Original Article

Experiences of Experts with Communication and Information Exchange in Response to Disasters

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Abstract

Background: Effective communication and timely information exchange during disasters and emergencies can help the responsive organizations prepare better and react rapidly and effectively in order to mitigate losses and casualties.

Objectives: This study summarizes the experiences of experts at Iran's Relief and Rescue Organization and Emergency Organization with regard to how communication and information exchange contributed in response to the past disasters.

Methods: The content analysis approach was used in this qualitative study. The statistical population included the operational managers and employees of Iran's Relief and Rescue Organization and Emergency Organization from different provinces with various in managerial and field work's experiences at high, middle, and operational levels as well as experiences with local, provincial, regional, national, and international disasters. The purposive sampling method was employed to collect data through semi-structured interviews with 24 participants. Data analysis was performed in MAXQDA 12.

Results: The results of analyzing the interviews extracted a main theme of communication and information exchange with two categories. The first category was identified as intra-organizational communication and information exchange with seven subcategories called organizational individuals and departments, communication channels, communication model, message content, purpose of communication, standards and instructions, and challenges. The second category was identified as inter-organizational communication and information exchange with six subcategories called organizational individuals and departments, communication channels, communication model, message content, purpose of communication, and challenges.

Conclusion: The participants believed that there were limited horizontal communications and information exchange between Iran's Relief and Rescue Organization and Iran's Emergency Organization at the same level via fixed phones, mobile phones, and wireless radios in response to disasters. Therefore, disturbance to accurate timely communication and information exchange between organizations, especially in the first 24 hours of a disaster and lack of inter-organizational agreements and communication infrastructure result in the further vulnerability of victims, Red Crescent rescuers, and emergency technicians.

Keywords: Communication, Disasters, Information exchange, Qualitative study

1. Background

Information is the most valuable product that every individual or organization needs to make decisions based on it in disasters and emergencies. Considered the main element for coordination, information has a key role in both national and international mobilization of resources in response to such emergencies. In fact, information has many sources of distribution. Depending on their roles and responsibilities, responsive organizations play an important role in generating and distribution of information. All of these organizations must include communication and information management in their disaster management plans and strategies. They must also cooperate in harmony to be able to respond to disasters more effectively (1). Information and communication management is mainly responsible for preparing situation reports, coordinating timely and effective distribution among stakeholders, organizing information exchange between national and international organizations responding to disasters, collecting, organizing, and storing relevant reports, and upgrading, facilitating, and generating sources of communication for response activities in the health sector. (2).

According to Hill *et al.*, the integrity of communication between the organizations responding to an event can lead to effective coordination, further efficiency, and higher effectiveness in achieving success (3). The advantages of this coordination includes reaching financial stability in organizations, improving the creativity of personnel in the respective organizations, attracting the public support, gaining further trust and reliability, reducing the discontinuation or termination of services, establishing service constancy, and mitigating the duplication of efforts (4). In fact, a complex network of organizations should establish the necessary communications in disasters to attract participation of all national organizations, state-run local

organizations, private associations, business associations, nongovernmental organizations, volunteer groups, universities, media, and foreign organizations.

Therefore, the stakeholders of disaster management sector are still facing a serious challenge that is to coordinate these organizations (4). Seyedin introduced the main problems of effective communication in Iran's information emergency system as follows: The lack of information integrity, absence of joint inter-organizational databases, lack of clear information strategies, and absence of an official system for recording disaster information at local and provincial levels. Seyedin also deemed it is necessary to develop an effective communication network and establish an accurate flow of information due to the existence of many organizations providing health services in order to improve inter-sector and extra-sector coordination in emergency management (5).

Hence, responsive organizations must cooperate in coordination, the major requirement of which is up-to-date information. Not only should these organizations play effective roles separately in disasters, but they also should cooperate with each other in harmony. For this purpose, it is essential to use and exchange accurate information at the right time inside the organizations frameworks as well as in the real time (6).

At the same time, exchanging information between different sectors of responsive organizations can reduce the mortality rate, increase the survival rate, mitigate the complications of disabilities, and help crisis management with respect to their activities in providing optimal and timely services (7). Therefore, it is essential to determine the health system performance criteria for establishing communication and exchanging information with these organizations in order to exchange and produce secure, reliable, and effective information in response to disasters (6). In Iran, studies indicate that inter-sector communication and information exchange have been classified as the response phase categories in Disaster Management and Risk Mitigation Document of Iran's Health System and have been considered a challenge in previous disasters (8).

Moreover, inter-organizational communications are now very limited in the centers for control and coordination of emergency operations across Iran, something which results in parallelism, inadequate and insufficient communications, false reporting, ineffective and untimely communication, unavailability of a reliable reference of information regarding disasters and emergencies, wastage of time and resources, and harm to human lives (9). In addition, the researcher's experience with previous disasters of Iran such as Bam's, Kermanshah's and Varzeqan's earthquakes, and Lorestan's flood indicated that the

absence of effective communication channels, absence of a uniform procedure for establishing communication, lack of relevant instructions and bylaws for communication and information exchange in response to disasters between responsive organizations such as Iran's Relief and Rescue Organization and Emergency Organization were among the serious challenges which the respective officials had to face.

2. Objectives

Hence, this study aimed to analyze the experiences of experts with how to communicated and information exchanged in response to past disasters in Iran. In fact, this study is expected to organizing inter-sector communication and information between responsive organizations, especially Iran's Relief and Rescue Organization and Iran's Emergency Organization in order to mitigate casualties and financial loss at the time of disasters.

3. Methods

3.1. Research Design and Participants

This qualitative content analysis study was conducted in 2021. The statistical population included the operational managers and employees from different provinces of Iran with high, middle, and operational management or field work, also with experiences of presence in different disasters at local, provincial, regional, national, and International levels at Iran's Relief and Rescue Organization and Emergency Organization. The purposive sampling method was employed to initially select two experts who were asked to introduce other qualified individuals for the interview. The sampling method was aimed to obtain rich cases of information for the research purpose. Like the other qualitative studies, the sample size was determined during the research process. In fact, sampling was continued until data saturation was reached in each of the themes. In total, 24 individuals from both organizations participated in this study. They had operational experiences in the response phase at the time of these disasters. Out of a total of 24 participants, 10 participants from the country's emergency organization at various organizational levels were technicians, city center officials, provincial and national officials at the organization level, and 14 participants from the country's rescue organization in various levels of base rescuers, branch heads, provincial officials, and provincial CEOs at the national level have contributed to this research.

3.2. Data Collection

The data collection tool was an interview guideline including a few general questions regarding

the demographics of participants as well as special questions regarding the status of communication and information exchange in response to previous disasters in Iran. The questions are as follows: 1) How are communications established in your organization (horizontal/vertical) in response to disasters and emergencies? 2) How are your extra-organizational communications (horizontal) with other responsive organizations (*e.g.*, Red Crescent with Emergency Organization or vice versa) at the time of disasters? 3) How is information exchange performed in your organization or field of work in response to a disaster? 4) What source is the information obtained from? What individual or organization is the information presented to? What tools are used for information exchange? When is it performed? Who is it performed by? 5) What information is exchanged? 6) What alternative methods are there to maintain communication and information exchange in your organization in case of disruption? 7) What problems do you think the status of communication and information exchange methods can cause in the current situation? Who can they finally harm?

In order to collect data with the permission of Isfahan University of Medical Sciences, the necessary coordination was made with the participants and informed consent was obtained and then the interviews were conducted. With the consent of the participants, a digital voice recorder was applied.

3.3. Data Analysis

The qualitative thematic analysis was employed in this study. The interview transcripts were first typed, and the resultant responses were coded, and grouping was performed on the basis of similarity. To ensure the accuracy of data analysis, the participants were provided with the transcribed interviews in both original and coded forms, so they could state their corrective or complementary opinions. The data were entered, coded, and analyzed in MAXQDA 12.

4. Results

The results of the analyzed interviews were classified as one main theme, two categories, 13 subcategories, and 156 codes. Table 1 presents the demographics of participants, whereas Table 2 reports the results of analyzing interviews. The participants characteristics are shown in table 3.

Table 1. Demographics of Participants

Demographic		Quantity (%)
Gender	Female	0
	Male	24 (100%)
Work Experience (year)	>10	0
	10–20	18 (75%)
	20<	6 (25%)
Degree	Associate's Degree	3 (12%)
	Bachelor's Degree	4 (17%)
	Master's Degree	13 (54%)
	PhD	4 (17%)

4.1. Theme 1: Intra-Organizational Communication and Information Exchange

This theme includes seven subcategories identified as "organizational individuals and departments", "communication channels", "communication model", "message content", "standards and regulations", "purpose of communication", and "challenges to intra-organizational communication" at Iran's Relief and Rescue Organization and Emergency Organization.

The participants stated that many organizational individuals and departments were involved in communication and information exchange at the time of disasters and accidents.

Table 2. Themes, Categories, and Subcategories of data of Iran's Emergency Organization and Red Crescent Relief and Rescue

Theme	Category	Subcategory
Communication and Information Exchange	Intra-Organizational Communication and Information Exchange	Organizational individuals and departments
		Communication channels
		Communication model
		Message content
		Standards and regulations
		Purpose of communication
		Challenges
	Inter-Organizational Communication and Information Exchange	Organizational individuals and Departments
		Communication channels
		Communication model
		Message content
		Challenges

Table 3. Organizational profile of the participants

Row	Organization	Province/City	Current position
1	Red Crescent Society	Western Azerbaijan	Chief Executive Officer
2	Red Crescent Society	Zanjan	Chief Executive Officer
3	Red Crescent Society	kurdistan	Head of the Provincial Rescue Operations Department
4	Red Crescent Society	kurdistan	Basic Rescuer of the Red Crescent
5	Red Crescent Society	Western Azerbaijan	Head of the Provincial Rescue Operations Department
6	Red Crescent Society	Western Azerbaijan	Head of the Red Crescent, city branch
7	Red Crescent Society	Western Azerbaijan	Head of the Red Crescent, city branch
8	Red Crescent Society	kurdistan	Provincial Public Relations Manager
9	Red Crescent Society	kurdistan	Head of Provincial Logistics Department
10	Red Crescent Society	Rescue and Relief Organization	Responsible for the province EOC
11	Red Crescent Society	kurdistan	Responsible for the province EOC
12	Red Crescent Society	kurdistan	Expert in charge of specialized trainings in the province
13	Red Crescent Society	kurdistan	Disaster Accident Documentation Expert
14	Red Crescent Society	Rescue and Relief Organization	Deputy of the country's rescue organization
15	Emergency organization	Golestan	Head of the provincial Emergency Operation Management Center
16	Emergency organization	Bushehr	Urban emergency management
17	Emergency organization	Western Azerbaijan	Urban emergency management
18	Emergency organization	Western Azerbaijan	Responsible for the province EOC
19	Emergency organization	Western Azerbaijan	City emergency management
20	Emergency organization	Tehran	Medical Emergency Technician
21	Emergency organization	Shiraz	Medical Emergency Technician
22	Emergency organization	kurdistan	Deputy Governor of the province
23	Emergency organization	kurdistan	Responsible for education in the province
24	Emergency organization	Zanjan	Medical Emergency Technician

"*At the time of disasters and accidents, information is disseminated via sources of the health sector, the public, media, the emergency operations center (EOC) based in the pre-hospital emergency center and accident management center of university of medical sciences.*" (Interviewee no. 18)

Regarding communication channels, the participants stated that official and unofficial channels would be used for communication and information exchange at the time of disasters. A participant from Iran's Relief and Rescue Organization said, "*There are various tools such as short- and long-range radios, mobile phones, fixed phones, faxes, social media, satellite phones, and routine devices used at organizations.*" (Interviewee no.14)

Another participant from Iran's Emergency Organization said,

The participants stated that communications with individuals and departments inside organizations were performed through various models at the time of disasters. For instance, a participant from Iran's Emergency Organization said, "*In response to accidents and disasters, intra-organizational communications are continuously performed at the EOC through different sessions, various reporting processes, information exchange with high-stream departments, subsidiary departments, and field departments based on the notified instructions and procedures governing these communications by setting and dividing responsibilities at different intra-organizational levels.*" (Interviewee 17)

Regarding the contents of messages exchanges between organizational individuals and departments, a participant from Iran's Relief and Rescue Organization said, "*Usually, the exchanged messages include the type of accident, necessary facilities and logistics, place of accident, scale of accident, and information on victims. However, the services provided by officials include the number of facilities used, the problems, and requirements.*" (Interviewee 5)

Regarding standards and instructions, the participants stated that different notified procedures such as the quick alert system, accident command system, and emergency response program would be used in order to comply with the correct procedure, rules, and instructions notified to individuals and departments inside organizations at the time of disasters for communication and information exchange.

Furthermore, the participants stated that communications would be established with individuals and departments within organizations at the time of disasters to have a primary evaluation, call and dispatch forces, provide logistics, announce the end of operations, and issue situation reports.

Participants mentioned different challenges to the current conditions of communications and information exchange that could prevent quick and effective responses.

"*Unfortunately, no software or hardware platforms have yet been designed, developed, or implemented for rapid communications in relief providing organizations, and all stages are conventional just like the previous procedures.*" (Interviewee no. 3)

Another participant from Iran's Emergency Organization said, "*Due to instability of the communication platform, it is always probable that*

communication lines such as the Internet or phones are disconnected, which can hard people in society." (Interviewee no. 19)

4.2. Theme 2: Inter-Organizational Communication and Information Exchange

This theme includes six subcategories identified as "*organizational individuals and departments*", "*communication channels*", "*communication model*", "*message content*", "*purpose of communication*", and "*challenges to inter-organizational communication*" at Iran's Relief and Rescue Organization and Emergency Organization.

The participants stated that a few organizational departments and individuals would be involved in inter-organizational communication and information exchange between Emergency Organization and Red Crescent Relief and Rescue at the time of disasters and accidents. In other words, the corresponding EOC expert and the officials of this department as well as the higher-rank officials would be in limited communication via official channels based on the type and scale of accidents.

"*Joint communication channels are established between Relief and Rescue Organization and Emergency Organization via fixed phones, wireless phones, and mobile phones*." (Interviewee 14)

Regarding the model of communication between the two organizations, a participant from Iran's Relief and Rescue Organization said, "*At the time of accidents and disasters, there are mainly horizontal communications or communications of the same level between different organizations such as Relief and Rescue Organization and Emergency Organization. However, these two organizations are immediately present at the scene to perform relief and rescue operations through their parallel channels in order to finish the job and mitigate casualties and financial loss. Each of these organizations has a specific organizational structure based on the accident command system*." (Interviewee 10)

Regarding the message content, a participant from Iran's Relief and Rescue Organization said, "*These messages contain information regarding the type of accident, severity of accident, scope of accident, and affected individuals or regions (in terms of the number of affected individuals and geographical locations)*." (Interviewee no. 1)

A participant from Iran's Emergency Organization said, "*Messages are based on the scale of accident, the number of ambulance victims, the number of ambulances, aerial relief, dispatch area, available capacity of organizations, available resources and facilities, and requirements*." (Interviewee no. 20)

Regarding inter-organizational challenges to communications and information exchange in response to disasters, a participant stated, "*I think that lack of a formulated joint response plan for inter-sector communication and organization and*

contradictory statistics due to the absence of an integrated system of statistics notification are the widest gaps in this regard." (Interviewee 3)

Another participant said, "*Inter-organizational discoordination, lack of emphasis on and inattention to learnings, inattention to opportunities and threats based on the previous studies, and lack of symposiums can be considered the main challenges to inter-sector communication and information exchange at the time of disasters*." (Interviewee no. 9)

5. Discussion

An important applied component that can play an effective role in mitigating casualties and loss is paying attention to a joint communication platform for information exchange between responsive organizations. For this purpose, it is essential to have a common language ([10], [11]). Lack of trust development prior to an accident, insufficient communication, and lack of alignment in emergency reactions made by the officials of communication and information exchange can worsen the problems with responses to emergencies ([12,13]). Like the management of other crises, the management of natural disasters require rapid thought-out decision-making and massive reactions ([14,15]). These decisions and reactions need organizational preparedness and extensive resources, for which large-scale governmental organizations have the necessary preparedness. Therefore, governmental organizations, militaries, and armies are usually the first organizations that reach to the field of crisis management at the time of emergency ([16–18]).

Given the role of communication and information exchange in disaster management, this study aimed to identify the experiences of experts with the quality of communication and information exchange at the time of disasters. Groups, officials, and institutions should consider necessary measures for crisis management before, during, and after a crisis. In this regard, they need to formulate and implement certain schemes with respect to the possible changes in different conditions ([16]).

Wang ([19]) indicated that legal institutions and information communication technology affected the formation and evolution of inter-organizational interactions in Taiwan's disaster reaction system after Chi Chi's earthquake and Morakot's storm. They concluded that situations not only helped the institutional development and disaster but also proposed a management theory and provide policymakers with the insight into how to improve capacity. Therefore, the statistical population was limited to two cases of disasters. This study analyzed the subject more accurately through further details and opinions of experts.

Bharosa *et al.* ([20]) indicated that verbal, telephone-based, and paper-based communication

could be employed to perform managerial tasks at the time of disasters, despite the presence of different technologies such as the Internet and mobile phones. Furthermore, the absence of standard procedures for digital exchange of information can cause certain challenges to inter-organizational coordination and interactions, something which was clearly pointed out by the participants in this study.

Claudia Berchtold *et al.* (21) analyzed inter-organizational challenges and introduced governmental organizations, political and legal conditions, organization of national cultures, personal preferences, and experiences of players as the main challenges. Their results were completely consistent with the findings of the present study; however, this study also addressed intra-organizational challenges.

Quarshie and Leuschner (22) introduced the main role of the government in interaction with the other responsive organizations including the ones that organize, facilitate, and establish the supply networks. In the present study, the participants stated that a major challenge to response to disasters would be the lack of a nationally formulated joint response plan for inter-sector communication and information exchange as well as inattention to this important matter at the higher levels of the country.

Shahkarami, Masoudi Asl, and Hessam (23) identified the components affecting the factors in coordination between the organizations responsible for crisis management. They deemed it necessary to formulate clear plans and frameworks, tasks, structures, details of organizational communication process, cooperation methods, and coordination of organizations in order to achieve more effective and efficient coordination between the respective organizations. They also stated that the plans should be implemented, practiced, and repeated in experimental maneuvers so that they would result in effective coordination between organizations in practice. Their conclusion is consistent with the results of this study.

Bharosa *et al.* (24) identified the structural challenges as the unavailability of vital information for decision-makers and information managers in the operations of emergency reactions and lack of necessary standards and technologies for the inter-organizational information exchange. Their results were consistent with the findings of this study, in which the participants introduced lack of appropriate inter-organizational communications and heterogeneous information provided by Iran's Emergency Organization and Red Crescent at the time of disasters to be the causes of harm to organizations, people, relief workers, and emergency technicians.

The findings of this study were also consistent with the results reported by Seyedin with regard to lack of information integrity, absence of clear information strategy, and lack of official disaster information registration system across Iran to establish effective inter-organizational communications (5).

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6. Conclusion

In general, the results indicate that the participants were aware of the importance of communication and information exchange with respect to various information requirements in response to disasters. They mentioned different factors such as official top-down intra-organizational communication, horizontal same-level communication between Iran's Emergency Organization and Red Crescent Relief and Rescue Organization, and use of official communication channels via fixed phones, radio networks, and mobile phones for the exchange of data between the two organizations.

However, the participants believed that there were problems and obstacles such as increasing vulnerability of people under the effects of disasters, e.g. Red Crescent relief workers, and emergency technicians, due to disruptions in timely accurate communication and information exchange between organizations, especially during the first 24 hours of a disaster. They also stated that the absence of agreements and inter-organizational communication infrastructure would cause certain challenges. Managers and planners at responsive organizations are advised to use a common language (formulation of common communication codes), provide joint communication channels (*e.g.* digital radio networks and frequency band division location) for the homogeneity of intra-organizational and inter-organizational instructions, employ joint hardware and software platforms, and integrate information management systems between both organizations in order to mitigate costs, reduce casualties and financial loss caused by disasters, and support a joint communication system.

Acknowledgments

Footnotes

Conflicts of Interest: The authors declare that they had no conflicts of interest.

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