

Coordination in Disaster: A Narrative Review

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Abstract

Disaster as an undeniable part of human life, is followed by some adverse economic effects. All equipments and facilities available in the society need to be mobilized according to their responsibilities and restrictions in the form of crisis management in order to combat it and to minimize the effects of crisis. Moreover, a systematic approach to the design, implementation, monitoring, evaluating the specific services, and providing the basic needs, good coverage, improved access and the high quality of service is desirable. It is obvious that Iran is not excluded from this rule, and like other countries, is an accident-prone country and can be considered as one of the most vulnerable countries to disaster. Evaluation of health care during natural disasters in Iran indicates the lack of coordination in providing health services. A comprehensive coordination is considered as the core activity before and during crisis. Therefore, the present review has aimed to study the coordination among organizations involved in the crisis, and the operational issues and solutions for effective and efficient responses, through search in valid Databases using some keyword such as Coordination in disaster, Coordination concept, Coordination barriers, Coordination facilitators, coordination in response, issue of coordination. Papers between 1995 and 2015 were searched and studied. It is not simple to coordinate among the responsible and service provider organizations and institutions, requiring a systematic approach in all actions and also inserting the coordination issue as a strategy in the comprehensive plan of crisis management. In order to reduce the adverse effects of crisis, in addition to apply a comprehensive plan in the crisis response phase, the coordination among the organizations should be promoted using some measures in the pre-crisis phase (preparation)

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1. Introduction

Natural disasters are a severe rupture with high intensity, and require a high degree of intervention under extreme conditions, and associate with some consequences such as financial, health damages and disease, and cannot be controlled effectively using common methods and available resources (1-3). Unexpected events, as irrefutable component of human life, always has threatened human lives in different forms such as volcanoes, earthquakes, floods, hurricanes, and despite advances in technology, human being still remains incapable of predicting events (4-7). Major natural disasters have affected at least 800 million people worldwide over the past two decades, causing thousands of deaths and more than \$ 50 billion economic damage. In addition, due to an increase in the density of the population in different parts of the world, human settlements in disaster-prone areas has increased (3). At the time of the accident, all the economic, political

and cultural infrastructures of societies are threatened that all equipments and facilities available in the society need to be mobilized, and according to their responsibilities and restrictions in the form of crisis management combat it in terms of national plans to minimize the effects of crisis (8). In this regard, rescue and health management in times of crisis, with rapid appropriate predictions of events, and determining the needs and potential problems, is an important factor in preserving human being life (9). The primary objectives of response to the crisis include the prevention and reduction of mortality and illness and also encourage to return to normal (10). During the responding phase, having a systematic approach to the design, implementation, monitoring, evaluating the specific services, and providing the basic needs, good coverage, improved access and the high quality of service is desirable (10). An appropriate response to unexpected events needs appropriate preparedness, and since each



event is unique and each organization has its own conditions, therefore, preparation programs for unexpected events should exist in each and every organization (9). These crises are due to the extension of incident, huge affected population and the limitations in the response capacity of agencies responsible in a short time which leads to a high volume of requests for aid and health care. Managing such crisis requires coordinated and proper use of all human and material, national and international resources (1). According to global statistics, in recent decades, Asia is inappropriately affected by accidents and incidents (11). Iran is an accident-prone country and can be considered as one of the most vulnerable countries to disaster. Almost 31 out of 40 cases of natural disasters occur in Iran. Generally, Iran is among the 10 disaster-prone countries in the world. In other words, Iran is the fourth country in Asia and the sixth in the world in terms of the statistics of natural disasters (1,10). Destructive events and crises which have occurred in Iran over the past few years along with their costs are presented in Table 1.

Due to the above mentioned items, a comprehensive plan for crisis management is vital to reduce the risks and losses resulted from incidents (12). Although disasters may rarely occur, they have devastating effects. Therefore, the

preparation and coordination of the authorities can be effective in reducing the irreparable effects (13). The evaluation of health care during natural disasters in Iran indicates the lack of coordination in providing health services (10). Due to the lack of coordination and necessary protocols in this area among organizations and groups associated with the unexpected events in Iran, planning and management decisions are made without the use of information in this area (9). Many years ago it was thought that the performance of health sectors is limited to the period after the occurrence of event; but according to the Ministry of Health and Governmental, non-governmental organizations involving the health services after the event occurrence, showed a lot of inconsistency, therefore, the work on the preparation before the event occurrence in the area of health was introduced to provide better services (14). Among the most important requirements related to events, providing relief equipments and necessary inner and outer coordination in the relief and requesting more support from the authorities cited (5). Social and behavioral studies have shown that coordination is the main challenge among individuals, groups and organizations in order to respond to disasters.

Table 1. Destructive events and crises since 1980

Year	Disaster type	Total deaths	Total affected	Damage ('000 US\$)
1990	Earthquake	40000	710000	8000000
1999	Drought		37000000	3300000
1992	Flood	63	20000	2969100
1986	Flood	200	40000	1561000
1981	Earthquake	1200	31000	1000000
1993	Flood	407	484728	1000000
2013	Earthquake	37	4350	600000
1992	Flood		15000	500300
2003	Earthquake	26796	267628	500000
2012	Earthquake	306	61546	500000
1991	Flood	28	14	404000
2002	Earthquake	227	111300	300000
1990	Earthquake	21	22400	232300
1993	Flood	370	2000	209000
2004	Earthquake	35	498	165000
1988	Flood	90	150000	150000
1991	Fire			150000
1994	Flood	12	75000	142000
1997	Earthquake	1568	74600	100000

In fact, studies have shown that coordination among governmental organizations, volunteers and humanitarian agencies is inadequate (15). To reduce the effects of crisis, the World Health Organization (WHO) has emphasized that the prevention and preparedness measures not only are not less important than relief prevention and preparedness measures in the time of crisis, but also may even be more important than prevention and preparedness measures in the time of crisis (16). Coordination and cooperation in crisis management among public and private sectors and organizations (at local, provincial, national and even international levels) are becoming increasingly necessary and vital. On the other hand, the disaster preparedness requires a comprehensive understanding of the risks, planning, coordination, and continuous investment in the National Standards Education and a leader is able to support the coordination at all levels of system (17). For managing the events, the measures must be continuous and dynamic (6) and the appropriate response includes the measures such as establishing the emergency facilities, searching and rescuing survivors, providing medical services, distributing the relief aid, moving the injured people, scheduling the relief and rescue forces, and coordinating all these activities in relevant organizations (18). The coordination appears as the most fundamental issue. Therefore, this study has aimed to investigate the coordination among the organizations involved in the crisis, and to provide the coordination and operational issues for an effective and efficient response.

1.1. The concept of coordination

According to the dictionary, coordination means "coordinated action of departments in order to achieve effective results" (19,20). In a study coordination is defined as a cooperation among two or more independent organizations or competitors which share their own knowledge and resources of (21). Another definition of coordination is thus provided: "Management of the parallel efforts to enhance the effectiveness" (22). According to another definition, the coordination is presented as common measures performed by two or more organizations in order to solve the problems and issues. Indeed, the coordination among two or more organizations is a process of designing and implementing programs and policies to achieve common goals. Generally, intraorganizational coordination emphasized on the collaboration and organization of programs to achieve the common objectives of organizations (23). The benefits related to coordination are as follows: involving economic efficiency, the quality of services, organizational learning, accessing to new skills, risk diffusion, improving the public accountability, reducing the uncertainty and

avoiding the conflict (22). Another study mentions the following advantages:

Creating a financial stability in organizations, enhancing the creativity of staff in their respective organizations, obtaining the public and law support on creating such organizations, obtaining more prestige, reducing a separation or interruption in service providing, establishing and continuing the services, reducing the rework (24). Generally, the coordination is the performance of coordinated activities including the management of dependencies among separate measures, and the clear definition of procedures, processes, responsibilities and structure (24). The fundamental and constant assumption in all definitions is that when organizations achieve the conformity and coordination will operate more effectively and efficiently (25).

1.2. Coordination in health

Intra sectorial cooperation and coordination is a well-known relationship between health sectors and other sectors established to measure in order to obtain the final results or the health system outcomes which is more effective, efficient and sustainable than when the health system operates alone. The major point in the case of inter sectional collaboration is that the sectors are all governmental and non-governmental organizations (public, private) and the inter sectoral cooperation should include all these items (26). The sections and elements which are required in health sectors are as follows (but not limited to the following): Efforts and measures in target population; Governmental and local activities in the affected areas, institutions, multinational organizations; academic institutions, armed forces and media.

1.3. The concept of coordination in disasters

The coordination is described as an efficient designation of useful recourses in order to effectively achieve the common objectives or is determined as common efforts designed to reduce reworks in the measures and also to reduce gaps in providing services (27).

Another study describes the coordination in natural disasters as:

Close relationship of organizations that need their services in time of natural disaster occurrence, so that all are aware of their duties against each other, and collaborate each other to achieve a common goal, under the command specified by the predetermined plan (24). Therefore, the lack of inter organizational coordination and cooperation can lead to detrimental effects on human beings and financial resources (21). For example, poor coordination among authorities involved in the response to the tsunami crisis in Indonesia (2004) is described as the "most important issue" (27), and this debate has always

been a challenge in disaster management (28). So often, the lack of national and regional disaster management plans results in the lack of coordination among agencies responsible for disasters (29). The disaster coordination requires understanding the different types of risks, planning, coordination, investing in continuing education and involves the national standards and a leadership who support at all levels (30). Disaster managers must cooperate and organize all miscellaneous and scattered measures under a single flag. As multiple institutions have a role in disaster management systems, there is a potent collision and conflict with each other. So, as far as possible, the concept of coordination among these institutions should be extended (31). Coordination mechanism is a mechanism that prevents the loss of time, investment and human actions in the time of crisis, and increases the efficiency and effectiveness of crisis management elements and the public forces in the relief and rescue operations, and even in the pre-crisis period, temporary housing and rehabilitation (24). The principle of coordination in the crisis management mechanisms, indeed, represents important and fundamental responsibilities of acquiring all components of institutional working group to achieve the objectives and duties of crisis management (32). Intersectoral cooperation divided into a variety of vertical and horizontal types. The horizontal collaboration occurs across sectors or subsectors in a separate section. Generally, this type of collaboration includes individuals or groups that are at the same level in making decisions, judgments or working in a set of defined objectives. The vertical collaboration is working across the government to consider the political challenges that needs

making decision by more than one level of government, including the work of international organizations with the national governments or the work of national governments with state, local or provincial government to consider the complex challenges of politics (26). A study conducted on facilitating the nodes and barriers of coordination among humanitarian organizations focused on the factors affecting coordination using a comprehensive literature review (Table 2) (22). According to Table 2, the above-mentioned factors are shown in 4 categories: (1) environmental factors, (2) the factors related to the role of donors, (3) the organizational factors and (4) and inter-organizational factors. The environmental factors points out the national and local available resources, as well as the unpredictable or demand uncertainty and infrastructure in the target area. The donors and related factors play a strong role in promoting the coordination measures among organizations. However, some concerns about affecting the tendency of organizations to participate in programs or hear the Donors' instructions. In terms of the third item (organizational factors), variation or contradiction among the rules or objectives (strategic) and standards, the operational and time approaches, and the variation internal policies in measures will lead to a poor coordination. In terms of the last one (intra organizational factors), the potential or present benefits of coordination with other organizations is not obvious in the response setting of disasters. Despite the many advantages related to intra organizational coordination, the managers have some concerns about the costs of coordination that can affect the common actions and discourage them from going to work.

Table 2. Factors Influencing the Coordination Effort among Humanitarian Organizations

Category	Evidences
<i>Environmental factors</i>	
Unpredictable situation	Changes in the political environment
	Changes in the military
	The location and timing of disasters
	Availability of adequate and reliable information
Demand	Characteristics and requirements of the affected population urgency of relief response
Supply	Intensity of damage to local infrastructure (i.e. Communications, transportation)
	Available local and international resources
	The presences of a considerable number of HOs (mostly new and inexperienced actors)
<i>Donors' factors</i>	
Limitations on the usage of resources	Usually available after the disaster spending the provided resources in a short period of time
Incentives mechanisms	The use of renewable and short term contracting
<i>Inter-Organizational Factors</i>	
Strategic compatibility	The differences among organizational objectives, missions or mandates
Operational compatibility	Differences among organizations' organizational structure, operational or internal policies, programming approaches, standards and techniques, or timeframes
Competition	Competition for funds
	Competition for visibility and media coverage
Power	The extent of disparity in organizations' power and resources
	Political imperatives and jockeying for power symmetry between the parties (i.e. size)
Coordination process	Mechanisms to allocate joint costs, benefits or risks
	Accountability over the performance

	Clarified roles and responsibilities Lack of tools or technical skills for coordination Availability and use of technology (e.g. cell phones, radios...) The principles of transparency and responsibility
	Organizational Factors
Concerns associated with collaboration	Lack of transparency regarding existing and potential benefits Increasing bureaucracy & decreasing flexibility Threatening timely response Accountability complications Threatening the value of being independent from other agencies or being a sovereign entity Threatening impartial and neutral humanitarian action Threatening the value of strengthening their humanitarian identity The possibility of losing competition after sharing their own competencies with other agencies Limited resources (personnel, money (i.e. staff salary or travels) dedicated to collaboration efforts
Resources	Short-term volunteers or temporary employees Frequent changes in team leaders and point persons The presence of organizations' junior staff at the coordination meetings (having little leadership/ decision making capacity)
Collaborative Capabilities	Propensity towards command and control mentality Management capacity and leadership style (i.e. collaborative leadership) Capabilities of staff carrying out the coordinating efforts (i.e. skills, attitude, knowledge, experience) Lack of incentives towards collaborative efforts

(Adapted from Moshtari 2012 (22)).

1.4. Problems and challenges of the coordination to deal with disasters

In the time of crisis, the need for necessary resources will be intensified and the ability to meet the demands reduces (33). Some needs for the coordination of emergency services during crisis, and key challenges associated with rapid response efforts are proposed (34). Although the coordination issue in the crisis management is important, success in emergency conditions may be impossible and in real terms during the response to the crisis may not be easy (35). In a research in which the coordination problems were studied, the September 11 attack was mentioned and it was noted that during the occurrence of the attack, the coordination issue had a vital importance in crisis management. In the mentioned study, the coordination issue was considered important and necessary, not only in preventing terrorist incidents, but also in ensuring an effective response to disasters. The attack on the World Trade Center led to overwhelming coordination problems. Some problems arising from the lack of coordination are as follows (17):

1. Director of emergency services in the towers lobby had no authoritative data about the events occurred on the upper floors or outside the buildings.
2. TV viewers' information who had watched the fire spread throughout the country was better than the director of emergency in the towers lobby who had no access to television programs.
3. There were no safety issues in the first response to the fire.
4. The police helicopter was over the towers, but there was no communication link between firefighter leaders and police data.

Coordination issues within and between the fire fighting organization and the police were combined with bureaucratic rivalries. Contradictory reports had been published about the hijackers. Therefore, the study is performed a comprehensive analysis on the coordination issue in the event of a terrorist incident and mentioned that in the time of event (such as terrorist incidents) a further coordination is vital among the organizations such as the police, medical emergency, firefighting and, etc (17).

Another study indicated the fundamental problems of coordination as follows (35): 1. Lack of coordination among organizations and responsible institutions; 2. Lack of communication and information sharing; 3. Having a competitive performance; 4. Lack of honesty and trust; 5. Slow and pacific response; 6. Lack of enough appropriate knowledge; 7. A weak definition of demand chain; 8. Failure in integrated response.

Another study was done using a workshop method discussing the barriers for the coordination and cooperation in the crisis (33).

1. Legal Challenges

The occurrence of crisis and disasters is not associated with legal boundaries.

Responsibilities and Commitments are not clear in various levels of government (federal, state and local). The Communications and trust among the different levels of government, and even affiliated organizations, are seen as barriers to the collaboration. In addition, putting the organizations into organizational silos can further provide competition than cooperation and interaction.

2. Concerns and fears from additional monitoring

Nowadays organizations are often overwhelmed by the governmental rules and regulations. Fearing of additional

monitoring by government is a deterrent factor to NGO organizations and others such as religious organizations

3. Issues related to the commitments and responsibilities

Concerns about commitment and responsibilities can establish a barrier to interaction and collaboration among organizations, and act as a major obstacle. Confusion and ambiguity regarding the responsibilities may seriously impact on the results and coordination.

4. Language barriers

It is usually said that language translation is often poor to different audiences. The lack of a common understanding of the concepts and terminologies can be a barrier to effective communication. In other words, the lack of a common language (even among those who are looking for results and performance) may make it difficult to coordinate. Therefore, it is preferred to create and establish an appropriate communication system before measuring the coordination strength. The lack of a proper communication could be a reason for the collapse of coordination in the event of a disaster.

5. Trust

The lack of trust is as the primary obstacle to effective networking activities. The trust varies by time and circumstances. It is worth noting that no single formula is applicable for all communities and even a community over time. Keeping the trust is a much greater challenge. The lack of public understanding on the human issues such as trust prevents the effective use of technology, methods and strategies in order to resilient the society.

6. Resource challenges

Stable funding sources are one of the primary obstacles to form and maintain the cooperation and the coordination.

The funding sources are often limited and short-term, and forming coordination is a long-term process. Another study focused on the issues of misunderstanding and ambiguity and noted that in terms of the coordination, a number of responsible institutions might face conflict with each other on the application method for responding operations and sometimes a misunderstanding occurs among them (35). Another problem is that participations are unpredictable and the study focuses on the fact that much of the information about the resources available is unknown and the participation of institutions can be unpredictable (34). Therefore, when the uncertainty factor is high, additional barriers to the coordination could be created (22). The study also pointed out that despite considerable efforts to establish the coordination, an ambiguity in the balance between the power and the responsibility, can lead to some problems in this respect among the organizations involved (36). Studies have also mentioned the fact that the coordination in reconstruction and improvement phases can be even more challenging than the initial relief and pacification measures (27).

Strategies and operational measures for the coordination in order to prepare to deal with disasters

In order to succeed in the coordination among beneficiaries and to begin the crisis management measures as a mainstream, the cooperation among beneficiaries is vital. Budget and political will can be seen as well as factors affecting the coordination of crisis management (35,37). Also, some factors affect the coordination among executive bodies such as clarifying the duties of organizations involved in crisis management, holding the pre-crisis readiness maneuvers, establishing a flexible organizational structure, and managing the capacity of crisis management, establishing suitable communication centers, having a systematic trend and lacking the interruption in affairs with changes in the management, the timely availability of organizations during the crisis, optimal use of resources and prevention of their loss, and lacking parallel work in organizations (38). The coordination through the Joint Plans is another good strategy to assist the responsible organizations in the effective use of available resources. The coordination through joint procurements by external sources can lead to an increased negotiating power and reduced costs which could eventually effect on improving service providing and also reducing competition (22). Noteworthy, whenever there is a predetermined network composed of local staff, the coordination can be effective and successful, which the logistical preparations can establish "quick measures" to deal with the created crisis (39). Members of the medical emergency teams need to establish a reliable communication with the coordination centers (39), and also free communications among other categories active in the crisis can considerably enhance the coordination and shorten the probable problems. According to a study prepared by the enforcement working group of emergency preparedness and health law, four operational measures were identified as follows (40):

1. Organizing to implement applicable measures

In order to have a comprehensive preparation at all administrative and justice levels, (local, provincial, national, etc.), the institutions and organizations must have a comprehensive understanding about the plans, responsibilities, authority and etc, of each other, to provide a proper response to natural and unnatural disasters. So, every field first needs to be organized through the establishment of a periodic framework by senior representatives in each section.

The operational measures include:

A) Establishing a steering committee to guide initiative designs to promote the coordinate and multisectoral response.

- B) Implementing a careful planning in order to achieve the peak of coordination and multisectoral response to the disasters
- C) Integrating the committee program to leadership in the national incident management system.
- D) Creating a direct link among the steering committee management system and emergency planning
- E) Creating a direct link with the counterparts in other provinces and neighboring countries

2. Roles and responsibilities

Beyond organizing in order to implement the measures, some other steps are required to comprehensively understand the roles, responsibilities and authorities. In other words, the roles and responsibilities for each action and intrasectoral and coordinated response in consistent with the National Incident Management System must be clear and unambiguous.

3. Communication and information sharing

The coordinated emergency response and preparedness needs to have access to intra communications and also the types of key information. In this field, the communication is referred to a network of interactions among specialists and organizations in all fields and communicational network created with other departments, chosen officials, the media, the public, as well as electronic systems that support the communication. The word of information is referred to the main content which experts need in all fields in order to perform their duties (before, during and after the events). Coordination requires the exchange of special information from all organizations involved to acknowledge the specific details of time, costs, and the needed measures to achieve common goals.

In other words, efforts will lead to failure without accurate, and timely information, and providing them to organizations involved to match their measures to changing circumstances and preferences in order to achieve a coordinated action (41). For an optimal and effective decision making, it is essential to face the crisis to have an accurate and real-time information about the type, location and the extent of incident, in addition to the location, type and the availability of resources needed (42). In other words, having correlated information is one of the most important prerequisites for a successful coordination. For instance, it includes accurate and timely information on the needs of target population and information on responding to organizations, their situation, capability and capacity to respond (43).

4. Education and training

If the required preparedness becomes achieved prior to the crisis and people get sufficiently trained, experiences get sufficiently obtained from previous crises, there will be more chances of success in managing the crisis. Therefore, it is required to perform necessary planning at different

national, provincial and municipal levels based on the cycle of crisis management. Different scenarios must be prepared and run in each region considering the frequency and probability of disasters, and the experiences on how to manage the crisis in non-critical condition must also be obtained by establishing regular and scheduled exercises, and necessary preparedness to encounter principally the probable crisis be achieved based on the results obtained from training and education (44). Scientific studies indicate that the training in the field of crisis management and the preparedness against disasters could lead to saving thousands of lives, reducing costs, maintaining assets, and preventing the secondary complications (44). Another study has suggested that in order to achieve the desired cooperation in response to the natural disasters, it is necessary to consider some measures in pre disaster phase, to precisely determine the duties, the exact details of the process of organizations, and how to cooperate and coordinate in the frame of specific instructions and programs. The study also suggested that in the preparation phase, these programs must be run and trained to achieve an effective coordination among the organizations in the response phase (24). Finally, the application of cooperation should be applied in the framework of crisis management community to leave a positive effect in reducing the impact of disasters. A study also confirmed this fact that coordinating an acceptable strategy in crisis management has a significant and positive results (45).

2. Conclusion

As mentioned, the coordination among the organizations and service providers is not simple and requires a systematic approach in all measures. In order to reduce the adverse effects of the crisis, in addition to applying a comprehensive model in the crisis response phase, some measures need to be performed in the pre-crisis (preparation) phase in order to promote the coordination between organizations. In other words, without the coordination and the preparation in the pre-crisis phase, a successful response cannot be expected. The coordination patterns used in other countries and copying them will not be beneficial for the country. It is worth noting that the experiences of other countries, besides considering the social, economic, cultural conditions of our country, can reduce considerable losses occurring due to disasters and crises. It is hoped that this study and similar studies can be helpful even small in improving the knowledge of crisis management in order to reduce the impact of disasters and crises. In this regard, studies in the field of coordination problems among the responsible organizations at the time of event in terms of structural, political, social and cultural can be beneficial to our country. The comprehensive

model of crisis management needs to be designed and implemented at different national, provincial, regional and local levels to establish more coordination effectively among responsible organizations.

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