



RESEARCH ARTICLE

# What Factors Influence the Communication of Health Rumours in Crisis Situations: A Systematic Literature Review from 5W Perspective

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ARTICLE INFO	ABSTRACT
Received: Jul 30, 2024 Accepted: Sep 9, 2024	The communication of health-related rumours during crises can result in social chaos, public panic, and poor health decisions. This study reviews literature on health rumours in crisis situations published between January 2009 and July 2023, a period marked by the rise of mobile social networks. Following PRISMA guidelines, we thoroughly searched the Web of Science (WoS) and China National Knowledge Infrastructure (CNKI) databases, identifying 1,015 papers, of which 42 met the inclusion criteria. By applying Lasswell's 5W framework (who, says what, in which channel, to whom, with what effect) in contextualising Grunig's three domains of communication behaviour (acquisition, selection, transmission), the results show that the communicator's psychological factors are the key drivers of information seeking, rumour acceptance, and transmission in crisis situations. Fear-based rumours are more likely to capture public attention and spread, while the framing of these rumours influences individuals' acceptance and behavioural responses. Media framing also plays a crucial role in shaping public perception, underscoring the complexity of rumour selection and transmission. The study highlights that the majority of research focuses on rumour transmission, with a significant gap in literature concerning information acquisition. Finally, this paper concludes with an emphasis on highlighting gaps in the existing research and suggesting directions for future studies.
<b>Keywords</b>	
Health rumour	
Crisis situations	
Communication behavior	
Mobile social media	
5W model	
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## INTRODUCTION

During a significant span of 15 years, the global health landscape has been profoundly influenced by momentous events such as Ebola, H1N1, MERS-CoV, and COVID-19, all of which pose significant health challenges during these crises. Notably, during the same period, the emergence and proliferation of mobile social media has become an indispensable key player in emergency response and health communication (Kim and Hawkins 2020, Li et al. 2021). Fuelled by this evolution, the communication of health rumours on social media has garnered particular attention (Guo et al. 2023).

Health rumours during crisis situations refer to unverified information pertaining to medical practices and healthcare (Voigt 2007), often surface during events and circumstances that present significant risks to public health, such as causing substantial casualties, expediting disease spread,

and aggravating resource scarcities (Toole and Waldman 1997; Wahab et al., 2024), which has garnered significant global scholarly attention, resulting in a substantial body of published literature.

According to Lasswell, a common framework for describing communication involves answering key questions: Who is communicating? What is being communicated? Through Which Channel? To Whom? And With What Effect? Scientific inquiry into communication processes often focuses on one or more of these questions, leading to the development of five distinct research fields: Control Analysis, Content Analysis, Media Analysis, Audience Analysis, and Effects (Lasswell, 1948). The communication of health rumours aligns closely with these fundamental components. Communication behaviour can be categorized into three domains (3Bs): information acquisition, selection, and transmission, each involving active and passive variables. These include information seeking and attending (acquisition), forefending and permitting (selection), and forwarding and sharing (transmission) (Kim and Grunig 2011; Shannaq et al., 2024).

Thus, by integrating the 5W framework with the three domains of communication action theories, this study aims to identify the factors influencing health rumour communication during crises and provide a comprehensive view to understand the dynamics involved. Additionally, it seeks to highlight gaps in the current research and suggest future research directions.

## **METHODS**

The research steps are carried out according to the statement on guidelines in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement of 2020, which is an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses (Page et al. 2021).

### **Research Questions**

The research questions are formulated in accordance with the PICO framework, which encompasses population or problem, interest, and context (Abas et al. 2022). Focused on the concepts of health-related rumours (population / problem), communication behaviour (interest) and crisis situations (Context), the research questions are outlined as follows.

- (1) What is the panorama of empirical research on health-related rumour communication behaviour in crisis situations over the past 15 years?
- (2) Over the past 15 years, what factors influence the communication of health rumours during crises?

### **Systematic Searching Strategies and Selection Criteria**

Following the PRISMA guidelines, systematic searching strategies can be divided into three steps: identification, screening, and eligibility. The flowchart is presented in Figure 1. As detailed in Table 1, the article has designed inclusion and exclusion criteria, which are systematically applied in the three stages. Numbers 1 through 6 are commonly used screening standards in SLR to ensure the precision and authority of the research sample (Indriasari et al. 2020; ). Number 7 aims to define the research scope. Number 8 is implemented to maintain the quality of the literature by excluding content from ordinary journals. Number 9 focusses on the index system, influencing factors, and measurement methods related to health rumours. Number 10 aims to restrict respondents to adults, excluding those under 18 years of age.

### **Identification**

Two independent researchers conducted a thorough search of articles covering the period from January 2009 to July 2023 in two prominent databases, representing both Chinese and international scholarly literature: China National Knowledge Infrastructure (CNKI) and Web of Science (WoS). The

search, executed on July 19, 2023, aimed to pinpoint articles addressing health-related rumours and related topics.

CNKI, recognized as the largest digital full-text periodical database and academic resource platform in China, has published a substantial number of articles on the health rumours related to COVID-19, the most widespread epidemic in the past 15 years. While WoS is serves as an international academic platform due to its extensive coverage of scholarly literature from around the world, characterised as a comprehensive research database and academic citation index providing access to a broad spectrum of scholarly literature and research resources.

The search term encompassed a variety of health-related terms, rumours, and specific topics, including Ebola, H1N1, MERS-CoV, COVID-19, etc. The search was further refined by article types, language, and research field. The outcome of the WoS yielded 597 papers, 418 articles from CNKI. In total, 1015 articles were retrieved from the two databases. The combinations of search terms using Boolean operators are detailed in Table 2.

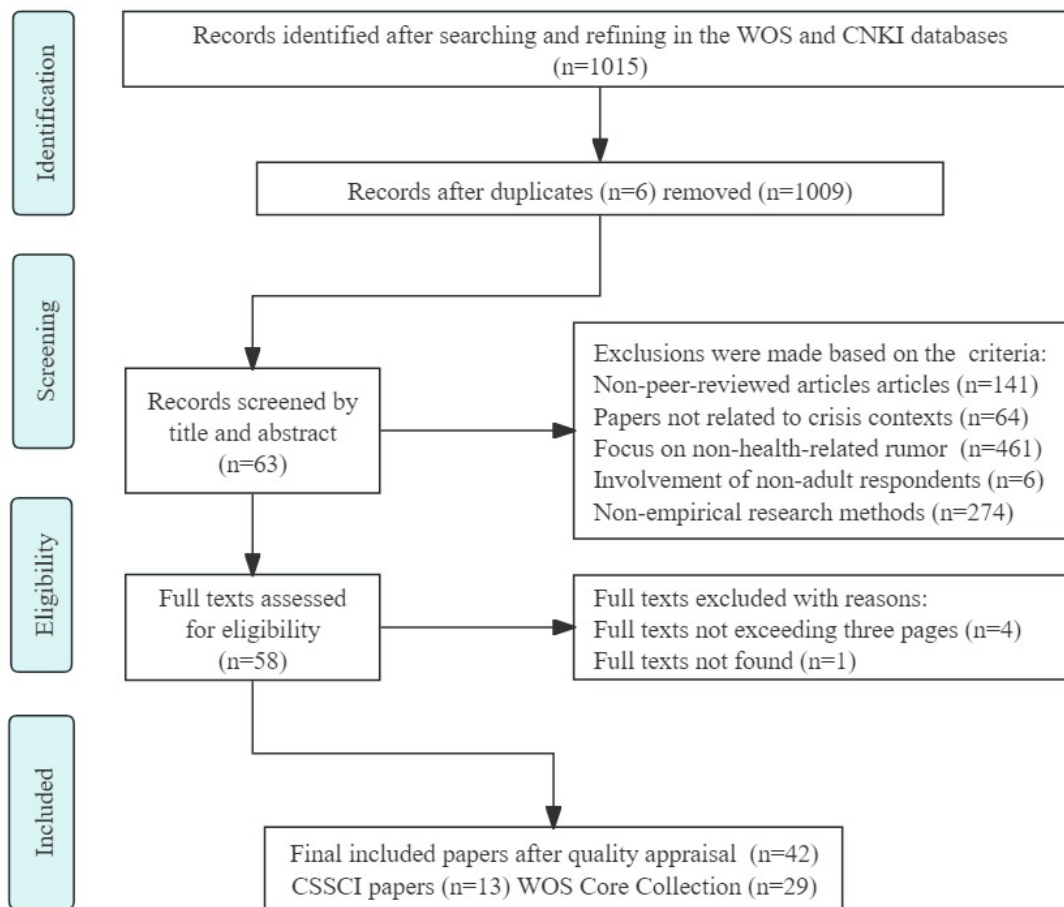


Figure 1: PRISMA flowchart

Table 1: The inclusion and exclusion criteria

Number	Indicators	Inclusion	Exclusion
1	Research methodology	Empirical research	Others
2	Full-text availability	Full text available	Full text is not available

3	Paper types	Peer-reviewed articles	Reports, Reviews, etc.
4	Number of pages	Above three pages	Under three pages
5	Language	English (WoS)/Chinese (CNKI)	Others
6	Title occurrence times	Only one copy of each title was included	Duplicated titles
7	Research domain	Humanity and social science	Others
8	Source types	WOS Core Collection/ CSSCI	General periodical
9	Focused theme	Health-related rumours during crisis situations	Non-health-related rumours
10	Respondents	Adults	Under 18 years old

**Table 2: The searching strings**

Database	Search Strings
WoS	(TI = (health-related rumours OR health-rumours OR misinformation OR disinformation) AND TI = (Ebola OR H1N1 OR MERS-CoV OR Dengue fever OR climate change OR nuclear pollution OR COVID-19 OR pandemic OR public health emergency) OR TI= (infodemic) Refined by: Document type: Article AND Language: English AND Source type: Core collection.
CNNIC	(TI = (health-related rumours OR health rumours OR misinformation OR disinformation) AND TI = (Ebola OR H1N1 OR H7N9 OR MERS-CoV OR Dengue fever OR climate change OR nuclear pollution OR COVID-19 OR pandemic OR public health emergency) OR TI= (infodemic) Refined by: Document type: Article AND Source type: CSSCI

### Screening and Eligibility

To ensure data quality, we curated our dataset to include only peer-reviewed articles written in English (WoS) and Chinese (CNKI), which, respectively, provide extensive coverage internationally and within China. This intentional selection process resulted in the exclusion of meeting abstracts, reviews, letters, correspondences, research reports, and newsletters, as well as articles in other languages.

Within the WoS dataset, 106 articles were excluded, and 2 duplicate papers were removed. Similarly, for CNKI, 35 papers and 4 duplicate articles underwent elimination. Due to these stringent criteria, we have successfully crafted a refined dataset, currently comprising a total of 855 papers.

The eligibility assessment, which constitutes the third pivotal phase in our selection process, involves a review of both abstracts and full texts. Through a manual review, we apply the inclusion and exclusion criteria for data filtering, ensuring that the selected literature adheres to stringent standards. Following these stages, we identified 64 articles unrelated to crisis contexts, 461 articles focussing on non-health-related rumours, 6 articles involving nonadult respondents, and 274 papers utilising non-empirical research methods. Consequently, 58 articles met the inclusion criteria.

### Quality Assessment and Data Extraction

The paper conducted crucial steps of quality evaluation and data extraction to ensure the credibility and effectiveness of the selected studies. Two independent authors conducted the quality assessment

using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist<sup>1</sup>, scrutinizing the methodological quality and risk of bias in each included study. Any disagreements that arise during this process were resolved through a consensus decision involving the third and fourth authors. Following a rigorous selection process, a total of 42 articles meeting eligibility criteria were retained (For detailed information, please refer to the appendix), consisting of 13 CSCI papers and 29 WOS Core papers; no duplicate articles were shown in either database.

In the data extraction phase, we crafted a detailed data extraction table encompassing key items, including authors, research method, variables affecting health rumour communication, focus object, and key findings. Each included study underwent multiple rounds of data extraction to ensure complete capture of all critical information.

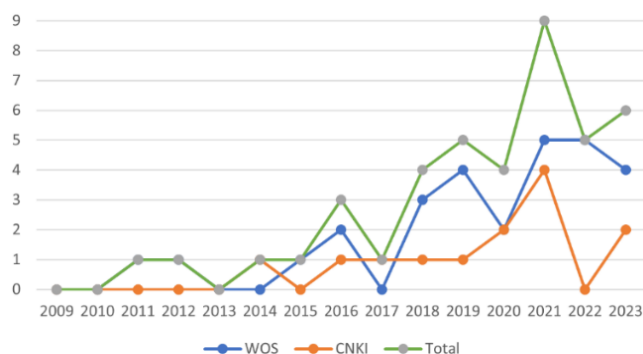
## RESULTS

### The Overview of the Included Articles

Health-related rumour research has continued to rise over the past 15 years and peaked in 2021, as shown in Figure 2. This notable surge is significantly influenced by the global impact of the COVID-19 pandemic. This underscores the global resonance of health-related rumour research, with the pandemic acting as a catalyst for increased research and academic attention across various regions, including China.

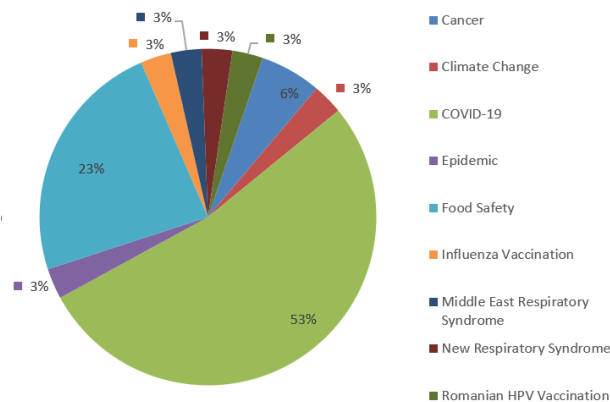
Examination of health-related rumours encompasses a diverse array of issues, such as food poisoning (Nekmat and Kong 2019), genetically modified foods (Lee and Kim 2023) and radiation-contaminated foods from the seas near Fukushima, Japan (Paek and Hove 2019). Additionally, discussions extend to rumours surrounding vaccinations (Pop 2016, Oh and Lee 2019, Xue and Taylor 2023) and respiratory syndrome, which presents a rich tapestry of subjects (Auter et al. 2016, Na et al. 2018).

However, the primary focus of health-related rumours, both in China and on an international scale, revolves around two key topics: food safety and COVID-19, accounting for 23% and 53%, respectively. This emphasis is visually depicted in Figure 3. The extensive exploration of health-related rumours concerning food safety topics spans a significant period, representing a continuous and prominent research hotspot due to the profound connection between food safety and our daily lives. On the contrary, research on health rumours related to the COVID-19 topic has focused primarily on the years 2021-2022, driven by the distinct transmission lifecycle of the virus, leading to evident spatiotemporal clustering characteristics in the dedicated research on this theme.



**Figure 2: Trend of publishing articles**

<sup>1</sup> <https://jbi.global/critical-appraisal-tools>.



**Figure 3: Theme distribution**

Regarding the published journals, as presented in Figure 4 and Figure 5, international studies on health-related rumours are predominantly featured in *Computers in Human Behaviour* (4) and the *Journal of Health Communication* (3). In Chinese literature, these studies are mainly published in the *Journal of Intelligence* (5).

In terms of research methodologies, specific approaches vary across different fields. Specifically, over the past 15 years, within the field of journalism and communication studies, qualitative research has been used predominantly in the investigation of health-related rumours. Methods such as interview observations, text analyses, and structural interviews have been primary. There is an increasing trend in the application of quantitative research in this field, primarily utilizing online surveys. Studies often focus on understanding the impact of communication elements on the spread of health rumours. In the fields of behavioural science and psychology, researchers have extensively employed controlled experiments, including intergroup experiments, along with online surveys. These studies primarily aim to unravel the motivations driving actions related to health rumour. In the realm of library and information science, empirical studies on health rumours predominantly utilise quantitative research methods, emphasising individual emotions and social relationships as mediators or moderators of rumour-spreading behaviours.

Furthermore, examining first-author and country distribution reveals notable contributors to the field. Internationally, Kim stands out as the most prolific author, contributing four relevant articles. In China, Tang and Lai have made significant contributions, with three selected articles. As shown in Figure 6, the first authors primarily originate from the United States, China, South Korea, Singapore, and Malaysia. This distribution underscores the global collaboration and diverse perspectives shaping the discourse on health-related rumours.

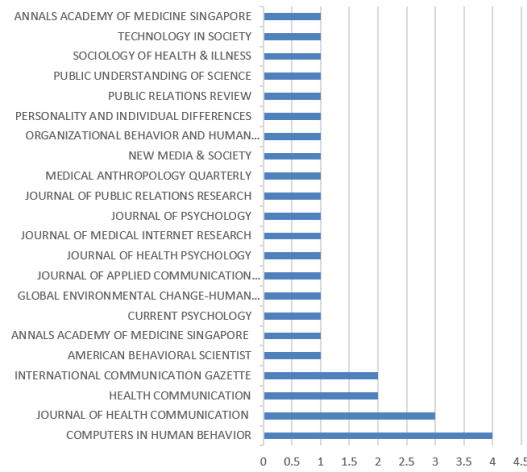


Figure 4: Distribution of international journals

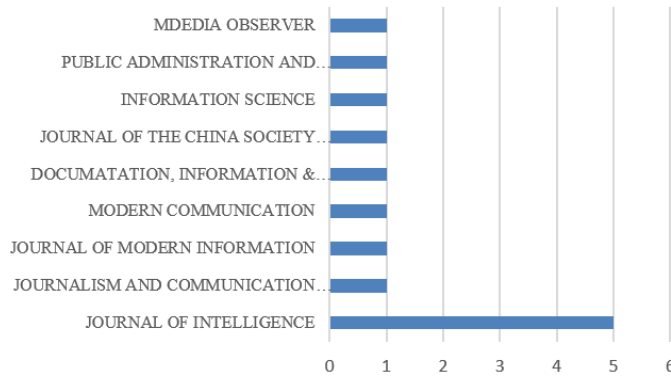


Figure 5: Distribution of Chinese journals

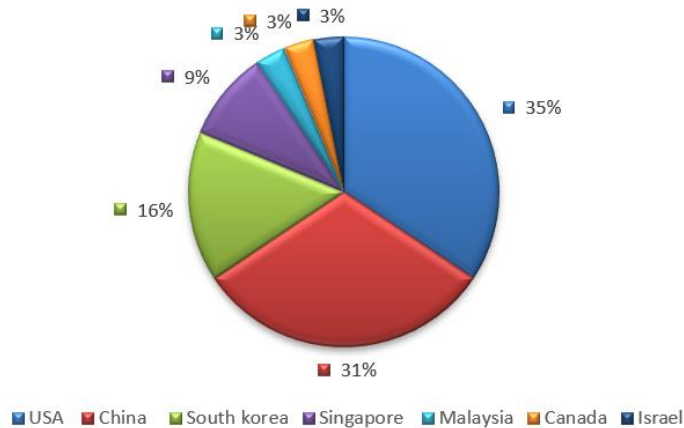


Figure 6: The distribution of the countries to which the first author belongs  
**Factors Influencing the Communication Behaviour of Health-Related Rumours.**

**Control Analysis (examining the “who” aspect)**

Over the past 15 years, a wealth of studies has extensively explored factors influencing rumour spread from the perspectives of psychological, cognitive, abilities, and skills of spreaders.

### **Psychological Factors: Emotion and Personality Traits**

Over the past 15 years, scholars have generally argued that emotions play a positive role in information spread, particularly highlighting that negative emotions such as anxiety are more conducive to rumour communication (Kwon et al. 2022, Ariel et al. 2022). They consistently concluded that anxiety plays a significant amplifying role in both the search for information and the transmission of health-related rumours during crises. For instance, some researchers argued that anxious individuals actively seek information to understand the sources of anxiety and alleviate uncertainties (Tang and Lai 2021). Tang further highlighted the positive influence of anxiety on the inclination to share health rumours online, acting as a mediator in the impact of online health rumours on forwarding intentions (Tang and Lai 2023).

The impact of personality traits is another finding. Individuals with elevated levels of neuroticism and extraversion appear to be particularly susceptible to accepting rumours (Lai et al. 2020). Furthermore, various studies have identified demographic factors, including older age, female gender, and lower educational attainment (Song et al. 2020, Long et al. 2021, He and Han 2021) as contributors to an elevated propensity to believe in rumours.

### **Cognitive Factors: Personal Health Consciousness, Involvement, and Perception**

Health consciousness serves as an intrinsic motivational, leading to increased motivation to engage with health information (Song et al. 2020), and subsequently positively influences the inclination to share health rumours. The involvement with particular emphasis on three key dimensions: personal involvement, social involvement and message involvement. Individuals who feel personally invested in a crisis are more likely to believe and share rumours related to that event (Oh et al. 2013, Chua and Banerjee 2018). Interestingly, people with higher social involvement are more likely to verify information from multiple sources and possess a stronger ability to discern rumours from factual information (Liu and Kong 2017). This ultimately diminishes their desire to trust rumours, negatively impacting the overall trustworthiness of rumours during crises. The communication of health rumours is also significantly influenced by individual information involvement (Tang and Lai 2023). This correlation with information importance highlights how the level of individual involvement directly affects the perception of the significance of the rumours, thus affecting the transmission of rumours (Chua and Banerjee 2018)

In terms of perception, researchers have primarily focused on four key perceptions: perception of risk of crisis situations, perception of rumour content, perception of external deterrence, and perception of social norms.

Risk perception involves individuals' subjective assessments of tangible hazards they encounter (Slovic 2016). Fear and the unknown play pivotal role in shaping how individuals perceive and respond to various risks. For example, fear of COVID-19 results in anxiety and online rumour sharing (Luo et al. 2021, Liang et al. 2022), and uncertainties about vaccines led to incorrect perceptions, contributing to the unsuccessful HPV vaccination campaign in Romania (Pop 2016).

The seriousness and unpredictability of the outcomes outlined in health-related rumours can swiftly provoke the public's perception of risk. For instance, Tang and Lai (2021) noted that the dissemination of information concerning the perils of the coronavirus contributed to an amplified perception of the virus's severity. Feng and Feng (2019) found that the severity of individuals' perceptions of online food rumours diminishes their political trust in food governance institutions, while trust in government playing a negative moderating role in the intricate relationship between rumour perception and the elicitation of negative emotions (Yuan et al. 2023, Lee and Kim 2022). Additionally, anchored in altruistic considerations, a higher perceived risk conveyed by health-related information corresponds to a higher perceived value in disseminating this information to others (Yang 2020). This alignment heightens the individual's inclination to transmit such content.



The perception of deterrence posits that individuals rationally assess whether to commit a crime by maximising benefits and minimizing costs (Ji et al. 2014). Zhang et al. (2016) found that when the public becomes aware of an increased likelihood and severity of punishment for spreading rumours, coupled with a swift and efficient implementation of punishment, individuals reinforce their subjective norm awareness. Consequently, this strengthens their ability to identify rumours, resist spreading them, and reinforces self-awareness regarding the dissemination of misinformation.

Investigations into rumour communication and social norms have concentrated on conformity and normative cues on social networks, as well as concerns and expectations from loved ones. The emulation of the majority's behaviour in rumour dissemination can foster a sense of belonging, support, and recognition within the public (lv et al. 2020, Lee and Kim 2023) presented an innovative interpretation of social norms, proposing that metrics such as Facebook Likes and comments can function as normative cues. When individuals observe that the majority likes information, they perceive it as a signal that the majority is endorsing and sharing the information, leading them to expect to do the same. From a cultural perspective, Zhang et al. (2021) emphasised that altruism displaying spontaneity and universality in Chinese society. During the pandemic, the anxieties to family and friends motivated people to seek relevant information and acquire preventive medications, potentially shaping their attitudes towards rumours and associated behaviours.

### **Personal Abilities and Skills: Health Knowledge and Literacy**

Health knowledge significantly shapes intentions in the communication of health rumours. Xue and Taylor (2023) affirmed that individuals with elevated levels of knowledge are adept at recognizing the dubious nature of rumours and exhibit a reduced intention to disseminate them. While personal literacy manifests in two aspects: E-health literacy and media literacy, which empower people to navigate the complex landscape of health information and media influences.

The central role of E-Health literacy in information seeking, defence against misinformation, and the sharing of rumours has been emphasized. Tang and Lai (2023) delineated its impact on individual health information behaviour, covering retrieval, comprehension, evaluation, and application. Song et al. (2020) pointed out that high E-Health literacy correlates with enhanced information processing, individuals with high E-Health literacy exhibit a diminished willingness to share misinformation. In contrast, those with low health literacy are prone to credulously believing rumours, influenced by emotions, and uncritically disseminating health information (Lee and Kim 2022).

Research on media literacy, primarily focused on critical thinking, Lutzke et al. (2019) demonstrated its significance in evaluating fake news, while Guo et al. (2023) suggested that critical thinking mitigates the positive effect of belief in rumours on their dissemination. Kuang and Wu (2021) emphasised that media literacy emerges as an effective factor in suppressing rumour transmission; higher media literacy correlates with a decreased likelihood of spreading rumours.

### **Content Analysis (addressing the “what” aspect)**

Included literature delves into various aspects of rumour content, including rumour content characteristics and overall rumour characteristics.

### **Rumour Content Characteristics: Rumour type and the Credibility of Rumour Content**

Intentions to trust and share rumours can be influenced by the nature of the rumour (Chua and Banerjee 2018). Over the past 15 years, scholars generally agree that dread rumours evoke greater willingness among the public and spread more readily than others (DiFonzo et al. 2012). For example, Chua and Banerjee (2018) suggested that fear-inducing rumours are more likely to prompt a greater intention to disseminate compared to those instilling hope. Song et al. (2020) observed that participants were more inclined to share rumours related to cancer, as these rumours evoked fear. Yang et al. (2023) and Tang and Lai (2023), from an altruistic standpoint, noted that forwarding

fearful rumours entails lower risks, offers greater benefits to the audience, and stimulates increased motivation for rumour dissemination.

The intricacies of health information make it particularly daunting for individuals lacking the requisite expertise to confidently assess accuracy and reliability. In these situations, the credibility of the information source and the accompanying details assume a pivotal role in shaping perceptions of information credibility. DiFonzo et al. (2012) underscored that respondent in the study tended to believe health rumours based on the confidence derived from personal relationships, such as family or friends. Moving beyond, Deng and Fu (2018) found that certification in the social media platform significantly influences the user's willingness to share.

Furthermore, emotional content intertwined with rumours, especially those evoking negative emotions such as anxiety and fear, makes recipients more susceptible to the information (Chua and Banerjee 2018, Li et al. 2020, DiFonzo et al. 2012, Luo et al. 2021). Na et al. (2018) observed that people are more inclined to believe a rumour when their emotional state aligns with the emotion induced by the rumour. Dong et al. (2020) substantiated these findings, underscoring a correlation between public emotions and the emotional content of rumours disseminating online during the COVID-19 crisis in China.

### **Overall Rumour Characteristics: Rumour Frame Characteristic**

The characteristics of the rumour frame are generally categorized into generic and issue-specific frames. Generic frames encompass structural themes such as conflict, human interest, economic impact, responsibility, and morality (Semetko and Valkenburg 2000), while issue-specific frames vary based on the content, topic, and context of study (De Vreese 2005). Song et al. (2020) found that, compared to other rumour frames, the responsibility frame significantly decreased the likelihood of sharing rumour messages. In other words, the attribution of responsibility was less viral than other types of rumours.

### **Media Analysis (studying communication channels)**

McLuhan's famous statement, "The Medium is the Message", emphasizes the significant influence of the form and characteristics of media on shaping social perceptions and behaviours, transcending explicit content conveyed (McLuhan 2017). This perspective serves as a fundamental framework for investigating how diverse types of media shape people's responses to information.

**Media Identity:** One perspective, the substantial influence of the identity of the information source on rumour belief. The credibility of sources, including experts, opinion leaders, authoritative media, government bodies (Zou and Tang 2021), leading to a reduced intention to share and disseminate rumours. Almomani and Al-Qur'an (2020) found that the extent of the spread of rumours and false information is decreasing based on the presence of governments and competent authorities through their official platforms within the mechanism of fighting against the Corona virus.

**Media Forms :** Contrasting perspectives emerge concerning the relationship between social media and rumour dissemination. Guo et al. (2023) proposed a negative correlation, suggesting that the multitude of sources and real-time interactions on social media platforms fosters a more cautious verification process, ultimately reducing the transmission of rumours. However, Kim (2018) study on virality metrics, including retweets, likes, and replies, indicated a positive link between high engagement in social media and the propensity to share rumours. The role of traditional media further complicates this relationship. Wanlian and Feng (2023) noted that traditional media, perceived as more professional and authoritative, weaken the negative association between the acquisition of social media information and rumour belief. Individuals are less likely to take verification-oriented action based on information from social media when traditional media supports rumours.

**Media Coverage:** Auter et al. (2016) added an additional layer to the discussion, revealing the potential for media coverage to exaggerate or distort medical stories and impact public perception and behaviour. For instance, excessive media coverage heightened public anxiety and led to a surge in online searches during the US H1N1 “swine flu” outbreak. In 2013, Krishnatray and Gadekar’s findings regarding the Times of India framing H1N1 to induce fear and panic further emphasise the role of media framing in shaping public responses to health-related information (Krishnatray and Gadekar 2014).

### **Audience Analysis (focussing on the recipients)**

Audience analysis primarily centres on aspects such as trust in rumours and factors influencing receivers’ acceptance of rumours, which stem from both individual internal characteristics and external influences. In-depth research findings on individual psychological, cognitive abilities and skills are the same as control analysis due to the difficulty of separating recipients from communicators in an era dominated by mobile social media (Persson 2010). Therefore, studying communicators is also studying the audience. In addition, audience analysis also intersects with other research fields. Some relevant findings have also been mentioned previously, such as examining the effect of characteristics of rumour content on individual rumour acceptance in content analysis and assessing the influence of different media types on individual rumour trust in media analysis. Hence, we will not delve further into this point here.

### **Effect Analysis (focusing on impact)**

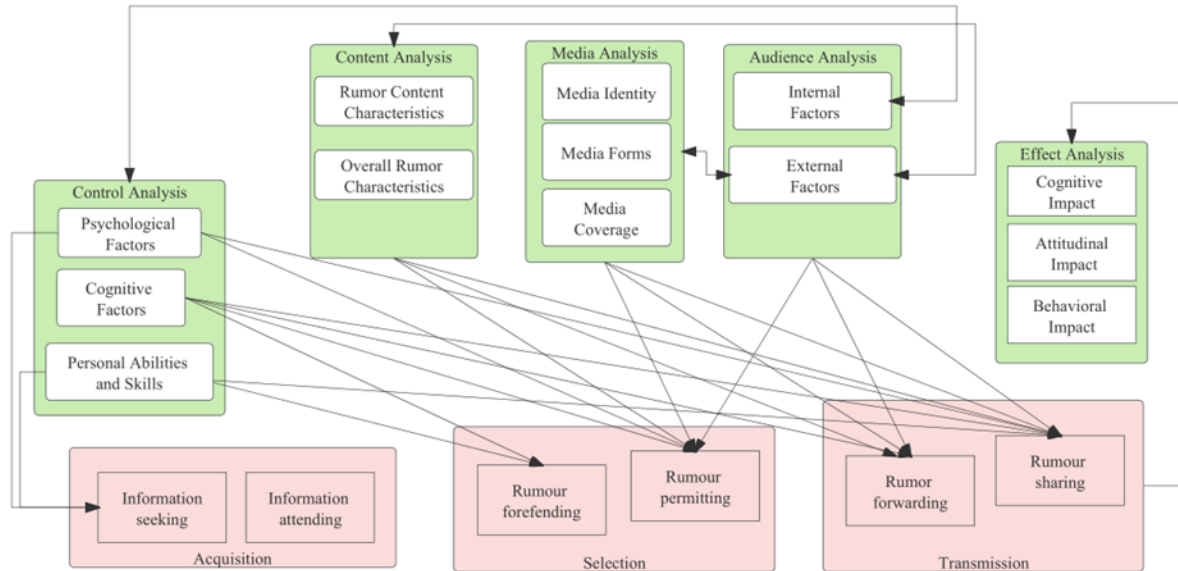
Effect Analysis comprises three critical dimensions: cognition, attitude, and behaviour, and explores the impact of rumour transmission by communicators on audiences. The intricate relationship between cognition, attitude, and behaviour, often described as a cognitive-attitude-behaviour sequence, emphasizes that the processing of information and personal evaluations fundamentally affects individuals’ actual behaviour. In risk and crisis situations, health-related rumours, following this sequence, can indeed lead to severe consequences, as demonstrated by several examples in the literature (Lee et al. 2021; Dulaimy et al., 2024).

DiFonzo (2007) argued that for persistent public health issues like vaccination and contraceptive use, rumours have the potential to influence individuals to disregard experts’ health and safety recommendations. They also found that rumours have misled people into panic-driven and counterproductive actions, such as stockpiling food and unsuccessful vaccination campaigns (Pop 2016), during major disasters and infectious disease outbreaks.

Furthermore, Dutta and Rao (2015) demonstrated that exposure to disease rumours can influence individuals to perceive outgroups as sources of cultural contamination. For example, the reference to COVID-19 as the “Wuhan virus” at the onset of its outbreak supporting the viewpoint. This case illustrates how rumours have fuelled discrimination and marginalization during outbreaks and underscores the critical importance of understanding the role of rumours in shaping public perceptions, attitudes, and behaviours during health emergencies.

## **DISCUSSIONS AND FUTURE PERSPECTIVES**

The study reveal that researchers have conducted multidimensional explorations of rumour dynamics from the perspectives of communicators, rumour content, media, and effects. Each unique perspective provides invaluable insight, collectively weaving a panorama (Figure 7) to understand the factors that influence the communication of health rumours.



**Figure 7: The panorama of influencing the communication behaviour of health rumours**

### Rumour Communication Behaviour is a Complex System

The communication of health rumours constitutes a complex system influenced by several factors in each research field, which shape the panorama of the communication of health-related rumours in crisis situations.

Firstly, the most fruitful studies on control analysis unravel a tapestry of factors shaping information behaviours during health rumour communication. Psychological factors such as emotion and personality traits emerge as catalysts for information seeking, rumour permitting, and rumour transmission, and anxiety playing a pivotal role. The cognitive underpinnings and abilities of individuals, including health awareness, knowledge, literacy, involvement, and perception, weave into the complex fabric of rumour communication.

Secondly, content analysis delves into the rumour content characteristics and overall rumour frame characteristics. The characteristics of rumour content significantly impact the permitting and transmission. Fear-inducing rumours are more likely to capture public attention and spread, while the framing features of rumours may alter individuals' acceptance and behavioural responses to them.

Additionally, media analysis of selected literature sheds light on how various types of media influence people's responses to information. Source credibility, the interplay between social and traditional media, and the influence of media framing on public perception highlight the complexities of rumour selection and transmission. Lastly, audience characteristics and behavioural responses further shape the communication patterns of rumours. Individual cognition, attitudes, and behaviours are influenced by rumours, leading to different actions.

### The overall trend in Research Focus Leans towards the Domain of Rumour Transmission

The panorama visually indicates that the general focus of research on health rumours during crises tends to favour the transmission domain. There is a limited amount of literature that addresses information acquisition and selection, and even no attention is paid to information attention. This inclination can be attributed to the understanding that the damage caused by rumours primarily originates from their transmission. Rumours that do not reach or shared struggle to reach a wide audience, grab attention, and significantly impact audience cognition, attitude, and behaviour.

However, in the realm of information communication, rumour prevention surpasses rumour governance in importance, particularly during crises (Zhang and Zhang 2009). Effective rumour prevention is based on timely and appropriate responses during the stages of information acquisition and selection (Faour-Klingbeil et al. 2021). Individuals equipped with the ability to acquire accurate information and discern false information are empowered to make informed decisions, preventing rumours from proliferating and depriving them of the necessary foundation for dissemination.

### **A Concerning Gap in the Literature Regarding Information Attention**

The panorama also highlights a concerning gap in the literature on information attention. In the era of mobile social networks characterised by information explosion and intermingling of truth and falsehood, coupled with the influence of algorithmic mechanisms creating filter bubbles and strengthening echo chambers that restrict exposure to diversity (Reviglio della Venaria 2020). Individuals find themselves immersed in an overwhelming ocean of information through their smartphones, often passively accepting content pushed by algorithms and trapped in an information cocoon. Thus, it is imperative to address this phenomenon and explore the factors influencing passive information acceptance among audiences, to strengthen their capabilities in information selection and defense and establish barriers to impede the entry of rumours into the transmission stages.

### **Future Perspectives**

There are several directions that warrant attention in future studies. First, in the algorithmic era, prioritizing rumour defense over governance is crucial. Although traditional research has focused mainly on rumour transmission and governance, the rise of social media requires a proactive approach to prevent false information. Strengthening information selection and verification before rumour transmission is essential to curb misinformation dissemination (Agarwal et al. 2022). Research on preventing rumours should explore the impact of algorithmic push, digital media literacy, and individual capabilities on information acquisition and selection to prevent rumours from gaining traction.

Second, exploring the impact of social factors on rumour propagation is essential because these factors significantly influence how rumours spread within communities. Social network structures, for instance, determine the pathways through which rumours travel and the speed at which they disseminate (Kossinets et al. 2008). Group dynamics, such as cohesion and communication patterns within social groups, also play a pivotal role in amplifying or mitigating the spread of rumours (Viehmann et al. 2022). By understanding these social dynamics, researchers can develop more effective strategies to combat the dissemination and mitigate its harmful effects.

Third, conducting multimodal studies across different media forms is necessary to understand how rumours communicate through various channels. Rumours can take different forms, including text, images, and videos (Albalawi et al. 2023), each with its own unique characteristics and potential for impact. By examining how manifest rumours across different media platforms and analysing the factors that contribute to their virality in each context, researchers can develop more nuanced strategies for detecting and debunking rumours. Additionally, understanding the role of visual content in the propagation can help researchers anticipate emerging trends in misinformation and develop proactive strategies to address them.

Finally, examining the long-term effects of rumour prevention strategies is significant to assess their efficacy and sustainability. Information immunisation theory suggests that exposing individuals to weakened versions of rumours can inoculate them against future misinformation (Forrest and Hofmeyr 2001). By studying how different prevention strategies influence public immunity to rumours over extended periods, researchers can identify the most effective approaches for building resilience to misinformation. Furthermore, understanding the long-term effects of rumour

prevention efforts can inform the development of comprehensive communication campaigns aimed at raising awareness of health crises and promoting evidence-based information exchange practices.

## CONCLUSION

This study follows the PRISMA guidelines, selecting articles published over last 15 years from two of the most representative databases in both international and Chinese contexts: WoS and CNKI. The research constructs the theoretical analysis framework to thoroughly analyse 42 included articles in depth. The results show that the communication of health rumours during crises forms an extraordinarily complex system, each unique perspective provides invaluable insights, collectively weaving a panorama for understanding the factors that influence the communication of health rumours. Psychological factors of the communicator are key drivers of information seeking, rumour acceptance, and transmission. Fear-based rumours content are more likely to capture public attention and spread, while the framing of these rumours influences individuals' acceptance and behavioural responses. Media framing also plays a crucial role in shaping public perception, underscoring the complexity of rumour selection and transmission. The study highlights that the majority of research focuses on rumour transmission, with a significant gap in literature concerning information attention. Finally, this paper emphasises on highlighting gaps in the existing research and suggesting directions for future studies. Certainly, the current research has several limitations, such as being restricted to only two databases and excluding articles from relevant fields like complex networks and system dynamics. Future efforts will aim to address and refine these limitations.

## ACKNOWLEDGMENTS

This work was supported by the General Project on Philosophical and Social Science Research in Jiangsu Universities for the Year 2023 under Grant 2023SJYB0629.

## AUTHOR'S CONTRIBUTIONS

YLL: Contributed to the conception, design, and writing of the entire manuscript. Led the data collection, analysis, and interpretation of the literature included in this review. Responsible for drafting and revising the manuscript.

EM: Provided significant guidance and feedback throughout the manuscript preparation. Reviewed and critically revised the manuscript for important intellectual content.

AAA: Contributed to the critical revision of the manuscript and provided academic supervision. Offered valuable insights and suggestions to enhance the quality of the work.

YSL: Assisted in the evaluation and selection of the literature included in this review. Worked closely with the first author during the literature assessment process.

All authors read and approved the final manuscript.

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## APPENDIX

## The summary of the included articles

Author	First Author'Country	Context	Method and Sample Size	Factors	dimension	Focus object
<b>WoS Included Articles</b>						
Almomani et al.,2020	Jordan	COVID-19	Survey (N=1500)	Information source	CAn	Rumour spreading extent
Tai et.al., 2011	USA	2003 SARS	Content analysis (N = 90 stories)	The degree of infection	CA	Rumour spreading
DiFonzo et al., 2012	USA	Cancer	Web survey (N = 169)	Anxiety, Belief, Uncertainty	CA	Rumour transmission
Dutta et al., 2015	USA	Epidemic, not specific	Online survey (N = 1082)	Anxiety	CA & EA	Rumour communication effect
Pop, 2016	USA	Romanian HPV vaccination	Surveys (N = 200s) & interviews (N = 43)	Anxiety, Uncertainty, Distrust to government	CA & EA	Rumour communication effect
Auter, et al., 2016	USA & Canada	Middle East Respiratory Syndrome in 2012	Content analysis (N = 1646)	Media Coverage	MA	Rumour spreading
Kim, 2018	USA	Food Safety	Online experiment (N = 203)	Virality metrics	CAn	Rumour believability (permitting) and transmission
Chua et al.,2018	Singapore & USA	Cancer-related rumours	Experiment & survey (N = 60)	Rumour type	CAn	Rumour trust (permitting) and sharing

Na et al., 2018	USA	New Respiratory Syndrome	Online experiment (N = 303)	Content emotion	CAn	Rumour permitting
Oh & Lee, 2019	South Korea	Influenza vaccination	Online experiment (N = 660)	Message importance, Health anxiety, Health literacy	CAn & CA	Rumour forefending & sharing
Paek et al., 2019	South Korea	Food safety	Online experiment (N = 942)	Rumour type Response strategies	CAn & CA	Rumour response
Nekmat & Kong, 2019	Singapore	Food safety	Online experiment (N = 366)	Rumour Type	CAn & EA	Rumour effects
Lai et al., 2020	China	Food safety, cancer, and eye problems	National survey (N = 11,551)	Personality traits	CA	Rumour belief (permitting)
Luo et al., 2021	China	COVID-19	Online survey (N = 1167)	Fear, Health self-efficacy	CA	Rumour sharing
Zou et al., 2020	China	COVID-19	In-depth interviews (N = 17)	Heuristic processing cues	CAn	Rumour processing (attending)
Lee et al., 2020	South Korea	Problematic situations	Online survey (N = 184)	Attitude	CA	Rumour sharing
Lee & Kim, 2022	South Korea	COVID-19	Online survey (N = 534)	Anxiety, Government trust, E-health literacy	CA	Rumour forefending & believability (permitting)
Yuan et al., 2023	China	COVID-19	Content analysis (N = 1907) &	Trust in governments	CA	Rumour sharing

			survey (N = 444)			
Liang et al., 2022	China	COVID-19	Online survey (N = 4596)	Information-source	CAn	Information seeking
Ariel et al., 2022	China Israel	COVID-19	Online and Offline survey (N = 918)	Personal needs Degree of negative feelings, Information sources	CA & CAn	Rumour forwarding
Kwon et al., 2022	USA	COVID-19	Content analysis (N = 621)	Psychological distance	CA	Rumour evolution and rumour belief (permitting)
Yang et al., 2023	China	COVID-19	Survey (N = 662)	Rumour type	CAn	Rumour sharing
Guo et al., 2023	China	COVID-19	Online survey (N = 2424)	Information acquisition channels, Critical thinking	CA & CAn	Rumour sharing
Xue & Taylor, 2023	USA	COVID-19 vaccine	Online experiment (N = 551)	Evidence types, Health literacy, Vaccine knowledge	CA & CAn	Seeking, forefending, and sharing
Lee & Kim, 2023	South Korea	Food Safety (Genetically modified foods)	Online experiment (N = 630)	Descriptive norm Injunction norm	CA	Rumour sharing
Long et al., 2021	Singapore	COVID-19	Online survey (N = 1237)	Education	CA	Rumour-sharing and believing (permitting)

Balakrishnan et al., 2021	Malaysia	COVID-19	A self-administered survey (N = 869)	Altruism Ignorance Entertainment Pass time Fear of miss out	CA	Fake news sharing
Dong et al, 2020	China	COVID-19	Content analysis (N = 1 million comments)	Public emotion	CA	Rumour spreading
Lutzke et al., 2019	USA	Climate change	Online experiment (N = 2750)	Priming critical thinking	CA	Fake news sharing
CSSCI Included Articles						
Feng & Ma, 2019	China	Food rumours	Online questionnaire survey (N = 795)	Belief level, Rumour risk Perception Social class	CA	Rumour spreading effectiveness
Zhang et al., 2017	China	Emergency Events	Online survey (N = 262)	Attitudes Social capital Certainty Severity Agility	CA	Rumour identification
Kuang & Wu, 2021	China	COVID-19	In-depth interviews (N = 30) & Online survey (N = 923)	Importance, Ambiguity Public emotions Media literacy	CA	Rumour forefending & spreading
Zhang et al., 2021	China	COVID-19	Questionnaire survey (N = 1483)	Anxiety Involvement Concerns of friends and relatives	CA	Rumour trust (permitting)
Ji et al., 2014	China	Social Hotspots	Questionnaire survey (N = 391)	Neutralization theory Deterrence theory	CA	Rumour spreading

Lai & Tang, 2016	China	Food Safety	Experiment & Questionnaire (N = 160)	Information emotions	CA and EA	Rumour Spreading
Lv et al., 2020	China	COVID-19	Scenario-based experiment survey (N = 271)	Herding behaviour, Refutation Perception Deterrence perception	CA	Rumour forefending & spreading
Tang & Lai, 2021	China	Public Health Safety Events	Scenario-based experiment survey (N = 627)	Risk perception, Anxiety emotions	CA	Rumour forwarding
Tang & Lai, 2023	China	Food Cancer	Scenario-based experiment survey (N = 200)	Rumour type Anxiety emotions Information Involvement  Health literacy	CA & CAn	Rumour forefending & forwarding
Song et al., 2020	China	Food Cancer	Scenario-based experiment survey (N = 252)	Rumour type, Demographics, Health awareness, Health literacy	CA	Rumour forefending & sharing
Deng & Fu, 2018	China	Non-specific	Scenario-based experiment & Interview (N = 30)	Social media Additional information	CAn	Rumour sharing
Li & Zeng, 2023	China	40 Emergency Safety Events	Qualitative comparative analysis method (N = 40 cases)	Information source, Information channel, Information audience	CA & MA	Triggering of rumours

He & Han, 2021	China	COVID-19	Online survey ( N = 334)	Education level, Perception knowledge, Anxiety, Risk perception, Involvement , Media dependence, Credibility	CA & EA	WeChat rumour dissemination
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CA: Control Analysis; CAn: Content Analysis; MA: Media Analysis; EA: Effect