu, S., Tseng, H., 2012. Emerging trends in regenerative medicine: a scientometric analysis in CiteSpace. Exp. Opin. Biol. Therapy 12, 593–608.

Chen, C., Wang, H., Lindell, M.K., Jung, M.C., Siam, M.R.K., 2022. Tsunami preparedness and resilience: evacuation logistics and time estimations. Transp. Res. Part D: Transp. Environ. 109. https://doi.org/10.1016/j.trd.2022.103324.

Chen, C., Koll, C., Wang, H., Lindell, M.K., 2023. An interdisciplinary agent-based evacuation model: integrating the natural environment, built environment, and social system for community preparedness and resilience. Nat. Hazards Earth Syst. Sci. 23 (2). https://doi.org/10.5194/nhess-23-733-2023.

Cheng, G., Wilmot, C. G., Baker, E. J., 2008. A destination choice model for hurricane evacuation. In: *Proceedings of the 87th Annual Meeting Transportation Research Board, Washington, DC, USA, 2008*(January 2008).

Cheng, G., Wilmot, C., Baker, E.J., 2013. Development of a time-dependent disaggregate hurricane evacuation destination choice model. nat. Hazard. Rev. 14 (3). https://doi.org/10.1061/(asce)nh.1527-6996.0000107.

Cheung, C., Law, R., 2006. How can hotel guests be protected during the occurrence of a Tsunami? Asia Pacific J. Tourism Res. 11 (3). https://doi.org/10.1080/10941660600753331.

Choi, S., Yoshida, K., Yamaji, H., Shindo, H., Maharjan, R., 2023. Factors influencing disaster response behavior of international tourists under the Tokyo Metropolitan Earthquake scenario. Front. Sust. Tourism 2. https://doi.org/10.3389/frsut.2023.1205084.

Cohn, P.J., Carroll, M.S., Kumagai, Y., 2006. Evacuation behavior during wildfires: results of three case studies. West. J. Appl. For. 21 (1). https://doi.org/10.1093/wjaf/21.1.39.

Cole, T.W., Fellows, K.L., 2008. Risk communication failure: a case study of new orleans and hurricane katrina. South Commun. J. 73 (3). https://doi.org/10.1080/10417940802219702.

Collins, J., Ersing, R., Polen, A., Saunders, M., Senkbeil, J., 2018. The effects of social connections on evacuation decision making during hurricane Irma. Weather Clim. Soc. 10 (3). https://doi.org/10.1175/WCAS-D-17-0119.1.

Collins, J., Polen, A., McSweeney, K., Colón-Burgos, D., Jernigan, I., 2021. Hurricane risk perceptions and evacuation decision-making in the age of COVID-19. Bull. Am. Meteorol. Soc. 102 (4). https://doi.org/10.1175/BAMS-D-20-0229.1.

Collins, J., Polen, A., Dunn, E., Jernigan, I., McSweeney, K., Welford, M., Lackovic, M., Colón-Burgos, D., Zhu, Y.J., 2022a. Hurricanes laura and sally: a case study of evacuation decision-making in the age of COVID-19. Weather Clim. Soc. 14 (4). https://doi.org/10.1175/WCAS-D-21-0160.1.

Collins, J., Polen, A., Dunn, E., Maas, L., Ackerson, E., Valmond, J., Morales, E., Colón-Burgos, D., 2022b. Hurricane hazards, evacuations, and sheltering: evacuation decision-making in the prevaccine era of the COVID-19 pandemic in the PRVI region. Weather Clim. Soc. 14 (2). https://doi.org/10.1175/WCAS-D-21-0134.1.

CRED, 2024a. *Executive summary (EM-DAT)*. https://files.emdat.be/reports/2024_EMDAT_report.pdf.

Crooks, A.T., Heppenstall, A.J., 2012. Introduction to agent-based modelling. Agent-Based Models Geogr. Syst. https://doi.org/10.1007/978-90-481-8927-4_5.

Cutter, S.L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., Webb, J., 2008. A place-based model for understanding community resilience to natural disasters. Glob. Environ. Chang. 18 (4). https://doi.org/10.1016/j.gloenvcha.2008.07.013.

Czajkowski, J., 2011. Is it time to go yet? Understanding household hurricane evacuation decisions from a dynamic perspective. Nat. Hazard. Rev. 12 (2), 72–84. https://doi.org/10.1061/(asce)nh.1527-6996.0000037.

D'Orazio, M., Quagliarini, E., Bernardini, G., Spalazzi, L., 2014a. EPES - earthquake pedestrians' evacuation simulator: a tool for predicting earthquake pedestrians' evacuation in urban outdoor scenarios. Int. J. Disaster Risk Reduct. 10 (PA). https://doi.org/10.1016/j.ijdrr.2014.08.002.

D'Orazio, M., Spalazzi, L., Quagliarini, E., Bernardini, G., 2014b. Agent-based model for earthquake pedestrians' evacuation in urban outdoor scenarios: behavioural patterns definition and evacuation paths choice. Saf. Sci. 62, 450–465. https://doi.org/10.1016/j.ssci.2013.09.014.

Dash, N., Gladwin, H., 2007. Evacuation Decision Making and Behavioral Responses: Individual and Household. doi: 10.1061/ASCE1527-698820078:369.

Dash, N., Morrow, B.H., 2000. Return delays and evacuation order compliance: the case of hurricane georges and the florida keys. Environ. Hazards 2 (3). https://doi.org/10.3763/ehaz.2000.0217.

Davidson, D.J., 2010. The applicability of the concept of resilience to social systems: some sources of optimism and nagging doubts. Soc. Nat. Resour. 23 (12). https://doi.org/10.1080/08941921003652940.

Delforge, D., Wathelet, V., Below, R., Lanfredi Sofia, C., Tonnelier, M., van Loenhout, J. A. F., & Speybroeck, N. (2024). The EM-DAT Emergency Events Database Archive [Dataset]. Open Data @ UCLouvain. https://doi.org/10.14428/DVN/I0LTPH.

Demeritt, D., Nobert, S., 2014. Models of best practice in flood risk communication and management. Environ. Hazards 13 (4). https://doi.org/10.1080/17477891.2014.924897.

Demuth, J.L., Morss, R.E., Morrow, B.H., Lazo, J.K., 2012. Creation and communication of hurricane risk information. Bull. Am. Meteorol. Soc. 93 (8), 1133–1145. https://doi.org/10.1175/BAMS-D-11-00150.1.

Dias, C., Rahman, N.A., Zaiter, A., 2021. Evacuation under flooded conditions: experimental investigation of the influence of water depth on walking behaviors. Int. J. Disaster Risk Reduct. 58. https://doi.org/10.1016/j.ijdrr.2021.102192.

Diaz, R., Acero, B., Behr, J.G., Hutton, N.S., 2023. Impacts of household vulnerability on hurricane logistics evacuation under COVID-19: the case of U.S. Hampton roads. Transport. Res. Part E: Logist. Transport. Rev. 176. https://doi.org/10.1016/j.tre.2023.103179.

Doocy, S., Daniels, A., Dick, A., Kirsch, T.D., 2013. The human impact of tsunamis: a historical review of events 1900-2009 and systematic literature review. PLoS Curr.

Dow, K., Cutter, S.L., 1998. Crying wolf: repeat responses to hurricane evacuation orders. Coast. Manag. 26 (4). https://doi.org/10.1080/08920759809362356.

Dow, K., Cutter, S.L., 2000. Public orders and personal opinions: household strategies for hurricane risk assessment. Environ. Hazards 2 (4), 143–155. https://doi.org/10.1016/S1464-2867(01)00014-6.
Drabek, T.E., 1969. Social processes in disaster: family evacuation. Soc. Probl. 16 (3). https://doi.org/10.2307/799667.
Drabek, T.E., 1986. *Human System Responses to Disasters: An Inventory of Sociological Findings.* Springer, 10.2307/2579446.
Drabek, T.E., Boggs, K.S., 1968. Families in disaster: Reactions and Relatives. J. Marriage Fam. 30 (3). https://doi.org/10.2307/349914.
Du, E., Cai, X., Sun, Z., Minsker, B., 2017a. Exploring the role of social media and individual behaviors in flood evacuation processes: an agent-based modeling approach. Water Resour. Res. 53 (11), 9164–9180. https://doi.org/10.1002/2017WR021192.
Du, E., Rivera, S., Cai, X., Myers, L., Ernest, A., Minsker, B., 2017b. Impacts of human behavioral heterogeneity on the benefits of probabilistic flood warnings: an agent-based modeling framework. J. Am. Water Resour. Assoc. 53 (2). https://doi.org/10.1111/1752-1688.12475.
Elder, K., Xirasagar, S., Miller, N., Bowen, S. A., Glover, S., Piper, C., 2007. African Americans' decisions not to evacuate New Orleans before Hurricane Katrina: a qualitative study (American Journal of Public Health (2007) 97 (S124-S129) doi: 10.2105/AJPH.2006.100867). Am. J. Public Health 97.
Elhami-Khorasani, N., Kinateder, M., Lemiale, V., Manzello, S.L., Marom, I., Marquez, L., Suzuki, S., Theodori, M., Wang, Y., Wong, S.D., 2023. Review of research on human behavior in large outdoor fires. Fire Technol. 59.
Elliott, J.R., Pais, J., 2006. Race, class, and Hurricane Katrina: Social differences in human responses to disaster. Soc. Sci. Res. 35 (2). https://doi.org/10.1016/j.ssresearch.2006.02.003.
Esteban, M., Tsimopoulou, V., Mikami, T., Yun, N.Y., Suppasri, A., Shibayama, T., 2013. Recent tsunamis events and preparedness: Development of tsunami awareness in Indonesia, Chile and Japan. Int. J. Disaster Risk Reduct. 5. https://doi.org/10.1016/j.ijdrr.2013.07.002.
Fakhruddin, S.H.M., Kawasaki, A., Babel, M.S., 2015. Community responses to flood early warning system: case study in Kaijuri Union, Bangladesh. Int. J. Disaster Risk Reduct. 14. https://doi.org/10.1016/j.ijdrr.2015.08.004.
Farmer, A.K., DeYoung, S.E., 2019. The pets of hurricane matthew: evacuation and sheltering with companion animals. Anthrozoos 32 (3). https://doi.org/10.1080/08927936.2019.1598661.
Faulkner, B., 2001. Towards a framework for tourism disaster management. Tour. Manag. 22 (2). https://doi.org/10.1016/S0261-5177(00)00048-0.
Favereau, M., Robledo, L.F., Bull, M.T., 2020. Homeostatic representation for risk decision making: a novel multi-method simulation approach for evacuation under volcanic eruption. Nat. Hazards 103 (1). https://doi.org/10.1007/s11069-020-03957-2.
Feng, Y., Cui, S., 2021. A review of emergency response in disasters: present and future perspectives. Nat. Hazard. 105.
Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., Combs, B., 1978. How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. Policy Sci. 9 (2). https://doi.org/10.1007/BF00143739.
Floyd, D.L., Prentice-Dunn, S., Rogers, R.W., 2000. A meta-analysis of research on protection motivation theory. J. Appl. Soc. Psychol. 30 (2), 407–429. https://doi.org/10.1111/j.1559-1816.2000.tb02323.x.
Folk, L.H., Kuligowski, E.D., Gwynne, S.M.V., Gales, J.A., 2019. A Provisional conceptual model of human behavior in response to wildland-urban interface fires. Fire Technol. 55 (5), 1619–1647. https://doi.org/10.1007/s10694-019-00821-z.
Fothergill, A., 1996. Gender, risk, and disaster. Int. J. Mass Emerg. Disasters 14 (1). https://doi.org/10.1177/028072709601400103.
Frieser, B. I., Vrijling, J. K., Jonkman, S.N., 2005. Probabilistic evacuation decision model for river floods in The Netherlands. In: International Symposium on Stochastic Hydraulics 2005: 23 and 24 May 2005. Nijmegen - The Netherlands, 65(May).
Fu, H., Wilmot, C. G., 2004. Sequential logit dynamic travel demand model for hurricane evacuation. *Transport. Res. Rec.* (1882), 19-26. doi: 10.3141/1882-03.
Ghorbanzadeh, M., Vijayan, L., Yang, J., Ozguven, E. E., Huang, W., Ma, M., 2021. Integrating evacuation and storm surge modeling considering potential hurricane tracks: the case of hurricane irma in southeast Florida. ISPRS Int. J. Geo-Inform. 10 (10). doi: 10.3390/ijgi10100661.
Gladwin, H., Peacock, W.G., 2012. Warning and evacuation: a night for hard houses. In: Hurricane Andrew: Ethnicity, Gender and the Sociology of Disasters. doi:10.4324/9780203351628-13.
Gladwin, C.H., Gladwin, H., Peacock, W.G., 2001. Modeling hurricane evacutaion decisions with ethnographic methods. Int. J. Mass Emerg. Disasters 19 (2). https://doi.org/10.1177/028072700101900201.
Gladwin, H., Lazo, J.K., Morrow, B.H., Peacock, W.G., Willoughby, H.E., 2009. Social science research needs for the hurricane forecast and warning system. Bull. Am. Meteorol. Soc. 90 (1), 25–29. https://doi.org/10.1175/2008BAMS2606.1.
Goldberg, M.H., Marlon, J.R., Rosenthal, S.A., Leiserowitz, A., 2020. A meta-cognitive approach to predicting hurricane evacuation behavior. Environ. Commun. 14 (1). https://doi.org/10.1080/17524032.2019.1687100.
Golding, B., 2022. Towards the "Perfect" Weather Warning.
Goodie, A. S., Sankar, A. R., & Doshi, P. (2019). Experience, risk, warnings, and demographics: Predictors of evacuation decisions in Hurricanes Harvey and Irma. *International Journal of Disaster Risk Reduction*, *41*(November 2018), 101320-101320. Doi: 10.1016/j.ijdrr.2019.101320.
Gregg, C.E., Houghton, B.F., Paton, D., Lachman, R., Lachman, J., Johnston, D.M., Wongbusarakum, S., 2006. Natural warning signs of tsunamis: Human sensory experience and response to the 2004 Great Sumatra earthquake and tsunami in Thailand. Earthq. Spectra 22 (SUPPL. 3), 671–691. https://doi.org/10.1193/1.2206791.
Grothmann, T., Reusswig, F., 2006. People at risk of flooding: why some residents take precautionary action while others do not. Nat. Hazards 38 (1–2). https://doi.org/10.1007/s11069-005-8604-6.
Haghani, M., Kuligowski, E., Rajabifard, A., Kolden, C.A., 2022. The state of wildfire and bushfire science: temporal trends, research divisions and knowledge gaps. Saf. Sci. 153 (April), 105797. https://doi.org/10.1016/j.ssci.2022.105797.
Haghani, M., Lovreglio, R., Button, M.L., Ronchi, E., Kuligowski, E., 2024. Human behaviour in fire: Knowledge foundation and temporal evolution. Fire Saf. J. 144. https://doi.org/10.1016/j.firesaf.2023.104085.
Hall, S., Sloan-Aagard, C., Harris, R., Emmett, C., Prasetyadi, C., Pettersson, J., Cope, A., Hamson Cox, M., 2022. Perceptions of tsunami susceptibility and self-efficacy among adolescents in Indonesia: the influence of gender, religion, location, age, hazard information source, and past experience. Int. J. Disaster Risk Reduct. 79. https://doi.org/10.1016/j.ijdrr.2022.103151.
Hamilton, K., Demant, D., Peden, A.E., Hagger, M.S., 2020. A systematic review of human behaviour in and around floodwater. Int. J. Disaster Risk Reduct. 47.
Harnantyari, A.S., Takabatake, T., Esteban, M., Valenzuela, P., Nishida, Y., Shibayama, T., Achiari, H., Marzuki Rusli, A.G., Marzuki, M.F.H., Aránguiz, R., Kyaw, T.O., 2020. Tsunami awareness and evacuation behaviour during the 2018 Sulawesi Earthquake tsunami. Int. J. Disast. Risk Reduct. 43 (September 2019). https://doi.org/10.1016/j.ijdrr.2019.101389.
Hasan, S., Ukkusuri, S., Gladwin, H., Murray-Tuite, P., 2011. Behavioral model to understand household-level hurricane evacuation decision making. J. Transp. Eng. 137 (5), 341–348. https://doi.org/10.1061/(ASCE)TE.1943-5436.0000223.
Hassanpour, S., Gonzalez, V., Liu, J., Zou, Y., Cabrera-Guerrero, G., 2022. A hybrid hierarchical agent-based simulation approach for buildings indoor layout evaluation based on the post-earthquake evacuation. Adv. Eng. Inf. 51. https://doi.org/10.1016/j.aei.2022.101531.
Haynes, K., Barclay, J., Pidgeon, N., 2008. Whose reality counts? Factors affecting the perception of volcanic risk. J. Volcanol. Geoth. Res. 172 (3–4). https://doi.org/10.1016/j.jvolgeores.2007.12.012.
Haynes, K., Coates, L., Leigh, R., Handmer, J., Whittaker, J., Gissing, A., McAneney, J., Opper, S., 2009. 'Shelter-in-place' vs. evacuation in flash floods. Environ. Hazards 8 (4). https://doi.org/10.3763/ehaz.2009.0022.
Heath, S.E., Kass, P.H., Beck, A.M., Glickman, L.T., 2001. Human and pet-related risk factors for household evacuation failure during a natural disaster. Am. J. Epidemiol. 153 (7). https://doi.org/10.1093/aje/153.7.659.
Helbing, D., Molnár, P., 1995. Social force model for pedestrian dynamics. Phys. Rev. E 51 (5). https://doi.org/10.1103/PhysRevE.51.4282.
Helbing, D., Farkas, I., Vicsek, T., 2000. Simulating dynamical features of escape panic. Nature 407 (6803). https://doi.org/10.1038/35035023.
Hensher, D.A., Mannering, F.L., 1994. Hazard-based duration models and their application to transport analysis: Foreign summaries. Transp. Rev. 14 (1). https://doi.org/10.1080/01441649408716866.
Hosseini, K.A., Izadkhah, Y.O., 2020. From "Earthquake and safety" school drills to "safe school-resilient communities": a continuous attempt for promoting community-based disaster risk management in Iran. Int. J. Disaster Risk Reduct. 45. https://doi.org/10.1016/j.ijdrr.2020.101512.
Hua, C., Huang, S.K., Lindell, M.K., Yu, C.H., 2020. Rural households' perceptions and behavior expectations in response to seismic hazard in Sichuan, China. Safety Sci. 125. https://doi.org/10.1016/j.ssci.2020.104622.
Huang, S.-K., Lindell, M.K., Prater, C.S., Wu, H.-C., Siebeneck, L.K., 2012. Household evacuation decision making in response to Hurricane Ike. nat. Hazard. Rev. 13 (4), 283–296. https://doi.org/10.1061/(asce)nh.1527-6996.0000074.
Huang, S.K., Lindell, M.K., Prater, C.S., 2016. Who leaves and who stays? A review and statistical meta-analysis of hurricane evacuation studies. Environ. Behav. 48 (8), 991–1029. https://doi.org/10.1177/0013916515578485.
Iliopoulou, C., Konstantinidou, M.A., Kepaptsoglou, K.L., Stathopoulos, A., 2020. ITS technologies for decision making during evacuation operations: a review. J. Transport. Eng. Part A: Syst. 146 (4). https://doi.org/10.1061/jtepbs.0000329.
Ishigaki, T., Kawanaka, R., Onishi, Y., Shimada, H., Toda, K., Baba, Y., 2009. Assessment of safety on evacuating route during underground flooding. Advances in Water Resources and Hydraulic Engineering - Proceedings of 16th IAHR-APD Congress and 3rd Symposium of IAHR-ISHS.
Iskandar, R., Dugdale, J., Beck, E., Cornou, C., 2024. Agent-based simulation of seismic crisis including human behavior: application to the city of Beirut, Lebanon. Simulation 100 (4). https://doi.org/10.1177/00375497231194608.
Islam, R., Jones, S., Hudnall, M., 2023. Transportation system functions during hurricane response: a systematic review of modes and methods. Transp. Res. Interdiscip. Perspect. 18.
Ivers, L. C., Ryan, E. T., 2006. Infectious diseases of severe weather-related and flood-related natural disasters. *Curr. Opin. Infect. Diseas.* 19.
Iwai, Y., 2024. Joint effects of perceived hazard risk and contextual situation on responses. Ann. Am. Assoc. Geogr. 114 (5). https://doi.org/10.1080/24694452.2024.2313513.
Jiang, Y., Li, Z., Cutter, S.L., 2021. Social distance integrated gravity model for evacuation destination choice. Int. J. Digital Earth 14 (8). https://doi.org/10.1080/17538947.2021.1915396.
Johnston, D.M., Bebbington, M.S., Lai, C.D., Houghton, B.F., Paton, D., 1999. Volcanic hazard perceptions: comparative shifts in knowledge and risk. Disast. Prevent. Manage.: Int. J. 8 (2). https://doi.org/10.1108/09653569910266166.
Johnston, D., Becker, J., Gregg, C., Houghton, B., Paton, D., Leonard, G., Garside, R., 2007. Developing warning and disaster response capacity in the tourism sector in

coastal Washington, USA. *Disast. Prevent. Manage.:* Int. J. 16 (2). https://doi.org/10.1108/09653560710739531.
Jonkman, S.N., 2005. Global perspectives on loss of human life caused by floods. Nat. Hazards 34 (2). https://doi.org/10.1007/s11069-004-8891-3.
Jurdak, R., Zhao, K., Liu, J., AbouJaoude, M., Cameron, M., Newth, D., 2015. Understanding human mobility from Twitter. PLoS One 10 (7). https://doi.org/10.1371/journal.pone.0131469.
Kang, J.E., Lindell, M.K., Prater, C.S., 2007. Hurricane evacuation expectations and actual behavior in Hurricane Lili. J. Appl. Soc. Psychol. 37 (4), 887–903. https://doi.org/10.1111/j.1559-1816.2007.00191.x.
Karaye, I. M., Taylor, N., Perez-Patron, M., Thompson, C., Horney, J.A., 2022. Factors associated with hurricane evacuation: a statistical meta-analysis of studies, 1999-2018. *Disast. Med. Public Health Prepared. 16*(3). doi: 10.1017/dmp.2021.24.
Kasperson, R.E., Renn, O., Slovic, P., Brown, H.S., Emel, J., Goble, R., Kasperson, J.X., Ratick, S., 1988. The social amplification of risk: a conceptual framework. Risk Anal. 8 (2). https://doi.org/10.1111/j.1539-6924.1988.tb01168.x.
Kaur, N., Kaur, H., 2022. A multi-agent based evacuation planning for disaster management: a narrative review. Arch. Comput. Methods Eng. 29.
Kellens, W., Zaalberg, R., Neutens, T., Vanneuville, W., De Maeyer, P., 2011. An analysis of the public perception of flood risk on the belgian coast. Risk Anal. 31 (7). https://doi.org/10.1111/j.1539-6924.2010.01571.x.
Kellens, W., Terpstra, T., De Maeyer, P., 2013. Perception and communication of flood risks: a systematic review of empirical research. Risk Anal. 33 (1). https://doi.org/10.1111/j.1539-6924.2012.01844.x.
Khalafzai, M.A.K., McGee, T.K., Parlee, B., 2021. Spring flooding and recurring evacuations of Kashechewan first nation, northern Ontario, Canada. Int. J. Disaster Risk Reduct. 63. https://doi.org/10.1016/j.ijdrr.2021.102443.
Kleinberg, J., 2002. Bursty and hierarchical structure in streams | Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining. In: *Proceedings of the Eighth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*. https://doi.org/10.1145/775047.775061.
Kovačić, S., Margarint, M.C., Ionce, R., Miljković, D., 2020. What are the factors affecting tourist behavior based on the perception of risk? Romanian and Serbian tourists' perspective in the aftermath of the recent floods and wildfires in Greece. Sustainability (Switzerland) 12 (16). https://doi.org/10.3390/SU12166400.
Kuligowski, E., 2021. Evacuation decision-making and behavior in wildfires: past research, current challenges and a future research agenda. Fire Saf. J. 120. https://doi.org/10.1016/j.firesaf.2020.103129.
Kuligowski, E.D., Zhao, X., Lovreglio, R., Xu, N., Yang, K., Westbury, A., Nilsson, D., Brown, N., 2022. Modeling evacuation decisions in the 2019 Kincade fire in California. Saf. Sci. 146. https://doi.org/10.1016/j.ssci.2021.105541.
Lachlan, K.A., Burke, J., Spence, P.R., Griffin, D., 2009. Risk perceptions, race, and Hurricane Katrina. Howard J. Commun. 20 (3). https://doi.org/10.1080/10646170903070035.
Lachman, R., Tatsuoka, M., Bonk, W.J., 1961. Human behavior during the tsunami of May 1960. Science 133 (3462). https://doi.org/10.1126/science.133.3462.1405.
Lakoba, T.I., Kaup, D.J., Finkelstein, N.M., 2005. Modifications of the Helbing-Molnár-Farkas-Vicsek Social force model for pedestrian evolution. Simulation 81 (5), 339–352. https://doi.org/10.1177/0037549705052772.
Lazo, J.K., Waldman, D.M., Morrow, B.H., Thacher, J.A., 2010. Household evacuation decision making and the benefits of improved hurricane forecasting: developing a framework for assessment. Weather Forecast. 25 (1), 207–219. https://doi.org/10.1175/2009WAF2222310.1.
Lechner, H.N., Rouleau, M.D., 2019. Should we stay or should we go now? Factors affecting evacuation decisions at Pacaya volcano, Guatemala. Int. J. Disaster Risk Reduct. 40 (April), 101160. https://doi.org/10.1016/j.ijdrr.2019.101160.
Lee, H.K., Hong, W.H., Lee, Y.H., 2019. Experimental study on the influence of water depth on the evacuation speed of elderly people in flood conditions. Int. J. Disaster Risk Reduct. 39. https://doi.org/10.1016/j.ijdrr.2019.101198.
Lee, S., Jain, S., Ginsbach, K., Son, Y.J., 2021. Dynamic-data-driven agent-based modeling for the prediction of evacuation behavior during hurricanes. Simul. Model. Pract. Theory 106. https://doi.org/10.1016/j.simpat.2020.102193.
Li, X., Yu, H., Xu, H., Ren, X., Song, W., Zhang, J., 2023. A comparative study on pedestrian flow through bottlenecks between flood evacuation and land evacuation. Int. J. Disaster Risk Reduct. 95. https://doi.org/10.1016/j.ijdrr.2023.103822.
Li, X., Qiang, Y., Cervone, G., 2024a. Using human mobility data to detect evacuation patterns in hurricane Ian. Ann. GIS. https://doi.org/10.1080/19475683.2024.2341703.
Li, X., Yu, H., Song, W., Zhang, J., 2024b. Investigation of pedestrian speed in formation evacuating in two specific water depths. Saf. Sci. 169. https://doi.org/10.1016/j.ssci.2023.106333.
Lim, H.R., Lim, M.B.B., Piantanakulchai, M., 2016. Determinants of household flood evacuation mode choice in a developing country. Nat. Hazards 84 (1). https://doi.org/10.1007/s11069-016-2436-4.
Lim, H. R., Lim, M. B. B., Piantanakulchai, M., 2019. Modeling route choice behavior of evacuees in highly urbanized area: a case study of Bagong Silangan, Quezon City, Philippines. *Asia Pacific Manage. Rev. 24*(2). doi: 10.1016/j.apmrv.2017.03.004.
Lim, H.R., Lim, M.B.B., Rojas, A.W.M., 2022. Towards modelling of evacuation behavior and planning for emergency logistics due to the Philippine Taal Volcanic eruption in 2020. Nat. Hazards 114 (1). https://doi.org/10.1007/s11069-022-05401-z.
Lindell, M.K., 2018. Communicating imminent risk. In: *Handbooks of Sociology and Social Research*. Springer Science and Business Media B.V, pp. 449–477. https://doi.org/10.1007/978-3-319-63254-4_22.
Lindell, M.K., 2020. Improving hazard map comprehension for protective action decision making. Front. Comput. Sci. 2 (July), 1–14. https://doi.org/10.3389/fcomp.2020.00027.
Lindell, M.K., Hwang, S.N., 2008. Households' perceived personal risk and responses in a multihazard environment. Risk Anal. 28 (2), 539–556. https://doi.org/10.1111/j.1539-6924.2008.01032.x.
Lindell, M.K., Perry, R.W., 1992. *Behavioral Foundations of Community Emergency Planning*. Hemisphere Press.
Lindell, M.K., Perry, R.W., 2012. The protective action decision model: theoretical modifications and additional evidence. Risk Anal. 32 (4), 616–632. https://doi.org/10.1111/j.1539-6924.2011.01647.x.
Lindell, M.K., Prater, C.S., 2007. Critical behavioral assumptions in evacuation time estimate analysis for private vehicles: examples from hurricane research and planning. J. Urban Plann. Dev. 133 (1), 18–29. https://doi.org/10.1061/(asce)0733-9488(2007)133:1(18).
Lindell, M.K., Lu, J.-C., Prater, C.S., 2005. Household Decision Making and Evacuation in Response to Hurricane Lili. https://doi.org/10.1061/ASCE1527-698820056:4171.
Lindell, M.K., Prater, C.S., Gregg, C.E., Apatu, E.J.I., Huang, S.K., Wu, H.C., 2015. Households' immediate responses to the 2009 American Samoa Earthquake and Tsunami. Int. J. Disaster Risk Reduct. 12, 328–340. https://doi.org/10.1016/j.ijdrr.2015.03.003.
Lindell, M.K., Murray-Tuite, P., Wolshon, B., Baker, E.J., 2019. *Large-Scale Evacuation: The Analysis, Modeling, and Management of Emergency Relocation from Hazardous areas*, first ed. CRC Press. 10.4324/9781315119045.
Lindell, M.K., Prater, C.S., House, D.H., 2022. Cascadia subduction zone residents' tsunami evacuation expectations. Geosci. (Switzerland) 12 (5). https://doi.org/10.3390/geosciences12050189.
Liu, H., Chen, H., Hong, R., Liu, H., You, W., 2020. Mapping knowledge structure and research trends of emergency evacuation studies. Saf. Sci. 121. https://doi.org/10.1016/j.ssci.2019.09.020.
Luo, W., Sandanayake, M., Hou, L., Tan, Y., Zhang, G., 2022. A systematic review of green construction research using scientometrics methods. J. Clean. Prod. 366. Elsevier Ltd.
Maclean, K., Cuthill, M., Ross, H., 2014. Six attributes of social resilience. J. Environ. Plan. Manag. 57 (1). https://doi.org/10.1080/09640568.2013.763774.
MacPherson-Krutsky, C., Lindell, M.K., Brand, D., B., 2023. Residents' information seeking behavior and protective action for earthquake hazards in the Portland Oregon Metropolitan Area. Risk Anal. 43 (2). https://doi.org/10.1111/risa.13916.
Maddux, J.E., Rogers, R.W., 1983. Protection motivation and self-efficacy: a revised theory of fear appeals and attitude change. J. Exp. Soc. Psychol. 19 (5). https://doi.org/10.1016/0022-1031(83)90023-9.
Ma, Z., Guo, S., Deng, X., Xu, D., 2021. Community resilience and resident's disaster preparedness: evidence from China's earthquake-stricken areas. Nat. Hazards 108 (1). https://doi.org/10.1007/s11069-021-04695-9.
Mahdavian, F., Wiens, M., Platt, S., Schultmann, F., 2020. Risk behaviour and people's attitude towards public authorities – a survey of 2007 UK and 2013 German floods. Int. J. Disaster Risk Reduct. 49. https://doi.org/10.1016/j.ijdrr.2020.101685.
Maity, S., Sundar, S., 2022. A coupled model for macroscopic behavior of crowd in flood induced evacuation. Physica A 607. https://doi.org/10.1016/j.physa.2022.128161.
Makinoshima, F., Imamura, F., Abe, Y., 2016. Behavior from tsunami recorded in the multimedia sources at Kesennuma City in the 2011 Tohoku Tsunami and its simulation by using the evacuation model with pedestrian-car interaction. Coast. Eng. J. 58 (4). https://doi.org/10.1142/S0578563416400234.
Makinoshima, F., Imamura, F., Oishi, Y., 2020. Tsunami evacuation processes based on human behaviour in past earthquakes and tsunamis: a literature review. Prog. Disaster Sci. 7, 100113. https://doi.org/10.1016/j.pdisas.2020.100113.
Makinoshima, F., Oishi, Y., Nakagawa, M., Sato, S., Imamura, F., 2021. Revealing complex tsunami evacuation process patterns induced by social interactions: a case study in Ishinomaki. Int. J. Disast. Risk Reduct. 58 (December 2020), 102182. https://doi.org/10.1016/j.ijdrr.2021.102182.
Martín, Y., Cutter, S.L., Li, Z., 2020. Bridging twitter and survey data for evacuation assessment of hurricane matthew and hurricane irma. Nat. Hazard. Rev. 21 (2). https://doi.org/10.1061/(asce)nh.1527-6996.0000354.
Mas, E., Suppasri, A., Imamura, F., Koshimura, S., 2012. Agent-based Simulation of the 2011 Great East Japan Earthquake/Tsunami Evacuation: An Integrated Model of Tsunami Inundation and Evacuation.
Mas, E., Koshimura, S., Imamura, F., Suppasri, A., Muhari, A., Adriano, B., 2015. Recent advances in agent-based tsunami evacuation simulations: case studies in Indonesia, Thailand, Japan and Peru. Pure Appl. Geophys. 172 (12), 3409–3424. https://doi.org/10.1007/s00024-015-1105-y.
Matyas, C., Srinivasan, S., Cahyanto, I., Thapa, B., Pennington-Gray, L., Villegas, J., 2011. Risk perception and evacuation decisions of Florida tourists under hurricane threats: a stated preference analysis. Nat. Hazards 59 (2), 871–890. https://doi.org/10.1007/s11069-011-9801-0.
McCaffrey, S., Wilson, R., Konar, A., 2018. Should I stay or should I go now? or should I wait and see? Influences on wildfire evacuation decisions. Risk Anal. 38 (7), 1390–1404. https://doi.org/10.1111/risa.12944.
McCool, S.F., Burchfield, J.A., Williams, D.R., Carroll, M.S., 2006. An event-based approach for examining the effects of wildland fire decisions on communities. Environ. Manage. 37.
McGee, T.K., 2021. Evacuating first nations during wildfires in canada. Fire Saf. J. 120. https://doi.org/10.1016/j.firesaf.2020.103120.
McLennan, J., Elliott, G., Omodei, M., 2012. Householder decision-making under imminent wildfire threat: stay and defend or leave? Int. J. Wildland Fire 21 (7). https://doi.org/10.1071/WF11061.
McLennan, J., Ryan, B., Bearman, C., Toh, K., 2019. Should we leave now? behavioral factors in evacuation under wildfire threat. Fire Technol. 55 (2), 487–516. https://doi.org/10.1007/s10694-018-0753-8.

Menninger, W.C., 1952. Psychological reactions in an emergency (flood). Am. J. Psychiat. 109 (2). https://doi.org/10.1176/ajp.109.2.128.
Meyer, R.J., Baker, J., Broad, K., Czajkowski, J., Orlove, B., 2014. The dynamics of hurricane risk perception: Real-time evidence from the 2012 Atlantic hurricane season. Bull. Am. Meteorol. Soc. 95 (9), 1389–1404. https://doi.org/10.1175/BAMS-D-12-00218.1.
Miceli, R., Sotgiu, I., Settanni, M., 2008. Disaster preparedness and perception of flood risk: a study in an alpine valley in Italy. J. Environ. Psychol. 28 (2). https://doi.org/10.1016/j.jenvp.2007.10.006.
Mikami, S., Ikeda, K.I., Shunji Mikami, K.I.I., 1985. Human response to disasters. Int. J. Mass Emerg. Disasters 3 (1). https://doi.org/10.1177/028072708500300107.
Mileti, D. S., 1995. Factors related to flood warning response. US-Italy research workshop on the hydrometeorology, impacts, and management of extreme floods.
Mileti, D.S., Beck, E.M., 1975. Communication in crisis: explaining evacuation symbolically. Commun. Res. 2 (1). https://doi.org/10.1177/009365027500200102.
Mileti, D.S., Darlington, J.D., 1997. The role of searching in shaping reactions to earthquake risk information. Soc. Probl. 44 (1), 89–103. https://doi.org/10.2307/3096875.
Mileti, D.S., O'Brien, P.W., 1992. Warnings during disaster: normalizing communicated risk. Soc. Probl. 39 (1). https://doi.org/10.1525/sp.1992.39.1.03x0062j.
Mileti, D.S., Soreusen, J.H., O'Brien, P.W., 1992. Toward an explanation of mass care shelter use in evacuations. Int. J. Mass Emerg. Disasters 10 (1), 25–42. https://doi.org/10.1177/028072709201000102.
Mls, K., Kořínek, M., Štekerová, K., Tučník, P., Bureš, V., Čech, P., Husáková, M., Mikulecký, P., Nacházel, T., Ponce, D., Zanker, M., Babič, F., Triantafyllou, I., 2023. Agent-based models of human response to natural hazards: systematic review of tsunami evacuation. Nat. Hazards 115.
Moreno, J., Lara, A., Torres, M., 2019. Community resilience in response to the 2010 tsunami in Chile: the survival of a small-scale fishing community. Int. J. Disaster Risk Reduct. 33. https://doi.org/10.1016/j.ijdrr.2018.10.024.
Morss, R. E., Demuth, J. L., Lazo, J. K., Dickinson, K., Morrow, B. H., 2016. Understanding Public Hurricane Evacuation Decisions and Responses to Forecast and Warning Messages*. doi: 10.1175/WAF-D-15.
Morss, R.E., Lazrus, H., Bostrom, A., Demuth, J.L., 2020. The influence of cultural worldviews on people's responses to hurricane risks and threat information. J. Risk Res. 23 (12). https://doi.org/10.1080/13669877.2020.1750456.
Mostafizi, A., Wang, H., Cox, D., Cramer, L.A., Dong, S., 2017. Agent-based tsunami evacuation modeling of unplanned network disruptions for evidence-driven resource allocation and retrofitting strategies. Nat. Hazards 88 (3). https://doi.org/10.1007/s11069-017-2927-y.
Mostafizi, A., Wang, H., Cox, D., Dong, S., 2019. An agent-based vertical evacuation model for a near-field tsunami: choice behavior, logical shelter locations, and life safety. Int. J. Disaster Risk Reduct. 34, 467–479. https://doi.org/10.1016/j.ijdrr.2018.12.018.
Mottershead, K.D., McGee, T.K., Christianson, A., 2020. Evacuating a first nation due to wildfire smoke: the case of dene tha' first nation. Int. J. Disaster Risk Sci. 11 (3). https://doi.org/10.1007/s13753-020-00281-y.
Mozumder, P., Raheem, N., Talberth, J., Berrens, R.P., 2008. Investigating intended evacuation from wildfires in the wildland-urban interface: application of a bivariate probit model. Forest Policy Econ. 10 (6). https://doi.org/10.1016/j.forpol.2008.02.002.
Muller Vogt, B., 1991. Issues in Nursing Home Evacuations. Int. J. Mass Emerg. Disasters 9 (2), 247–265. https://doi.org/10.1177/028072709100900208.
Mumuni, B., Nashiru, D., Jun, Z., 2022. An overview of general human behavior under a disaster situation. Pacif. Int. J. http://pacificinternationaljournal.com/.
Murray-Tuite, P.M., Mahmassani, H.S., 2003. Model of household trip-chain sequencing in emergency evacuation. Transp. Res. Rec.
Murray-Tuite, P.M., Mahmassani, H.S., 2004. Transportation network evacuation planning with household activity interactions. Transp. Res. Rec.
Murray-Tuite, P., Wolshon, B., 2013. Evacuation transportation modeling: an overview of research, development, and practice. Transp. Res. Part C Emerg. Technol. 27, 25–45. https://doi.org/10.1016/j.trc.2012.11.005.
Murray-Tuite, P., Ge, Y.G., Zobel, C., Nateghi, R., Wang, H., 2021. Critical time, space, and decision-making agent considerations in human-centered interdisciplinary hurricane-related research. Risk Anal. 41 (7). https://doi.org/10.1111/risa.13380.
Nagel, K., Schreckenberg, M., 1992. A cellular automaton model for freeway traffic. J. Phys. I 2 (12). https://doi.org/10.1051/jp1, 1992277.
Netzel, L.M., Heldt, S., Engler, S., Denecke, M., 2021. The importance of public risk perception for the effective management of pluvial floods in urban areas: a case study from Germany. J. Flood Risk Manage. 14 (2). https://doi.org/10.1111/jfr3.12688.
Njome, M.S., Suh, C.E., Chuyong, G., de Wit, M.J., 2010. Volcanic risk perception in rural communities along the slopes of mount Cameroon, West-Central Africa. J. Afr. Earth Sc. 58 (4), 608–622. https://doi.org/10.1016/j.jafrearsci.2010.08.007.
Norris, F.H., Stevens, S.P., Pfefferbaum, B., Wyche, K.F., Pfefferbaum, R.L., 2008. Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. Am. J. Commun. Psychol. 41 (1–2). https://doi.org/10.1007/s10464-007-9156-6.
Nowlin, M.C., Wehde, W., 2021. Social capital and hurricane warning response. Int. J. Disaster Risk Reduct. 65. https://doi.org/10.1016/j.ijdrr.2021.102536.
Parker, D.J., Priest, S.J., Tapsell, S.M., 2009. Understanding and enhancing the public's behavioural response to flood warning information. Meteorol. Appl. 16 (1). https://doi.org/10.1002/met.119.
Paton, D., Smith, L., Daly, M., Johnston, D., 2008. Risk perception and volcanic hazard mitigation: individual and social perspectives. J. Volcanol. Geoth. Res. 172 (3–4). https://doi.org/10.1016/j.jvolgeores.2007.12.026.
Peacock, W.G., Brody, S.D., Highfield, W., 2005. Hurricane risk perceptions among Florida's single family homeowners. Landsc. Urban Plan. 73 (2–3), 120–135. https://doi.org/10.1016/j.landurbplan.2004.11.004.
Pei, S., Dahl, K.A., Yamana, T.K., Licker, R., Shaman, J., 2020. Compound risks of hurricane evacuation amid the COVID-19 pandemic in the United States. GeoHealth 4 (12). https://doi.org/10.1029/2020GH000319.
Pelechano, N., Badler, N.I., 2006. Modeling crowd and trained leader behavior during building evacuation. IEEE Comput. Graph. Appl. 26 (6). https://doi.org/10.1109/MCG.2006.133.
Pel, A.J., Hoogendoorn, S.P., Bliemer, M.C.J., 2010. Evacuation modeling including traveler information and compliance behavior. Proc. Eng.
Pel, A.J., Bliemer, M.C.J., Hoogendoorn, S.P., 2012. A review on travel behaviour modelling in dynamic traffic simulation models for evacuations. Transportation 39, 97–123.
Pérez-Gañán, R., Dema Moreno, S., González Arias, R., Cocina Díaz, V., 2023. How do women face the emergency following a disaster? a PRISMA 2020 systematic review. Nat. Hazards 116 (1). https://doi.org/10.1007/s11069-022-05663-7.
Perry, R.W., Lindell, M.K., 2008. Volcanic risk perception and adjustment in a multi-hazard environment. J. Volcanol. Geoth. Res. 172 (3–4). https://doi.org/10.1016/j.jvolgeores.2007.12.006.
Perry, R.W., Lindell, M.K., Greene, M.R., 1981. *Evacuation Planning in Emergency Management*. Lexington, Mass.
Perry, R.W., Lindell, M.K., Greene, M.R., 1982. Threat perception and public response to volcano hazard. J. Soc. Psychol. 116 (2). https://doi.org/10.1080/00224545.1982.9922771.
Perry, R.W., Lindell, M.K., Tierney, K.J., 2001. Facing the Unexpected: Disaster Preparedness and Response in the United States. Joseph Henry Press.
Priest, G.R., Stimely, L.L., Wood, N.J., Madin, I.P., Watzig, R.J., 2016. Beat-the-wave evacuation mapping for tsunami hazards in Seaside, Oregon, USA. Nat. Hazards 80 (2), 1031–1056. https://doi.org/10.1007/s11069-015-2011-4.
Purbani, D., Marzuki, M. I., Ontowirjo, B., Zein, F. M., Tjahjo, D. W. H., Purnamaningtyas, S. E., Akhwady, R., Syam, A. R., Rahman, A., Sugianti, Y., Dody, S., Nastiti, A. S., Warsa, A., Astuti, L. P., Yosmaniar, Kadarini, T., Prihadi, T. H., Wisha, U. J., 202). Tsunami evacuation model in the panimbang subdistrict, Banten Province, Indonesia: GIS and agent-based modeling approaches. Geogr. Tech. 18(2). doi: 10.21163/GT_2023.182.10.
Qin, H., Brenkert-Smith, H., Sanders, C., Vickery, J., Bass, M., 2021. Explaining changes in perceived wildfire risk related to the mountain pine beetle outbreak in north central Colorado. Ecol. Ind. 130. https://doi.org/10.1016/j.ecolind.2021.108080.
Quagliarini, E., Bernardini, G., Wazinski, C., Spalazzi, L., D'Orazio, M., Quagliarini, E., Bernardini, G., Wazinski, C., Spalazzi, L., D'Orazio, M., 2016. Urban scenarios modifications due to the earthquake: ruins formation criteria and interactions with pedestrians' evacuation. Bull. Earthq. Eng. 14(4). doi: 10.1007/s10518-016-9872-0.
Quagliarini, E., Romano, G., Bernardini, G., 2023. Investigating pedestrian behavioral patterns under different floodwater conditions: a video analysis on real flood evacuations. Saf. Sci. 161. https://doi.org/10.1016/j.ssci.2023.106083.
Quarantelli, E.L., 1980. Evacuation Behavior and Problems: Findings and Implications from the Research Literature.
Quintal, V.A., Lee, J.A., Soutar, G.N., 2010. Tourists' information search: the differential impact of risk and uncertainty avoidance. Int. J. Tour. Res. 12 (4). https://doi.org/10.1002/jtr.753.
Rahman, R., Hasan, S., 2023. A deep learning approach for network-wide dynamic traffic prediction during hurricane evacuation. Transp. Res. Part C Emerging Technol. 152. https://doi.org/10.1016/j.trc.2023.104126.
Rambha, T., Nozick, L.K., Davidson, R., 2021. Modeling hurricane evacuation behavior using a dynamic discrete choice framework. Transp. Res. B Methodol. 150. https://doi.org/10.1016/j.trb.2021.06.003.
Rappaport, E.N., 2014. Fatalities in the united states from atlantic tropical cyclones: new data and interpretation. Bull. Am. Meteorol. Soc. 95 (3). https://doi.org/10.1175/BAMS-D-12-00074.1.
Riad, J.K., Norris, F.H., Ruback, R.B., 1999. Predicting evacuation in two major disasters: risk perception, social influence, and access to resources. J. Appl. Soc. Psychol. 29 (5), 918–934. https://doi.org/10.1111/j.1559-1816.1999.tb00132.x.
Robinson, R., Khattak, A., 2012. Evacuee route choice decisions in a dynamic hurricane evacuation context. Transport. Res. Rec. (2312). https://doi.org/10.3141/2312-15.
Rogers, R.W., 1975. A protection motivation theory of fear appeals and attitude change1. J. Psychol. 91 (1), 93–114. https://doi.org/10.1080/00223980.1975.9915803.
Roy, K.C., Hasan, S., 2021. Modeling the dynamics of hurricane evacuation decisions from twitter data: an input output hidden markov modeling approach. Transp. Res. Part C Emerg. Technol. 123. https://doi.org/10.1016/j.trc.2021.102976.
Roy, K.C., Hasan, S., Culotta, A., Eluru, N., 2021. Predicting traffic demand during hurricane evacuation using Real-time data from transportation systems and social media. Transp. Res. Part C Emerg. Technol. 131. https://doi.org/10.1016/j.trc.2021.103339.
Sadri, A.M., Ukkusuri, S.V., Murray-Tuite, P., Gladwin, H., 2014. Analysis of hurricane evacuee mode choice behavior. Transp. Res. Part C Emerging Technol. 48, 37–46. https://doi.org/10.1016/j.trc.2014.08.008.
Sadri, A. M., Ukkusuri, S. V., Gladwin, H., 2017. The Role of Social Networks and Information Sources on Hurricane Evacuation Decision Making. doi: 10.1061/(ASCE)NH.1527.
Santos, R., Costa, A.A., Grilo, A., 2017. Bibliometric Analysis and Review of Building Information Modelling Literature Published between 2005 and 2015 Vol. 80, 118–136.
Sarwar, M.T., Anastasopoulos, P.C., Ukkusuri, S.V., Murray-Tuite, P., Mannering, F.L., 2018. A statistical analysis of the dynamics of household hurricane-evacuation decisions. Transportation 45 (1). https://doi.org/10.1007/s11116-016-9722-6.

Scharbach, J., Waldram, J.B., 2016. Asking for a disaster: being “at risk” in the emergency evacuation of a northern canadian aboriginal community. Hum. Organ. 75 (1). https://doi.org/10.17730/0018-7259-75.1.59.

Senanayake, G. P. D. P., Kieu, M., Zou, Y., Dirks, K., 2024. Agent-based simulation for pedestrian evacuation: A systematic literature review. In: International Journal of Disaster Risk Reduction (Vol. 111): Elsevier Ltd.

Sene, K., 2008. Flood warning, forecasting and emergency response. Select. Appl. https://doi.org/10.1007/978-3-540-77853-0_8.

Shao, W., Xian, S., Keim, B.D., Goidel, K., Lin, N., 2017. Understanding perceptions of changing hurricane strength along the US Gulf coast. Int. J. Climatol. 37 (4). https://doi.org/10.1002/joc.4805.

Shen, S., Cheng, C., Yang, J., Yang, S., 2018. Visualized analysis of developing trends and hot topics in natural disaster research. PLoS One 13 (1). https://doi.org/10.1371/journal.pone.0191250.

Shultz, J.M., Russell, J., Espinel, Z., 2005. Epidemiology of tropical cyclones: the dynamics of disaster, disease, and development. In. Epidemiol. Rev. 27.

Siam, M.R.K., Wang, H., Lindell, M.K., Chen, C., Vlahogianni, E.I., Axhausen, K., 2022. An interdisciplinary agent-based multimodal wildfire evacuation model: critical decisions and life safety. Transport. Res. Part d: Transport Environ. 103. https://doi.org/10.1016/j.trd.2021.103147.

Siebeneck, L.K., Cova, T.J., 2008. An assessment of the return-entry process for hurricane Rita 2005. Int. J. Mass Emerg. Disast. 26 (2). https://doi.org/10.1177/028072700802600202.

Siebeneck, L.K., Cova, T.J., 2012. Spatial and temporal variation in evacuee risk perception throughout the evacuation and return-entry process. Risk Anal. 32 (9). https://doi.org/10.1111/j.1539-6924.2011.01781.x.

Siegrist, M., Cvetkovich, G., 2000. Perception of hazards: the role of social trust and knowledge. Risk Anal. 20 (5). https://doi.org/10.1111/0272-4332.205064.

Siegrist, M., Gutscher, H., 2006. Flooding risks: a comparison of lay people’s perceptions and expert’s assessments in Switzerland. Risk Anal. 26 (4). https://doi.org/10.1111/j.1539-6924.2006.00792.x.

Singh, D., Strahan, K., McLennan, J., Robertson, J., Wickramasinghe, B., 2021. What will they do? Model. Self-Evacuat. Archetyp. http://arxiv.org/abs/2105.12366.

Smith, S.K., McCarty, C., 2009. Fleeing the storm(s): an examination of evacuation behavior during florida’s 2004 hurricane season. Demography 46 (1). https://doi.org/10.1353/dem.0.0048.

Sohn, W., Kotval-Karamchandani, Z., 2023. Risk perception of compound emergencies: a household survey on flood evacuation and sheltering behavior during the COVID-19 pandemic. Sustain. Cities Soc. 94. https://doi.org/10.1016/j.scs.2023.104553.

Song, X., Zhang, Q., Sekimoto, Y., Shibasaki, R., 2014. Prediction of human emergency behavior and their mobility following large-scale disaster. In: *Proceedings of the ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, pp. 5–14. https://doi.org/10.1145/2623330.2623628.

Soon, J.J., Kamaruddin, R., Anuar, A.R., 2018. Flood victims’ evacuation decisions: a semi-nonparametric estimation. Int. J. Emerg. Serv. 7 (2). https://doi.org/10.1108/IJES-05-2017-0031.

Sorensen, J.H., 2000. Hazard warning systems. Rev. 20 Years Prog. 1 (2), 119–125.

Strahan, K., Gilbert, J., 2021a. Protective decision-making in bushfire part 1: a rapid systematic review of the ‘wait and see’ literature. Fire 4 (1). https://doi.org/10.3390/fire4010004.

Strahan, K., Gilbert, J., 2021b. Protective decision-making in bushfire part 2: a rapid systematic review of the ‘leave early’ literature. Fire 4.

Strahan, K., Gilbert, J., 2021c. The wait and see literature: a rapid systematic review. Fire 4 (1), 1–26. https://doi.org/10.3390/fire4010004.

Strahan, K., Whittaker, J., Handmer, J., 2018. Self-evacuation archetypes in Australian bushfire. Int. J. Disaster Risk Reduct. 27 (October 2017), 307–316. https://doi.org/10.1016/j.ijdrr.2017.10.016.

Sutton, J., Vos, S.C., Wood, M.M., Turner, M., 2018. Designing effective tsunami messages: examining the role of short messages and fear in warning response. Weather Clim. Soc. 10 (1). https://doi.org/10.1175/WCAS-D-17-0032.1.

Suwanno, P., Yaibok, C., Tsumita, N., Fukuda, A., Theerathitichaipa, K., Seefong, M., Jomnonkwao, S., Kasemsri, R., 2023. Estimation of the evacuation time according to different flood depths. Sustainability 15 (7). https://doi.org/10.3390/su15076305.

Tahesh, G., Abdulsattar, H., Abou Zeid, M., Chen, C., 2023. Risk perception and travel behavior under short-lead evacuation: Post disaster analysis of 2020 Beirut Port Explosion. Int. J. Disaster Risk Reduct. 89. https://doi.org/10.1016/j.ijdrr.2023.103603.

Taillandier, F., Di Maiolo, P., Taillandier, P., Jacquenod, C., Rauscher-Lauranceau, L., Mehdizadeh, R., 2021. An agent-based model to simulate inhabitants’ behavior during a flood event. Int. J. Disaster Risk Reduct. 64. https://doi.org/10.1016/j.ijdrr.2021.102503.

Takabatake, T., Shibayama, T., Esteban, M., Ishii, H., Hamano, G., 2017. Simulated tsunami evacuation behavior of local residents and visitors in Kamakura, Japan. Int. J. Disaster Risk Reduct. 23 (April), 1–14. https://doi.org/10.1016/j.ijdrr.2017.04.003.

Takabatake, T., Fujisawa, K., Esteban, M., Shibayama, T., 2020a. Simulated effectiveness of a car evacuation from a tsunami. Int. J. Disaster Risk Reduct. 47 (February). https://doi.org/10.1016/j.ijdrr.2020.101532.

Takabatake, T., Nistor, I., St-Germain, P., 2020b. Tsunami evacuation simulation for the District of Tofino, Vancouver Island. Canada. Int. J. Disaster Risk Reduct. 48 (September 2019), 101573. https://doi.org/10.1016/j.ijdrr.2020.101573.

Tanim, S.H., Wiernik, B.M., Reader, S., Hu, Y., 2022. Predictors of hurricane evacuation decisions: a meta-analysis. J. Environ. Psychol. 79. https://doi.org/10.1016/j.jenvp.2021.101742.

Thapa, B., Cahyanto, I., Holland, S.M., Absher, J.D., 2013. Wildfires and tourist behaviors in Florida. Tour. Manag. 36. https://doi.org/10.1016/j.tourman.2012.10.011.

Thompson, R.R., Garfin, D.R., Silver, R.C., 2017. Evacuation from natural disasters: a systematic review of the literature. Risk Anal. 37 (4), 812–839. https://doi.org/10.1111/risa.12654.

Tobin, G.A., Whiteford, L.M., Jones, E.C., Murphy, A.D., Garren, S.J., Padros, C.V., 2011. The role of individual well-being in risk perception and evacuation for chronic vs. acute natural hazards in Mexico. Appl. Geogr. 31 (2), 700–711. https://doi.org/10.1016/j.apgeog.2010.12.008.

Toledo, T., Marom, I., Grimberg, E., Bekhor, S., 2018. Analysis of evacuation behavior in a wildfire event. Int. J. Disaster Risk Reduct. 31 (2017), 1366–1373. https://doi.org/10.1016/j.ijdrr.2018.03.033.

Travers, C., Degeling, C., Rock, M., 2017. Companion animals in natural disasters: a scoping review of scholarly sources. J. Appl. Anim. Welf. Sci. 20.

Treiber, M., Hennecke, A., Helbing, D., 2000. Congested traffic states in empirical observations and microscopic simulations. Phys. Rev. E – Stat. Phys. Plasmas Fluids Relat. Interdiscipl. Top. 62 (2). https://doi.org/10.1103/PhysRevE.62.1805.

Trogrlić, R. Š., Van Den Homberg, M., Budimir, M., McQuistan, C., Sneddon, A., Golding, B., Šakić Trogrlić, R., Van Den Homberg, M., Budimir, M., McQuistan, C., Sneddon, A., 2022. Early warning systems and their role in disaster risk reduction. *Towards the “Perfect” Weather Warning*, 11–46. doi: 10.1007/978-3-030-98989-7_2.

Tweedie, S.W., Rowland, J.R., Walsh, S.J., Rhoten, R.P., Hagle, P.I., 1986. A methodology for estimating emergency evacuation times. Soc. Sci. J. 23 (2). https://doi.org/10.1016/0362-3319(86)90035-2.

UNHCR, 2019. *Key Concepts on Climate Change and Disaster Displacement*.

Urbanik, T., 2000. *Evacuation time estimates for nuclear power plants* (Journal of Hazardous Materials, Issue. www.elsevier.nlrlocaterjhazmat.

Usman, F., Murakami, K., Dwi Wicaksono, A., Setiawan, E., 2017. *Application of Agent-Based Model Simulation for Tsunami Evacuation in Pacitan, Indonesia*.

Vaiciulyte, S., Hulse, L.M., Veeraswamy, A., Galea, E.R., 2021. Cross-cultural comparison of behavioural itinerary actions and times in wildfire evacuations. Saf. Sci. 135. https://doi.org/10.1016/j.ssci.2020.105122.

Veeraswamy, A., Galea, E. R., Filippidis, L., Lawrence, P. J., Haasanen, S., Gazzard, R. J., Smith, T. E. L., 2018. The simulation of urban-scale evacuation scenarios with application to the Swinley forest fire. *Safety Sci. 102*(February 2017), 178–193. doi: 10.1016/j.ssci.2017.07.015.

Vicario, S.A., Mazzoleni, M., Bhamidipati, S., Gharesifard, M., Ridolfi, E., Pandolfo, C., Alfonso, L., 2020. Unravelling the influence of human behaviour on reducing casualties during flood evacuation. Hydrol. Sci. J. 65 (14). https://doi.org/10.1080/02626667.2020.1810254.

Vieweg, S., Hughes, A.L., Starbird, K., Palen, L., 2010. Microblogging during two natural hazards events: what twitter may contribute to situational awareness. Conference on Human Factors in Computing Systems - Proceedings.

Villegas, J., Matyas, C., Srinivasan, S., Cahyanto, I., Thapa, B., Pennington-Gray, L., 2013. Cognitive and affective responses of Florida tourists after exposure to hurricane warning messages. Nat. Hazards 66 (1). https://doi.org/10.1007/s11069-012-0119-3.

Wahlqvist, J., Ronchi, E., Gwynne, S.M.V., Science, M.K.S., Undefined, 2021. The Simulation of wildland-Urban Interface Fire Evacuation: The WUI-NITY Platform. Elsevier. https://www.sciencedirect.com/science/article/pii/S0925753520305415.

Wang, Z., Jia, G., 2021a. A novel agent-based model for tsunami evacuation simulation and risk assessment. Nat. Hazards 105 (2), 2045–2071. https://doi.org/10.1007/s11069-020-04389-8.

Wang, Z., Jia, G., 2021b. Tsunami evacuation risk assessment and probabilistic sensitivity analysis using augmented sample-based approach. Int. J. Disaster Risk Reduct. 63 (January), 102462. https://doi.org/10.1016/j.ijdrr.2021.102462.

Wang, Z., Jia, G., 2022. Simulation-based and risk-informed assessment of the effectiveness of tsunami evacuation routes using agent-based modeling: a case study of seaside, oregon. Int. J. Disaster Risk Sci. 13 (1). https://doi.org/10.1007/s13753-021-00387-x.

Wang, H., Mostafizi, A., Cramer, L.A., Cox, D., Park, H., 2016. An agent-based model of a multimodal near-field tsunami evacuation: Decision-making and life safety. Transp. Res. Part C Emerg. Technol. 64, 86–100. https://doi.org/10.1016/j.trc.2015.11.010.

Wang, H., Lindell, M.K., Siam, M.R.K., Chen, C., Husein, R., 2022. Local residents’ immediate responses to the 2018 Indonesia earthquake and tsunami. Earthq. Spectra 38 (4). https://doi.org/10.1177/87552930221105104.

Watts, J., Morss, R.E., Barton, C.M., Demuth, J.L., 2019. Conceptualizing and implementing an agent-based model of information flow and decision making during hurricane threats. Environ. Model. Softw. 122. https://doi.org/10.1016/j.envsoft.2019.104524.

Wei, H.L., Lindell, M.K., 2017. Washington households’ expected responses to lahar threat from Mt. Rainier. Int. J. Disaster Risk Reduct. 22 (February), 77–94. https://doi.org/10.1016/j.ijdrr.2016.10.014.

Wei, H.L., Lindell, M.K., Prater, C.S., 2014. “Certain death” from storm surge: a comparative study of household responses to warnings about hurricanes Rita and Ike. Weather Clim. Soc. 6 (4), 425–433. https://doi.org/10.1175/WCAS-D-13-00074.1.

Weinstein, N.D., Nicolich, M., 1993. Correct and incorrect interpretations of correlations between risk perceptions and risk behaviors. Health Psychol. 12 (3). https://doi.org/10.1037/0278-6133.12.3.235.

Whitehead, J.C., 2005. Environmental risk and averting behavior: Predictive validity of jointly estimated revealed and stated behavior data. Environ. Resour. Econ. 32 (3), 301–316. https://doi.org/10.1007/s10640-005-4679-5.

Whitehead, J.C., Edwards, B., Van Willigen, M., Maiolo, J.R., Wilson, K., Smith, K.T., 2000. Heading for higher ground: factors affecting real and hypothetical hurricane evacuation behavior. Environ. Hazards 2 (4), 133–142. https://doi.org/10.3763/ehaz.2000.0219.

Whytlaw, J.L., Hutton, N., Yusuf, J.E., Richardson, T., Hill, S., Olanrewaju-Lasisi, T., Antwi-Nimarko, P., Landaeta, E., Diaz, R., 2021. Changing vulnerability for hurricane evacuation during a pandemic: issues and anticipated responses in the early days of the COVID-19 pandemic. Int. J. Disaster Risk Reduct. 61 (February), 102386. https://doi.org/10.1016/j.ijdrr.2021.102386.

Wilmot, C., Bian, R., Gudishala, R., 2019. *Development of a Mode Choice Model To Estimate Evacuation Transit Demand.*

Wolshon, B., 2001. *''One-Way-Out'': Contraflow Freeway Operation for Hurricane Evacuation.*

Wolshon, B., Urbina Hamilton, E., Levitan, M., Wilmot, C., 2005. Review of policies and Practices for Hurricane Evacuation. II: Traffic operations, management, and control. Nat. Hazard. Rev. 6 (3). https://doi.org/10.1061/(asce)1527-6988(2005)6:3(143).

Wong, S.D., Pel, A.J., Shaheen, S.A., Chorus, C.G., 2020. Fleeing from hurricane Irma: empirical analysis of evacuation behavior using discrete choice theory. Transp. Res. Part D: Transp. Environ. 79 (January). https://doi.org/10.1016/j.trd.2020.102227.

Wong, S.D., Broader, J.C., Walker, J.L., Shaheen, S.A., 2023. Understanding California wildfire evacuee behavior and joint choice making. Transportation 50 (4), 1165–1211. https://doi.org/10.1007/s11116-022-10275-y.

Wong-Parodi, G., Garfin, D.R., 2022. Hurricane adaptation behaviors in Texas and Florida: exploring the roles of negative personal experience and subjective attribution to climate change. Environ. Res. Lett. 17 (3). https://doi.org/10.1088/1748-9326/ac4858.

Wong-Parodi, G., Relihan, D.P., Garfin, D.R., 2024. A longitudinal investigation of risk perceptions and adaptation behavior in the US Gulf Coast. PNAS Nexus 3 (4). https://doi.org/10.1093/pnasnexus/pgae099.

Wood, N.J., Schmidtlein, M.C., 2013. Community variations in population exposure to near-field tsunami hazards as a function of pedestrian travel time to safety. Nat. Hazards 65 (3). https://doi.org/10.1007/s11069-012-0434-8.

Wu, H.C., Lindell, M.K., Prater, C.S., Samuelson, C.D., 2014. Effects of track and threat information on judgments of hurricane strike probability. Risk Anal. 34 (6). https://doi.org/10.1111/risa.12128.

Wu, H., Heyland, L.K., Yung, M., Schneider, M., 2023. Human–animal interactions in disaster settings: a systematic review. Int. J. Disaster Risk Sci. 14 (3). https://doi.org/10.1007/s13753-023-00496-9.

Xu, K., Davidson, R.A., Nozick, L.K., Wachtendorf, T., DeYoung, S.E., 2016. Hurricane evacuation demand models with a focus on use for prediction in future events. Transp. Res. A Policy Pract. 87. https://doi.org/10.1016/j.tra.2016.02.012.

Yang, X., Wu, Z., Li, Y., 2011. Difference between real-life escape panic and mimic exercises in simulated situation with implications to the statistical physics models of emergency evacuation: the 2008 Wenchuan earthquake. Physica A 390 (12). https://doi.org/10.1016/j.physa.2010.10.019.

Yang, K., Davidson, R.A., Vergara, H., Kolar, R.L., Dresback, K.M., Colle, B.A., Blanton, B., Wachtendorf, T., Trivedi, J., Nozick, L.K., 2019. Incorporating inland flooding into hurricane evacuation decision support modeling. Nat. Hazards 96 (2). https://doi.org/10.1007/s11069-019-03573-9.

Yi, W., Nozick, L., Davidson, R., Blanton, B., Colle, B., 2017. Optimization of the issuance of evacuation orders under evolving hurricane conditions. Transp. Res. B Methodol. 95. https://doi.org/10.1016/j.trb.2016.10.008.

Yohe, G., Tol, R.S.J., 2002. Indicators for social and economic coping capacity - moving toward a working definition of adaptive capacity. Glob. Environ. Chang. 12 (1). https://doi.org/10.1016/S0959-3780(01)00026-7.

Yusuf, J.E., Whytlaw, J.L., Hutton, N., Olanrewaju-Lasisi, T., Giles, B., Lawsure, K., Behr, J., Diaz, R., McLeod, G., 2023. Evacuation behavior of households facing compound hurricane-pandemic threats. Public Adm. Rev. 83 (5). https://doi.org/10.1111/puar.13634.

Zehra, S.N., Wong, S.D., 2024. Systematic review and research gaps on wildfire evacuations: infrastructure, transportation modes, networks, and planning. Transp. Plan. Technol. https://doi.org/10.1080/03081060.2024.2348713.

Zhan, F.B., Chen, X., 2008. Agent-based modeling and evacuation planning. In: GeoJournal Library. https://doi.org/10.1007/978-1-4020-8507-9_9.

Zhang, F., Morss, R.E., Sippel, J.A., Beckman, T.K., Clements, N.C., Hampshire, N.L., Harvey, J.N., Hernandez, J.M., Morgan, Z.C., Mosier, R.M., Wang, S., Winkley, S.D., 2007. An in-person survey investigating public perceptions of and responses to Hurricane Rita forecasts along the Texas Coast. Weather Forecast. 22 (6), 1177–1190. https://doi.org/10.1175/2007WAF2006118.1.

Zhang, R., Liu, D., Du, E., Xiong, L., Chen, J., Chen, H., 2024. An agent-based model to simulate human responses to flash flood warnings for improving evacuation performance. J. Hydrol. 628. https://doi.org/10.1016/j.jhydrol.2023.130452.

Zheng, X., Zhong, T., Liu, M., 2009. Modeling crowd evacuation of a building based on seven methodological approaches. Build. Environ. 44 (3), 437–445. https://doi.org/10.1016/j.buildenv.2008.04.002.