Exploring information seeking pathways of inhabitants about cyclones: a mixed method approach

Sarthak Chakraborty[a] and Sabuj Kumar Chaudhuri[b]

[a]Librarian, Kultali Dr. B. R. Ambedkar College, University of Calcutta, West Bengal, India

E-mail: sarthakchakraborty2012@gmail.com

[b]Professor, Department of Library and Information Science, University of Calcutta, Kolkata, West Bengal, India

E-mail: sabujkchaudhuri@caluniv.ac.in

The study explores the information needs, information source selection and barriers in information seeking of the residents regarding cyclones. Fifty semi-structured interviews and 471 questionnaires yielded data from the population sample of Sundarbans, a coastal region of West Bengal, India. Findings show that after receiving the warnings, respondents preferred to depend on human sources and, to some extent, media sources for alert verification and confirmation. Human sources were most trusted in informal discussion for subsequent information seeking to pursue informed decisions against cyclones.

Keywords: Information Seeking Behaviour, Pathways, Information needs, Information Source Selection, Barriers to information seeking, Effectiveness of information sources, Cyclone, Natural Disaster, India

Introduction

Information is a major driver in developing community resilience against natural disasters. Availability of information improves individuals' capacity to make informed decisions by minimizing the severity of damage[1,2,3]. In the event of a disaster, timely dissemination of information reduces anxiety and aids in determining the best option for preventive action[4]. On the contrary, the absence of essential information creates unnecessary confusion and misleads individuals to take mitigation efforts[5]. However, new endeavours at the intersection of information seeking research and natural disaster studies to address the gap are less comprehensive[6,7,8]. There is very little research on on information pathways and information seeking practices that would allow individuals to make informed judgments during natural hazards. Existing studies in the Indian context are concerned with disaster communication, with no consideration given to theories of information seeking behaviour[9-13].

The Government of India (GOI) has created disaster information databases to provide disaster information-related services to the nation. These services are developed to assist individuals in making informed decisions during natural disasters[14,15]. However, the government's generic and top-down strategies have failed to meet the micro-level information needs of heterogeneous communities[16]. Customized and people-centric approaches in information dissemination for natural disasters is therefore required.

We surveyed a sample population belonging to Sundarbans, a coastal region in West Bengal, India to unveil information pathways and information seeking behaviour at the micro level. We also attempt to offer local and national policymakers, a guideline for adopting the most appropriate pathways to provide information to vulnerable populations during natural disasters.

Review of literature

In the last decade, the growth and development of disaster information seeking have been accompanied by different research approaches in the academia[17]. Yang and Zhuang[18] and Armstrong *et al.*[19] have focused on cognitive sides to demonstrate that risk perception induces negative emotions and feelings of information insufficiency within the individuals which drive further information seeking. Another study on seven hundred sixteen respondents in Louisiana revealed that strong risk perception led to more intense information seeking[20].

Information seeking during disasters is also motivated by socio-economic parameters. A recent study found that social-economic factors and local

determinants shaped disaster awareness leading to more information seeking[21]. Studies on information seeking behaviour reported that inhabitants were mostly dependent on different elements of social capital for the selection of preferred information source[22-26]. Bhandari[27] in a study explained that social capital strengthened communication within social ties, helped in immediate responses, and developed long term preparedness.

A recent study found that well-developed social memory in younger generations is more crucial to disaster-related information seeking. It provides a higher chance of successful risk communication in the community[28]. People's informal social networks and other determinants like traditions, culture, memory, local settings, and native knowledge shape their perspective of information pathways and help in information seeking. Experiences from past disturbances were positively correlated with individuals' current information seeking. Furthermore, the impact of social determinants like sex, education, occupation, and ethnicity on information seeking during a hazard was also observed[29,30].

Literatures on disaster information seeking have reported a conducive relationship between information seeking and information sources[31,32,33]. Similarly, Guo et al.[34] have shown a higher preference for local and informal information sources during typhoons for securing community resilience. Likewise, a study on residents of Istanbul also reported that real life stories on disaster events, induced with emotional elements, were widely accepted by the respondents to acquire earthquake related information[28]. But information seeking approaches and selection of sources vary with different types of hazards[4]. Therefore, the present study reviewed only the research on information seeking behaviours during a cyclone or similar hazards.

Earlier studies have reported that the predominance of television and radio was observed for cyclone related information seeking. A large-scale study on two hundred respondents has shown that television was most preferred information source for cyclone warnings[10]. Teo et al.[21] and Tekeli-Yesil et al.[28] also found that television was the most trusted source by residents for risk communication. Similarly, a study on natives of Bangladesh has reported radio as widely preferred source for warning and subsequent information seeking[35]. Several other studies have also reported that higher preferences have been given to both television and radio to collect warning information[36,37,38].

The prevalence of human sources like friends, family and neighbours was also reported by several studies, although credibility and authenticity of these sources were fundamentally different from media sources[35,36]. Cyclone survivors in Bangladesh reported that relatives, family, and friends were major information mediators that influenced evacuation decisions[37]. Socio-economically backward communities in third world countries like India and Bangladesh also rely upon local government bodies for warning alerts and disaster management. Studies in India and Bangladesh reported a strong intervention of local bodies like panchayats in disaster management[10,37]. Dissemination of warnings by panchayat staff were well received by locals due to their prior acquaintance.

The literature review has revealed that research mainly discussed the impact of different parameters of socio-ecological systems on disaster information seeking, but its information pathways, particularly for cyclone related hazards are less explored. Therefore, this study tries to investigate existing pathways of disaster information seeking in response to cyclones in the coastal parts of India.

Objectives of the study
- To identify specific information needs of the cyclone victims in coastal parts of India;
- To find the effectiveness of information sources for serving information needs at the time of cyclone; and
- To explore the pathways of information seeking of the cyclone victims.

Methodology
This study deployed a mixed-method strategy to collect data from residents. A mixed-method approach broadens the scope of the study by allowing both qualitative and quantitative data. It helps to provide researchers a valuable and meaningful insight into the research problem[39,40]. Qualitative data on information behaviour, disaster experience, and a few other related aspects were obtained via open-ended, semi-structured interviews, while quantitative data were gathered through a closed-ended, structured questionnaire.

Scope and coverage
Gosaba, a community block of South 24 Parganas district of West Bengal, India was selected for the study. Gosaba is situated in the Sundarbans area, a coastal region of West Bengal and is disaster prone[41]. The study geographically covered five Gram Panchayats (GP)

namely Lahiripur, Satjelia, Kumirmari, Chotta Mollakhali, Bali II.

Sample

A purposive sample of 50 inhabitants was selected to participate in the interview. Participants were selected if they met following the criteria: i) above 18 years, ii) able to communicate in Bengali language and iii) have faced natural disasters.

Using Snowball sampling strategy participants were asked to recommend other inhabitants for participation[42]. Five hundred questionnaires were distributed purposively within 5 GPs, out of that 471 (94.2%), were duly filled and returned.

Data collection

The entire data collection was carried out between November 2019 and March 2020. It covered 50 in-person interviews and a survey of 471 participants. All the participants were interviewed in Bengali.

Open-ended, semi-structured interviews were conducted to gather data about information behaviour. Many of the interview questions focused on the details of disaster communication and the participants' perspectives on it (e.g., How do you get disaster warnings? How convenient are the sources and channels?). A semi-structured interview method was used to provide uniformity while offering flexibility[42,43]. Each interview lasted about 20 to 35 minutes. The interviews were recorded and transcribed.

A structured, closed-ended survey questionnaire was developed based on primary interactions with inhabitants. The questionnaire collected demographic data from participants, as well as information about several aspects of social learning, information sources, and connectivity. A pilot survey was conducted with 50 (10% of total distributed questionnaires i.e., 500) people to ensure the questionnaire's inclusivity and consistency. The feedback from the pilot survey led to the reformatting of several questions, the substitution of technical jargon with common languages and the translation into Bengali for the convenience of the participants.

The responses received from semi-structured interviews were transcribed for qualitative analysis. To import transcriptions and decode the obtained data into themes, NVivo10 software package was used. NVivo10 software's text searching, sorting, and crosstab functions were used to examine how segments of interview text allocated to different codes linked to one another, to developing themes, and to other participant background characteristics. This software suite was used in a variety of ways to help in the identification and development of themes within the data.

Quantitative data analysis was limited to descriptive statistics, represented as figures and tables.

Intercoder reliability

Kothari[44] noted, "A measuring instrument is reliable if it provides consistent results". Consistency of the questionnaire was tested by deploying two coders, having knowledge on risk communication to survey 50 (10% of total distributed questionnaire i.e., 500) habitats. The data were compared using Cohen's Kappa and the overall Kappa value was 0.83 (range = 0.57-1), indicating "strong agreement" in coding among the raters[45].

Analysis and findings

Demographic categorizations and sample characteristics

Table 1 summarises the background information of participants: 60.09% of the 471 respondents were male and 39.91% were female. Approximately 58% of the participants were between the ages of 26 to 50, while nearly 38% were over the age of 50. The participants' ages varied from 19 to 77 years, with an average of 46.4 (SD = 11.71). Almost all the respondents (97.23%) have been living in the places of study since their birth. In terms of family size, 57.96% reported a family size of between 4 to 6 members. Mean of the family size is 4.27, reflecting average family size in the community to be four people. There is a fair degree of deviation (SD = 1.63) in family size. Almost two-thirds (63.26%) of the respondents have a single earning member in their family.

As shown in Table 1 farmer most prevalent occupation among respondents is farmer (58.38%), followed by labour (9.6%), while only 21.4% of women are housewives. Teachers, Shop owners, Fishermen, Rickshaw pullers and Folk artists are grouped as others (10.6%) category. Among the respondents 54.98% have monthly earnings between 3 to 5 thousand Indian rupees. However, 22.08% have earnings below 3 thousand Indian rupees. In terms of academic qualification, only 10.8% have a graduate degree and almost 36% of the participants' qualifications ranged between class 9 to 12. Nearly

Table 1 — Demographic profile of the respondents

Variables	Sample Statistics (N=471)	Variables	Sample Statistics (N=471)
Gender		*Earning family member*	
Male	283 (60.09%)	Single person	298 (63.26%)
Female	188 (39.91%)	More than one member	173 (36.74%)
Age		*Job*	
Under 25	18 (3.82%)	Farmer	275 (58.38%)
26-40	134 (28.45%)	Labour	45 (9.6%)
41-50	139 (29.51%)	Housewife	101 (21.4%)
51-60	79 (16.77%)	Others	50 (10.6%)
60 above	101 (21.44%)		
		Income	
Year of stay		Less than 3k	104 (22.08%)
Since birth	458 (97.23%)	3k-5k	259 (54.98%)
Less than 10 years	4 (0.84%)	5k-10k	96 (20.38%)
More than 10 years	9 (1.91%)	10k-15k	9 (1.9%)
		More than 15k	3 (0.6%)
Family Size		*Education*	
Less than 4	126 (26.75%)	0-5	107 (22.71%)
4-6	273 (57.96%)	6-8	146 (30.99%)
7-10	59 (12.52%)	9-12	169 (35.88%)
More than 10	13 (2.77%)	Undergraduate	47 (17.62%)
Mean	4.27	Post Graduate	2 (0.4%)
SD	1.63		

Table 2 — Results of the thematic analysis of interview data for disaster information seeking

Information need	Barriers of communication	Information exchange
Inhabitants looking for the information about:	Problems in information seeking are:	Communication process is motivated by:
Severity and timings of cyclone	Electricity issues	Local personal network
Close ones and relatives	Interpersonal problems	Social and cultural embeddedness
Damages in neighbourhoods	Geographically remote location	Past experience of cyclone
Shelters/Evacuation	Power structure	Face to face informal interactions

22.7% of the participants were either illiterate or studied up to class 5.

Categories and themes

The responses from the interviews were categorised descriptively and thematically by the authors. Each author reviewed random, non-overlapping interview data several times to assess the consistency, validity, and confirmability of the analysis and marked key points within it. We discussed the coding choices with others to have an agreement on the meaning and distinguishing characteristics of data themes.

Thereafter, the authors reviewed and recoded transcripts to conduct a more complete analysis of the agreed topics. Finally, interview data were coded by identifying meaningful chunks within it. Themes in the data were found via a series of analyses performed through the software on these chunks of interview data. Thematic analysis through NVivo10 was performed to understand internal relations among codes for establishing categories. In qualitative data analysis categories were reflections of repetitive concepts described by participants, generally, identified by comparing similarities within the data and observing expressed phrases. Further, categories were merged into non-overlapping themes while maintaining consistency, clarity and exclusiveness.

Through qualitative analysis of interview data, 12 categories with moderate strength have been identified (Table 2). Internal cohesiveness among these categories was satisfactory. Further, 12 categories were grouped into three themes, consistent among interviews: 1) Information need, 2) Communication barriers and 3) Information exchange.

Information need

Forty three of the 50 interviewees stated that their willingness to seek information was motivated by specific information needs that developed during cyclones. The demand for information in cyclones

was divided into four categories by the inhabitants: a) How powerful will the cyclone be, and what is the time of landfall? b) What is the condition of their close ones and relatives? c) How much damage was done in the neighbourhood? d) What precautions are being taken in terms of shelters and evacuation?

Communication barriers

Thirty nine of the 50 respondents indicated that their willingness to seek disaster information was strongly impeded by four perennial issues, such as, a) Electricity related issues, b) Interpersonal problems, c) Geographical remoteness of the community, d) Uneven power structure within community.

Information exchange

Qualitative data analysis helped in identifying four aspects under the theme of Information exchange. Four categories under this theme were: a) Existence of strong local personal network, b) Social and cultural embeddedness, c) Past experience of cyclone and d) Face to face informal interactions.

Warning sources

The study revealed seven warning sources for tropical cyclone primarily used by the respondents: family (4.02%), friend or neighbour (26.93%), opinion leader or power leader present at locality (20.43%), local government authorities like panchayats, police stations, gram unnayan samiti (88.54%), television (54.49%), radio (71.21%) and mobile phones (12.69%). Generally, respondents received cyclone alerts from more than one source.

Respondents' use of Information Sources

Warning confirmation

Research on risk communication models showed 'confirmation of warning' as a step in the communication process. Following the receipt of the warning, confirmation process happens where an individual seeks information from another source to verify the credibility of the alert message[46]. Majority of the respondents seek confirmation from friend/neighbour (74.83%) followed by radio (71.54%), family (66.8%), television (59.08%). Compared to these sources, a lesser number turned up to local government authorities (38.86%) and opinion/power leaders (33.65%) for confirmation.

Sources for subsequent information seeking

Most of the participants confirmed that initiation of information search is always followed by successful confirmation of cyclone warnings. For subsequent information seeking, 86.2% of the respondents seek information from friends and neighbours, while 74.7% trusted television and 73.91% considered radio as the credible source to take informed decisions in face of cyclones. Participants also claimed that local government authorities (60.3%) informed them about protective actions. Table 3 shows family (49.5%), opinion/power leaders (35.24%) and mobile (20.3%) helped them with response action details. Individuals' higher information dependency on human sources, as shown in data analysis, indicates the presence of strong social network among the villagers[13].

Selection of respondents' preferred sources of information

Participants were asked to rank three sources of information that they used in the event of a cyclone. It helped the authors to comprehend respondents' overall hazard-oriented information seeking tendency. The first preference group represents sources that were regularly consulted by participants, the second preference category suggests sources that were moderately consulted, and the third preference category indicates sources that were seldom consulted.

Respondents preferred local government authorities, radio, and television, followed by friend/neighbour, opinion/power leader, family, and mobile (Table 4). Friends/neighbours were the second

Table 3 — Distribution of information sources

	Warning sources (%)	Information sources (%)
Family	6.58	49.5
Friend/Neighbour	30.03	86.2
Opinion/Power Leader	22.21	35.24
Local Government Authorities	85.35	60.3
Television	59.66	74.7
Radio	72.27	73.91
Mobile	9.46	20.3

Table 4 — Distribution of information sources according to preference category

Sources	1st preference	2nd preference	3rd preference
Local government authorities	141	53	27
Radio	103	85	72
Television	75	99	51
Friend/Neighbour	56	139	94
Opinion/Power Leader	37	28	81
Family	34	41	131
Mobile	25	26	15

most desired source of information on cyclones. Television and radio were also strongly favoured sources in this category. The distribution of sources in the third preference category reveals that respondents considerably preferred family and friend/neighbour over other sources (Table 4).

To understand the source selection strategy, the study further reviewed source preferences from the perspective of information source horizon. The study discovered seven distinct sources of information that individuals used to gain insights about cyclones. These sources were arranged into information source horizons for further analysis. Although prior researches[47,48] have mentioned about 6 major groups in information source horizons, here all sources were compartmentalized within four groups only, namely: human, organization, media and others.

Human sources included family, friends/ neighbours and opinion/power leaders whom participants consulted to find information for their specific problems. Organizational sources refer to local government authorities like panchayats, police stations and gram unnayan samiti. Radio and television were defined as media sources and the rest of the sources (mobile in this case) were categorized as other sources.

Table 5 indicates that media was considered as the most often selected item in first and second preference category with 40.01% and 43.87% occurrence respectively. But sources in the third preference category should offer scope for discussion and consultation, and that was not available through media sources, resulting in their comparatively lesser presence (18.2%) in this category.

The study shows a higher prevalence of different organizational sources with 30.8% in first preference category. Organizational sources primarily deliver warning messages; and are seldom used for confirmation purposes. Hence, organizational sources were less observed in the second preference category. However, due to higher opportunities for consultation regarding emergency measures and government

Table 5 — Percentage of distribution of information source horizons according to preference category

	Preference 1 (%)	Preference 2 (%)	Preference 3 (%)
Human	25.6	41.82	51.46
Organizational	30.8	9.24	28.21
Media	40.01	43.87	18.2
Others	3.66	5.16	2.16

instructions, organizational sources secured a decent presence in third preference category. Residents use of the public libraries as an organisational source was the least noticed. Informal discussions with the participants revealed poor acceptance of public library in the neighbourhood due to lack of staff, lower outreach and weak social ties. They further narrated that lower involvement of local libraries in their everyday life made public library irrelevant. Individuals find it more convenient to consult about protective measures with more acquainted organisational local sources.

Human sources provide a wide scope for warning confirmation, interpretation of information and valuable suggestions, helping respondents to make informed decisions in the wake of cyclone. Therefore, human sources were well located (41.82%) in the second preference category and most often occurred (51.46%) as the third preference of the participants. Predominance of organizational and media sources in the first preference category made human sources less observable. Other sources of information were insignificant and marginal among all preference categories.

Effectiveness of information sources for serving information needs

The present study has tried to assess the effectiveness of information sources used during the cyclone. The participants were asked to express their opinion on a 5-point Likert scale (1= Least informed, 2= Less informed, 3= Moderately informed, 4= Properly informed, 5= Highly informed) on how far each type of information source addressed their needs. This attempt helped to assess justification behind the qualitative result and further validates the ground scenario explicitly. For seeking situational details of the neighbourhood, both human and organizational sources were found to be effective.

Table 6 indicates that for warning related information needs (Q1-Q5), media sources were most preferred as shown by their higher mean values (4.13, 3.75, 3.93, 2.82 and 2.41). Information related to evacuation planning, instructions and guidance on protective measures (Q14-Q16) were mostly addressed by organizational sources and human sources respectively. Organizational sources indicate higher mean value i.e., 4.58, 2.98 and 3.18 and more steady preferences (low SD value 0.59, 1.20, 0.93) compared to other horizons of information sources.

Human sources are preferably used for consulting protective measures that are also reflected in

Table 6 — Perception about effectiveness of information sources to address information needs

Categories in Information need	Information sought	Information sources							
		Human		Organizational		Media		Others	
		M	SD	M	SD	M	SD	M	SD
Severity and timings of cyclone	Q1. How far you are informed about the timings of cyclone?	3.12	1.01	3.96	0.94	4.13	0.44	1.93	1.04
	Q2. How far you are informed about the tentative trajectory of cyclone?	2.34	1.88	3.28	0.84	3.75	0.64	1.62	1.32
	Q3. How far you are informed about who are the vulnerable groups?	2.54	1.34	3.63	1.11	3.93	0.99	1.15	1.43
	Q4. How far you are informed about the intensity of the cyclone?	3.47	0.88	3.85	0.77	2.82	0.91	2.04	1.55
	Q5. How far you are informed about the chance of the cyclone strikes in your community?	2.69	1.47	3.91	0.61	2.41	0.73	1.03	0.95
Close ones and relatives	Q6. How far you are informed whether they are affected by cyclone or not?	3.79	0.71	1.98	0.74	1.34	0.89	3.31	0.64
	Q7. How far you are informed about their health conditions?	3.93	0.88	2.04	0.63	1.03	1.01	3.47	0.89
	Q8. How far you are informed whether they are safe or not?	4.14	0.43	1.83	0.78	1.05	0.74	3.15	0.77
Damages in neighbourhoods	Q9. How far you are informed about the local neighbourhood got affected by cyclone?	3.82	0.88	3.57	0.91	1.24	0.77	2.43	0.92
	Q10. How far you are informed about financial losses happened in neighbourhood?	3.64	1.18	3.24	1.25	1.71	0.89	1.16	1.04
	Q11. How far you are aware of the level of damage to the electric supply and communication system?	4.31	0.83	4.19	0.98	1.11	1.09	2.86	0.74
	Q12. How far you are informed about the condition of river embankment in nearby areas?	4.19	0.94	4.78	0.74	2.45	1.04	1.73	0.64
	Q13. How far you are informed about what extent to flood water can enter in the locality?	3.98	1.21	4.36	0.61	1.83	1.23	1.04	0.53
Shelters/ Evacuation	Q14. How far you are informed about the directives measures?	3.15	0.82	4.58	0.59	3.32	0.64	1.89	0.43
	Q15. How far you are informed about when to take actions?	2.90	1.38	2.98	1.20	2.51	0.80	1.84	0.56
	Q16. How far you are informed about how to execute protective actions?	2.42	1.06	3.18	0.93	2.79	0.72	1.38	0.75

M= Mean; SD= Standard Deviation

quantitative data analysis with high mean values compared to other sources in this category i.e., 3.15, 2.90 and 2.42. Subsequent information seeking by inhabitants in time of cyclone primarily cover two major aspects—1) seeking information about relatives and close ones at the personal level (Q6-Q8) and, 2) gathering information about situational details of the neighbourhood (Q9-Q13). For collecting information about close ones, participants trusted human sources. The study shows only human sources have higher acceptance (higher mean value i.e., 3.79, 3.93 and 4.14).

Discussions

Data analysis revealed that during a cyclone; local police station, panchayat office, political parties and other social institutions are the preferred information sources by the inhabitants. However, the currency and comprehensiveness of these sources are lesser than media sources. Many people preferred media sources as second preference, and for complementing organizational sources with further detailed, current and continuous flow of information. Radio and television have high penetration among the rural masses. Therefore, individuals who received alert messages preferred to consult media sources for further confirmation and detailed narration. Seeking warning confirmation is also observed from human sources as respondents opined that discussion with friends, family and neighbours and opinion/power leaders helps them comprehend cyclone risk more quickly.

Information related to protective measures and evacuation processes were also being shared within the neighbourhood during the dissemination of cyclone warning. Result shows that organizational sources were most preferred within the community followed by human and media sources. Organizational sources were found to be integrated within an individual's personal network, which extends its availability, accessibility, acceptability and trustworthiness. Informal interview revealed that organizational sources were people-centric in nature. It helps in developing collective awareness about cyclone within neighbourhood and eventually facilitates an informed decision-making process.

Warnings and preventive instructions about cyclone were primary information needed by an individual at the time of the event. Subsequently, information related to news of close ones and relatives and level of damages in neighbourhoods were considered by the respondents. In line with previous ethnographic research on social-ecological system of Sundarbans, the study has observed presence of strong social capital constructing healthy personal networks[13,49-51]. These connections increase communication strength, speed and comprehensiveness within the community, as shown in the study. Participants preferred to ask friends, neighbours, and other human sources about local issues such as the condition of river embankments in nearby areas, the possibility of flood water entering the locality, how badly the electric supply system collapsed, and information about injuries and fatalities in the neighbourhood; news of close ones and relatives was also frequently sought. During cyclones, inhabitants faced power cuts that hindered information flow from electronic media. This made them rely more on informal discussion with family, friends and neighbours.

Conclusion

A usual pathway of disaster information seeking has been observed where media and organizational sources were mainly used for obtaining cyclone warnings. After receiving the warnings, participants preferred human sources and to some extent media sources for alert verification and confirmation. Human sources were considered most trusted by respondents for subsequent information seeking to make informed decisions against cyclones. Along with it, thematic analysis of the qualitative interview data identified three major themes 1) Information need, 2) Barriers of communication and 3) Information exchange, contributing to disaster information seeking.

Research on disaster information seeking is less explored. The study is one of a few in the LIS domain that attempts to understand the pathways of information seeking behaviour of residents, particularly during cyclones. More research on information behaviour during natural hazards is needed to find new collaborations and explore more complicated and culturally situated information seeking practices.

References

1 Folke C, Hahn T, Olsson P and Norberg J, Adaptive governance of social-ecological ystems, *Annual Review of Environment and Resources*, 30(1) (2005) 441-473.
2 Norris F, Stevens S, Pfefferbaum B, Wyche K and Pfefferbaum R, Community Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness, *American Journal of Community Psychology*, 41 (1-2) (2007) 127-150.
3 Grothmann T, Lessons learned for the communication of impacts, vulnerabilities and adaptation options, In: Climate Change Adaptation Manual: Lessons learned from European and other industrialised countries,(Routledge; London, England), 2014, p. 114-116.
4 Ryan B, A model to explain information seeking behaviour by individuals in the response phase of a disaster, *Library & Information Science Research*, 40 (2) (2018a) 73-85.
5 Lloyd A and Hicks A, Contextualising risk: the unfolding information work and practices of people during the COVID-19 pandemic, *Journal of Documentation*, 77 (5) (2021) 1052-1072.
6 Steelman T, McCaffrey S, Velez A and Briefel J, What information do people use, trust, and find useful during a disaster? Evidence from five large wildfires, *Natural Hazards*, 76(1) (2015) 615-634.
7 Liu T and Jiao H, How does information affect fire risk reduction behaviors? Mediating effects of cognitive processes and subjective knowledge, *Natural Hazards*, 90 (3) (2017) 1461-1483.
8 Kothe E J, Ling M, North M, Klas A, Mullan B A and Novoradovskaya L, Protection motivation theory and pro-environmental behaviour: A systematic mapping review, *Australian Journal of Psychology*, 71(4) (2019) 411-432.
9 Sharma U and Patt A, Disaster warning response: the effects of different types of personal experience, *Natural Hazards*, 60 (2) (2011) 409-423.
10 Kuppuswamy S, A Perception Study on Community Response to Media Technologies for Cyclone Warning and Disaster Communication in South India *Science, Technology and Society*, 19 (3) (2014) 399-414.

11 Rautela P, Traditional practices of the people of Uttarakhand Himalaya in India and relevance of these in disaster risk reduction in present times, *International Journal of Disaster Risk Reduction*, 13 (2015) 281-290.

12 Sanyal S and Routray J, Social capital for disaster risk reduction and management with empirical evidences from Sundarbans of India, *International Journal of Disaster Risk Reduction*, 19 (2016) 101-111.

13 Misra S, Goswami R, Mondal T and Jana R, Social networks in the context of community response to disaster: Study of a cyclone-affected community in Coastal West Bengal, India, *International Journal of Disaster Risk Reduction*, 22 (2017) 281-296.

14 National Disaster Management Authority (NDMA) Annual Report 2018-2019, National Disaster Management Authority (NDMA), Government of India(2019) Available at https://ndma.gov.in/sites/default/files/PDF/Reports/NDMA-Annual-Report-2018-19-English.pdf (Accessed 18 April 2021).

15 UN Office for Disaster Risk Reduction, 2020. *Human cost of disasters: an overview of the last 20 years (2000-2019)*. [online] The UN Office for Disaster Risk Reduction. Available at: <https://www.undrr.org/media/48008/download> [Accessed 17 April 2021].

16 Sukhwani V and Shaw R, Operationalizing crowdsourcing through mobile applications for disaster management in India, *Progress in Disaster Science*, 5 (2020) 100052.

17 Barnes B, Dunn, S and Wilkinson, S, Natural hazards, disaster management and simulation: a bibliometric analysis of keyword searches, *Natural Hazards*, 97 (2) (2019) 813-840.

18 Yang J and Zhuang J, Information Seeking and Information Sharing Related to Hurricane Harvey, *Journalism & Mass Communication Quarterly*, 97 (4) (2020) 1054-1079.

19 Armstrong C, Cain J and Hou J, Ready for disaster: information seeking, media influence, and disaster preparation for severe weather outbreaks, *Atlantic Journal of Communication*, 29 (3) (2020) 121-135.

20 KimD and Madison T, Public Risk Perception Attitude and Information-Seeking Efficacy on Floods: A Formative Study for Disaster Preparation Campaigns and Policies, *International Journal of Disaster Risk Science*, 11 (5) (2020) 592-601.

21 Teo M, Goonetilleke A, Ahankoob A, Deilami K and Lawie M, Disaster awareness and information seeking behaviour among residents from low socio-economic backgrounds, *International Journal of Disaster Risk Reduction*, 31 (2018) 1121-1131.

22 Woudstra L and Van Den Hooff B, Inside the source selection process: Selection criteria for human information sources, *Information Processing and Management*, 44 (3) (2008) 1267-1278.

23 Woudstra L, van den Hooff B and Schouten A, Dimensions of quality and accessibility: Selection of human information sources from a social capital perspective, *Information Processing & Management*, 48 (4) (2012) 618-630.

24 Zimmer J and Henry R, The role of social capital in selecting interpersonal information sources, *Journal of the Association for Information Science and Technology*, 68 (1) (2015) 5-21.

25 Costello K, Social relevance assessments for virtual worlds: Interpersonal source selection in the context of chronic illness, *Journal of Documentation*, 73 (6) (2017) 1209-1227.

26 Ryan B, Establishing information seeking pathways in slow and flash floods, *International Journal of Disaster Risk Reduction*, 31 (2018b) 9-19.

27 Bhakta Bhandari R, Social capital in disaster risk management; a case study of social capital mobilization following the 1934 Kathmandu Valley earthquake in Nepal, *Disaster Prevention and Management*, 23 (4) (2014) 314-328.

28 Tekeli-Yesil S, Pfeiffer C and Tanner M, The determinants of information seeking behaviour and paying attention to earthquake-related information, *International Journal of Disaster Risk Reduction*, 49 (2020) 101734.

29 Rivera J, Factors Influencing Individual Disaster Preparedness Information Seeking Behavior: Analysis of US Households, *Natural Hazards Review*, 22 (4) (2021) 04021042.

30 Lachlan K, Hutter E, Gilbert C and Spence P, Need for cognition and rumination: Alternate explanations for sex differences in disaster information seeking *Progress in Disaster Science*, 11 (2021) 100180.

31 Mileti D S and Fitzpatrick C, The causal sequence of risk communication in the Parkfield earthquake prediction experiment, *Risk Analysis*, 12 (3) (1992) 393-400.

32 Ryan B, Information seeking in a flood, *Disaster Prevention and Management*, 22 (3) (2013) 229-242.

33 Rahmi R, Joho H and Shirai T, An analysis of natural disaster-related information-seeking behavior using temporal stages, *Journal of the Association for Information Science and Technology*, 70 (7) (2019) 715-728.

34 Guo C, Sim T and Ho H, Impact of information seeking, disaster preparedness and typhoon emergency response on perceived community resilience in Hong Kong, *International Journal of Disaster Risk Reduction*, 50 (2020) 101744.

35 Kelman I, Ahmed B, Esraz-Ul-Zannat M, Saroar M, Fordham M and Shamsudduha M, Warning systems as social processes for Bangladesh cyclones, *Disaster Prevention and Management*, 27 (4) (2018) 370-379.

36 Burger J, Gochfeld M, Jeitner C, Pittfield T and Donio M, Trusted information sources used during and after superstorm Sandy: TV and radio were used more often than social media, *Journal of Toxicology and Environmental Health, Part A*, 76 (2013) 1138–1150.

37 Parvin G A, Sakamoto M, Shaw R, Nakagawa H and Sadik S, Evacuation scenarios of cyclone Aila in Bangladesh: Investigating the factors influencing evacuation decision and destination, *Progress in Disaster Science*, 2 (2019) 100032.

38 Yore R and Walker J, Early warning systems and evacuation: rare and extreme versus frequent and small-scale tropical cyclones in the Philippines and Dominica, *Disasters*, 45 (3) (2020) 691-716.

39 Johnson R, Onwuegbuzie A and Turner L, Toward a Definition of Mixed Methods Research, *Journal of Mixed Methods Research*, 1 (2) (2007) 112-133.

40 Timans R, Wouters P and Heilbron J, Mixed methods research: what it is and what it could be, *Theory and Society*, 48 (2019) 193-2016.

41 District Disaster Management Plan 2020-2021, District Disaster Management Department, Office of the District Magistrate, South 24 Parganas (2020) 1-262. Available at http://wbdmd.gov.in/writereaddata/uploaded/DP/DPSouth%2024-Parganas 81787.pdf (Accessed 18 April 2021).

42 Pickard A, Research Methods in Information, 2ndedn (Facet Publishing; London), 2013.

43 Corbin J and Strauss A, Basics of qualitative research: Techniques and procedures for developing grounded theory, 4thedn (Sage Publications; Thousand Oaks), 2015.

44　Kothari C, Research Methodology: Methods and Techniques, (New Age International; New Delhi), 2004.

45　McHugh M, Interrater reliability: the kappa statistic, *Biochemia Medica*, 22 (3) (2012) 276-282.

46　MiletiD, Factors related to flood warning response. In: U.S.-Italy Research Workshop on the Hydrometeorology, Impacts, and Management of Extreme Floods, (1995) Available at https://www.engr.colostate.edu/ce/facultystaff/salas/us-italy/papers/46mileti.pdf (Accessed 27 April 2021).

47　Savolainen R, Information Source Horizons and Source Preferences of Environmental Activists: A Social Phenomenological Approach, *Journal of the American Society for Information Science and Technology*, 58 (12) (2007) 1709-1719.

48　Savolainen R, Source preference criteria in the context of everyday projects: Relevance judgments made by prospective home buyers, *Journal of Documentation*, 66 (1) (2010) 70-92.

49　Bera M, Collective efforts of people to reduce disasters in the Indian Sundarban islands, *Disaster Prevention and Management*, 28 (5) (2019) 691-705.

50　Chakraborty A and Satpati L N, Vulnerability, Resilience and Quality of Life: A Micro Level Study of Ghoramara Island in the Sundarban Region of West Bengal, India. In: Multidimensional Approach to Quality of Life Issues, (Springer; Singapore), 2019, p. 241-252.

51　Mistri A and Das B, Environmental Change, Livelihood Issues and Migration, (Springer; Singapore), 2020.