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Qualitative study of health system preparedness for traumatic incidents in a religious mass gathering

Arezou Karampourian[a], Zohreh Ghomian[a], Davoud Khorasani-Zavareh[a,b,c,*]

[a] Department of Health in Disasters and Emergencies, School of Public Health and Safety, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[b] Safety Promotion and Injury Prevention Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[c] Department of Neurobiology, Care Sciences and Society (NVS), H1, Division of Family Medicine and Primary Care, Alfred Nobels Allé 23 141 83 Huddinge, Sweden

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ABSTRACT

Background and Objectives: Traumatic incidents may occur during religious mass gatherings. A lack of preparedness by the health system to respond to traumatic incidents may increase the mortality rate. This study investigated the factors that affect the preparedness of a health system to respond to traumatic incidents, and we provide appropriate suggestions for improving the response to such incidents during religious mass gatherings.
Methods: A qualitative research method was used with a conventional content analysis approach. In total, 22 semi-structured interviews were conducted employing the content analysis method. The data were analyzed based on the means of the meaning units, condensed meaning units, sub-themes, themes, and codes.
Results: Four main categories and nine sub-categories emerged from the data: factors that increased or decreased the occurrence of incidents (with three sub-categories comprising risk perception and fatalism, pilgrims' responses to incidents, and health system response to traumatic events); medical infrastructure (with two sub-categories comprising medical infrastructure in the host country and medical structures in border cities); organizational resource category (with two sub-categories comprising manpower, and equipment and facilities); and coordination of responsible organizations (with two sub-categories comprising inter-organizational coordination and inter-agency collaboration). All of the data were extracted from the experiences of the participants.
Conclusion: Similar to other mass gatherings, Arbaeen requires multi-sectoral and international planning, organizing, and management. The key factors that could improve the preparedness to respond to traumatic events in Arbaeen include training, increasing the perception of risk, changing the attitudes and behavior of pilgrims, developing a national strategic plan of the health system preparedness for policymakers, and implementing scenario-based exercises for executives.

Introduction

Mass gatherings of people are usually defined as involving a specified number of persons at a particular location for a specific purpose and a defined period of time (1). The number of people attending is sufficient to impose a strain on the planning and response resources of the community, state, or nation that hosts the event (1). The pilgrimage of Arbaeen is one of the largest annual religious gatherings throughout the world. During this ceremony, a large number of pilgrims gather on the 40th day after the anniversary of the martyrdom of Imam Hussein, who was the third Imam of the Shiite Muslims, in Ashura near Karbala south of Baghdad (2). The number of Iranian pilgrims at the Arbaeen ceremony during 2016 was around 2.5 million (3). In general, several factors may contribute to the causes of traumatic incidents in mass gatherings, including the density and mood of the population, stampedes and terrorist incidents, and the lack of necessary infrastructure, where these factors can affect the amount and type of medical needs in mass gatherings (4–8). One negative consequence of these incidents may be a stampede by a crowd. Stampedes are severe human catastrophes (4) because they can occur repeatedly in gatherings with a high mortality rate, and they mainly happen at religious ceremonies (5). For example, the Mina stampede in Saudi Arabia during 2015 resulted in 4173 deaths (5).

* Corresponding author.
E-mail addresses: a.karampourian@sbmu.ac.ir (A. Karampourian), zghomian@gmail.com (Z. Ghomian), davoud.khorasani@sbmu.ac.ir (D. Khorasani-Zavareh).

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The nature and magnitude of massive human gatherings vary, but the accumulation of people can increase the likelihood of traumatic incidents that affect a significant number of people, so emergency management is required if there is an increased demand and inadequate provision of emergency and medical services (9,10). The management of mass gatherings requires planning, preparation, coordination, and emergency responses. Planning for events that might lead to trauma is absolutely essential for mass gatherings (1). Preparation by the health system provides an opportunity to identify the population at risk. In addition to reducing mortality, the provision of medical care at mass gatherings can significantly reduce the number of patients transferred to hospitals (1,11). The planning for mass gatherings must start before the event commences. Depending on the country concerned, planning usually involves a range of governmental and nongovernmental organizations (NGO) at the local, national, and regional levels, and it may require an interdisciplinary approach (9,12). Mass gatherings attract many people who can be exposed to a wide range of health hazards. A major challenge is the incidence of physical traumatic events and the need for health services (12–14). A low level of preparedness to respond to traumatic victims can lead to catastrophic consequences with negative consequences for the health sector (15). Therefore, comprehensive planning and considerations of the outcomes for mass gatherings are essential, and they will contribute to improving the preparedness of the health system. Studies have investigated various types of mass gathering related to sports, festivals, music, and shows (16–18), but the factors that affect the preparedness of health systems vary for different religious mass gatherings, particularly among countries.

The factors that influence the preparedness of health systems for mass gatherings are multidimensional, subjective, and dependent on the context, so qualitative research is essential. In this study, we investigated the factors that might affect the preparedness of the health system for traumatic incidents during a religious mass gathering.

Materials and methods

A qualitative research method was used with a conventional content analysis approach. Qualitative content analysis is a suitable method for generating knowledge, new ideas, presenting facts, and practical guidance to fulfill the purpose of the research (19).

Study setting

The study was conducted on three land borders between Iran and Iraq on the route to Karbala. Initially, unstructured interviews were performed followed by semi-structured interviews, where they focused on the experiences of people involved with policy making, planning, and the provision of services, and the implementation of the Arbaeen ceremony.

Study participants

The objective of this study was to determine the factors that might affect the preparedness of the health system for traumatic incidents during a religious mass gathering. Based on the qualitative study principles, the participants were selected from individuals with extensive experience or knowledge of the event. Initially, the key informants in various organizations were listed according to a purposeful sampling method based on the knowledge of the authors who were involved with disaster management and the management of mass gatherings. The principal investigator then contacted the key informants and those who agreed to participate in the study were contacted to arrange future interviews. The experienced pilgrims had participated in the Arbaeen ceremony at least twice and those who agreed to participate in the study were also selected purposefully. In total, we selected 22 participants comprising six pilgrims, 12 executive managers, and four policymakers in the health services field. The backgrounds of the participants varied greatly, including subjects from the Ministry of Health and Medical Education, Ilam University of Medical Sciences, Khuzestan University of Medical Sciences, Kermanshah University of Medical Sciences, the Iranian Red Crescent organization, Social Security Organization, and Hajj and Pilgrimage Organizations, as well as pilgrims.

Data collection procedure

Face-to-face interviews were the main method employed for collecting data, where two unstructured interviews were initially performed to identify the general concepts and areas for exploration. Next, 20 semi-structured interviews were conducted with an interview guide. Open questions were used for collecting data, including the experiences and beliefs of individuals, with no restriction on the definitions or specifics (20). The interviews started with introductory and open questions, following by probing questions until data saturation occurred (21). The duration of the interview was based on the tolerance, amount of information, willingness, and agreement of the participants, where they lasted between 40 and 100 minutes. The interviews were conducted individually based on a convenient time and place for the participants. Each interview was conducted with the permission of the participants and it was also recorded with their consent. Interviews were conducted with pilgrims/managers/policy makers based on the study questions. Initially, the following general questions were asked: “please describe your experiences with the preparation of the mass gathering for the Arbaeen ceremony,” “what problems did you face during the deployment?,” “what types of organizations were needed to coordinate the team's deployment?,” “what are your suggestions for managers and policymakers regarding the management of the health system for Arbaeen?,” and “what are your suggestions to pilgrims/ managers/ policymakers regarding travel safety during the pilgrimage?” Next, based on the responses of the contributors, advanced and exploratory questions were asked to obtain more in-depth information. The recorded digital files were transcribed on the first day after the interview.

Data analysis

The method proposed by Graneheim and Lundman was used to analyze the qualitative content (22). The researcher listened to the interview files several times and the transcribed text was read multiple times. Data were extracted from the primary text by careful examination and multiple comparisons of the data, sub-themes, and themes. Thus, the data were first encoded as meaning units, condensed meaning units, codes, and sub-themes, and eventually the main themes (22).

Ethical considerations and study permission

This study was approved on 2017/08/10 under number IR.SBMU.RETECH.REC.1396.349 by the Ethics Committee of Shahid Beheshti University of Medical Sciences (23). Written consent was given by executive managers and policymakers, and oral consent by pilgrims before participation in the study and for recording the interviews. Anonymity, confidentiality of information, and the right to leave the interviews at any time were considered. The interview time and place were set at the convenience of the participants.

Trustworthiness

In order to ensure the validity of the findings, rigor was confirmed by using the guidelines suggested by Guba and Lincoln for establishing trustworthiness (24). In order to meet the requirement for credibility, all of the authors who were involved with the overall process conducted the research. Moreover, the principal investigator always engaged with the participants and was available to conduct in-depth interviews with the participants. Ongoing and prolonged engagement was ensured during the data collection and data analysis process, which lasted for around two years. Triangulation was also used to ensure the credibility and confirmability of the data, where the data collection and data analysis process were checked for two investigators during the coding process. In addition, a check was performed by an expert in the field of mass gatherings to validate the findings. Furthermore, the overall process for coding and developing themes, as well as its monitoring, was performed by an expert in qualitative research to ensure the credibility of the results. Member checks were conducted to ensure better interactions and understanding between the participants and researchers. The eligibility of the research team was considered where the team members all had sufficient experience in the field of mass gatherings. In addition, representative findings were obtained by maximizing the variations in the sampling and selection procedure where the participants came from different organizations, including the Ministry of Health and Medical Education, medical team, and executive managers, as well as from other organizations including the Red Cross, Medical Community Mobilization, Hajj and Pilgrimage Organization, medical universities throughout the country in the border cities, and the Social Security Organization, and they differed in terms of their work experience, education, and gender. Finally, the experiences of the pilgrims were carefully considered in this study. In order to allow reproducibility, we documented the detailed processes employed.

Results

The mean age of the participants was 45 years with average work experience of 20 years and the highest number of Arbaeen visit was five (Table 1).

The number of initial codes obtained from the interviews was 1365, which were first placed in 25 sub-categories and 10 categories. After merging, nine sub-categories with four categories were obtained.

The main theme identified in this study was coordination due to the focus on preparation or organization-oriented preparation for events in the Arbaeen ceremony. Establishing multi-organizational coordination as well as correcting the fatalistic beliefs and enhancing the perception of risk by people and authorities facilitated the provision of appropriate healthcare infrastructure and manpower management. The results obtained in this study highlighted the challenges involved with organizational coordination and its impact on other components of the Arbaeen ceremony. The main categories and sub-categories comprised: factors that increase or decrease the occurrence of incidents (with three sub-categories comprising risk perception and fatalism, the response of pilgrims to incidents, and health system response to traumatic events); medical infrastructure (with two sub-categories comprising medical infrastructure substructures in the host country and medical structures in border cities); organizational resources (with two sub-categories comprising manpower, and equipment and facilities); and coordination of responsible organizations (with two sub-categories comprising inter-organizational coordination and inter-agency collaboration) (Table 2).

Table 1
Demographic characteristics of participants in the study on factors affecting the health system preparedness in a religious mass gathering.

	Variables	Number (Percent)
Participants	**The pilgrim**	**6(% 27.3)**
	Executive managers	**12**(54.5**%**)
	Policymakers	**4**(18.2**%**)
Age	**30-40**	**8**(36.4**%**)
	41-50	**8 (36.4%)**
	51-60	**6 (27.2%)**
Sex	**Male**	**20 (90.9%)**
	Female	**2 (% 9.1)**
Work experience (Years)	**10**	**4 (18.2%)**
	11-20	**6 (27.3%)**
	21-30	**9 (% 40.9)**
	30	**3 (13.6%)**
Number of Arbaeen visit	**No**	**3 (13.6%)**
	1-5	**15 (68.2%)**
	5 -10	**4 (18.2%)**

Factors that increase or decrease the occurrence of incidents

Risk perception and fatalism

Most of the contributors described factors that might increase or decrease the occurrence of incidents as the main effective factors. These factors were not the causes of incidents but they could be related to neglect and risky behavior. Individual and group safety during the trip as well as physical and mental preparedness before the journey can prevent certain incidents, where insecurity and inappropriate behavior in congested conditions may increase the likelihood of certain incidents occurring. The Arbaeen event occurs in Iraq. Due to internal conflicts and pseudo-war conditions, the probability of deliberate and unintentional incidents occurring is high and there have been many incidents in this country, so it is necessary for pilgrims as well as policymakers and administrators to recognize and understand the possible risks involved.

> *"Pilgrims begin to travel without physical preparedness and knowledge of the dangers of the journey . . . There are dangers such as stampedes and terrorist attacks . . . Some traumatic events occur due to these reasons . . . "*

Responses of pilgrims to incidents

Similar to any other trip, the Arbaeen pilgrimage may involve risks; therefore, it is necessary for pilgrims to increase their physical preparation for carrying loads and undergoing long walks before travelling. The distance from the city of Najaf to Karbala is about 80 kilometers, and pilgrims usually walk this path over the course of three days and two nights. Thus, the pilgrims must be psychologically prepared to accept the hardship of the trip, to cope with any incidents, and to become acquainted with methods for assisting the injured, so that they can help themselves at the earliest possible time and reduce the incidence of subsequent injuries. Pre-travel training will help pilgrims to increase their level of knowledge to meet future challenges.

> *"The pilgrims must be physically prepared for long journeys and cargo transportation. People who are not physically prepared will incur worse injuries . . . Pilgrims must carry their own equipment and essential drugs . . . We must train them before the trip about possible occurrences and first aid in order to prepare themselves for these situations . . . "*

Health system responses to traumatic events

The organizations responsible for the health system should be prepared months before the start of the ceremony. The participants indicated that policymakers and executives need to be aware of previous events, the lessons learned, and possible scenarios for

Table 2
The inductive process of abstraction of codes and categories of factors affecting the health system preparedness in a religious mass gathering.

Category	Subcategory	Code
Increasing or decreasing factors for the occurrence of incidents	**Risk perception and fatalism**	The possibility of stampede due to crowds
		The imagination that the hazard will not happen
		Low perception of risk on pedestrianism
	Pilgrims response to incidents	The creation of physical preparation before the trip
		Understanding the difficulty of traveling
		Know the travel requirements and conditions
	Health system response to traumatic events	Identify the vulnerable people on the trip
		Evaluate and prioritize route hazards
		Establish health centers to respond to health needs
		Having contingency plans for mass casualty incidents(MCI)
		Facilitate and expedite the transfer of injured individuals
Medical infrastructures	**Medical infrastructure in the host country**	The need for common therapeutic protocols between countries involved in mass gatherings
		The need to equip medical centers in the host country
		Engaging experienced medical personnel in the neighboring country
	Medical infrastructure in border cities	Create a dedicated path for rescue vehicles
		Creating a rail and airway to reduce traffic crashes
		Prohibition of the passage of personal vehicles on border roads
		The necessity to equip medical centers in border cities
Organizational resources	**Manpower**	The need to estimate a specialist team based on the population
		Providing volunteers based on the culture of pilgrims
		Providing medical personnel familiar with religious mass gathering
		The presence of trained rapid response forces
	Equipment and facilities	Allocation of the necessary funds for holding the ceremony
		Assessment of medicines and equipment
		Equitable distribution of health facilities
		Providing essential equipment for traumatic medical centers
		Providing facilities for the medical team
Coordination of responsible organizations	**Inter-organizational coordination**	Coordination of the responsible organization with partner organizations
		Determine responsible organizations in biological events
		Establishment of an organization for managing NGOs
		Formation of unit command and incident command system
		The existence of the same policy among organizations
	Inter-agency collaboration	The need to have a plan for religious mass gathering
		Establishment of a data registration system
		Implementation of therapeutic guidelines during the ceremony

mass casualty incidents (MCI) and terrorist incidents. They should be able to respond in an appropriate manner and transfer victims rapidly. Planners and executives should consider the worst possible scenarios and maintain the safety and security of pilgrims, and the possibility of incidents should not be ignored. Data should be monitored and evaluated continually to ensure the effectiveness of the services provided. Increasing the readiness of the responder organizations requires the will, knowledge, experience, and skill of managers.

" . . . We already have a history of MCI and terrorist incidents, and we should prepare ourselves to face such situations and determine how to respond if a terrorist incident occurs. We need to predict what should be done if a terrorist incident happens. Policymakers should not wait until an incident happens and then take action . . . "

Medical infrastructure

Medical infrastructure in the host country

Equipped centers are key factors related to the accountability and effectiveness of therapeutic processes. Due to the occurrence of terrorist and traffic incidents in Iraq, and the existence of numerous barriers that hinder the transfer of patients, the availability of well-equipped medical centers along with specialized personnel in border towns and in Iraq were requirements identified by pilgrims and officials. Moreover, the lack of standardized operational procedures, protocols, and therapeutic guidelines in the two countries can lead to problems with treatments, and thus legal problems. A lack of facilities, medical equipment, and specialist equipment were other problems for pilgrims. The production of a memorandum of understanding for the establishment of common medical treatment protocols between the two countries could enhance the effectiveness of health services, as well as standardizing healthcare and legal practices.

"The medical guidelines in Iraq are very different from those in Iran. For example, if someone needs advanced medical care because of an incident, they may face some limitations and difficulties. There are fewer physicians and nurses in Iraq and the medical facilities are not very good . . . We require common therapeutic protocols in the two countries to prevent any legal problems. "

Medical infrastructure in border cities

Iranian and non-Iranian pilgrims enter the country via the three land borders at Mehran, Shalamche, and Khosravi. In most cases, travel to the border is by road and personal vehicles, which increases the risk of road traffic crashes. Despite the creation of temporary health centers, as well as emergency stations on the routes to and around border towns, the access to healthcare in these cities is poor due to the entry and transit of millions of pilgrims. The development of permanent and temporary healthcare infrastructure for the pilgrim population could be effective strategies for improving access to healthcare. It is also advisable to create a variety of service delivery methods to serve both pilgrims and residents in the border regions, such as helicopter ambulances in border regions and cities. In addition, in order to reduce the risk of road traffic injuries, it is necessary to prohibit the use of personal cars and increase the use of rail and air vehicles.

"Therapeutic facilities are limited in the border cities . . . There is no correlation between the population density and the facilities

available . . . The travel routes for ambulances and other vehicles are the same and this delays the provision of services . . . The large numbers of personal cars lead to traffic jams and road crashes . . . Additional hospital infrastructure and air ambulances (helicopter ambulances) should be considered in the border cities . . . Creating infrastructure is in the interests of the people of the region . . . "

Organizational resources

Manpower

According to the participants, human resources are among the most important factors that affect the provision of health services. An expert team must be established according to the needs and pilgrim populations at the treatment centers in the border towns as well as along the route to Arbaeen. In fact, the supply of human resources should be based on the needs of the region, the population, and the culture of the pilgrims and their religious values. Training rapid response teams for the border and Iraqi cities is a key issue for policymakers. According to the laws of Iraq, agreements are required for cooperation in the fields of communication and coordination.

"In some camps, there was a shortage of qualified people to provide help and treatment . . . In order to refer patients to Iraqi hospitals, we need people who are familiar with the culture of the pilgrims and the Arabic language . . . Due to the possibility of chemical, biological, radiological, and nuclear explosive incidents in Iraq, we need trained rapid response teams."

Equipment and facilities

According to the contributors, especially policymakers, one problem is the lack of equipment and facilities due to inadequate financial provision for the Arbaeen ceremony. Equipment and facilities are not provided by Iraq and the requirements are not met, so it is necessary to increase the allocation in terms of financial resources. The Iranian Red Crescent has therapeutic centers in Iraq, but Iraq is not able to supply medicine and equipment to the centers, Therefore, it is necessary that the requirements in terms of medicine and equipment are correctly estimated according to the needs of the health team and the medical team, so they can coordinate with the Iranian Red Crescent and send supplies to Iraq before the ceremony begins. The basic requirements of the team must be met in terms of accommodation, nutrition, and heating and cooling arrangements in order to provide effective quality services. Most of the executives and policymakers who participated in the study agreed that:

"One of the challenges is the lack of funds for the ceremonies . . . Due to the Iraqi conflict with the Islamic State of Iraq and the Levant, and the lack of facilities and treatment facilities, we have to supply these facilities . . . After the end of the ceremony, physicians are requested to report the number of cases and the medical expenses that need to be considered for the next year . . . Comfortable facilities should be provided for the health team. "

Coordination of responsible organizations

Inter-organizational coordination

According to the participants in this study, especially policymakers, in addition to the Ministry of Health and Medical Education as the main provider of healthcare, it is important to facilitate coordination and cooperation with other partner organizations. The implementation of a command and control system for incidents can help to create a common language and understanding in order to aggregate and allocate resources as well as for responding to incidents. However, coordination is not achieved at present due to inconsistencies. Strengthening intergovernmental coordination, establishing a joint command system, and developing a joint operational plan between the Ministry of Health and Medical Education and Medical Assistance with collaborative and supportive organizations will improve the quality of services at the Arbaeen ceremony. The organizations responsible for providing services in chemical, biological, radiological, and nuclear incidents must be identified in advance, and pre-hospital and hospital centers should be provided at the time of the response to an incident. In addition, a specific organization should be considered for managing the NGOs.

"All organizations should be coordinated to provide better services because they are currently considered to be non-aligned with each other due to the lack of a common and united command structure . . . The command structure must be of a militaristic nature and authority is necessary to manage several different organizations . . . There is no specific organization for responding to biological events and managing NGOs, and the organizations do not follow a single policy."

Inter-agency collaboration

It is essential that the Ministry of Health and Medical Education as a healthcare organization is prepared months before the ceremony, but there are no therapeutic guidelines for providing healthcare according to the participants. The implementation of a system for registering information and patient referrals should be considered and scheduled before the ceremony. An automated system could be designed for identifying, tracking, and registering patients, and existing data could be used for planning ceremonies in future years. It would be helpful to develop guidelines and protocols to establish a precedent for healthcare organizations and centers.

"It is necessary to plan several months in advance for the Arbaeen ceremony . . . A data registration system should be developed to accurately analyze the results and to plan for the next event . . . There must be common protocols and guidelines between the governmental health centers and NGOs to prevent legal issues"

Discussion

In this study, which is the first of its kind in Iran, we explored the factors that might influence the preparedness of a health system for responding to traumatic events in a religious mass gathering. The most important factors that affect the preparedness of a health system for dealing with the injured pilgrims include factors that increase or decrease the occurrence of incidents, as well as the medical infrastructure, organizational resources, and the coordination of responsible organizations.

Coordination is one of the key management elements and it comprises a set of structural and human mechanisms that are designed to link components together to facilitate the achievement of goals (25), but some problems were identified in this area in the present study. In particular, the coordination of responsible organizations, as well as effective interactions and procedural standardization in the planning, organizing, and allocation of resources before, during, and after the event will allow the provision of more favorable healthcare for pilgrims. Collaboration also involves coordination and dividing the roles between subsystems to achieve shared roles. Various studies have shown that a lack of resources and coordination, and poor communication are problems that affect organizational performance in critical situations. In fact, a lack of correlation and the inappropriate distribution of resources are due to a lack of coordination, and thus coordination is the most important element compared with other factors such as resources and communication. Improving

coordination can reduce casualties in the community. In addition, coordination requires the transfer of information between beneficiary organizations to achieve a common goal. Poor resources and education are important problems that affect coordination during mass gathering events, as well as posing problems for disaster managers (26–28). The Ministry of Health and Medical Education is responsible for health at the ceremony but because of its nature and extent, in addition to inter-organizational coordination, it needs to be coordinated with other supportive collaborator organizations (29). In this study, a lack of coordination was identified as a fundamental inter-organizational challenge and it was stated that the organizations often operate in isolation. The coordination of responsible organizations in mass gatherings is a key concern for planners in a similar manner to other types of disasters and mass casualty incidents (29,30). In terms of post-event management and challenging disaster management, there should be a focus on the problem of inter-organizational coordination and the need for integrated organization to ensure the monitoring and coordination of preventive activities. Thus, it was agreed that a coordinated prevention strategy is the most important requirement (29–33). In the Hajj ceremony religious gathering, a multidisciplinary planning and multidisciplinary team comprising health, research, educational, and security organizations is formed before the start of the event in order to coordinate the necessary services. In addition, a specialized interdisciplinary approach is required in order to hold the ceremony, as well as the need to plan and coordinate with the organizations involved (12,34). Comprehensive planning of preparedness is essential for other mass gatherings such as sports, festivals, music events, and shows (16–18). Some mass gatherings are predetermined and planned, especially sports and music mass gatherings, so they usually have fewer coordination problems (3,35), whereas some religious mass gatherings are held spontaneously and voluntarily with no governmental involvement and little coordination. Similar to the Arbaeen ceremony, these gatherings are based more on the beliefs and values of individuals.

Furthermore, increasing or decreasing the probability of occurrence of traumatic events was identified as another factor that might affect the preparedness of the health system. In fact, modifying some factors can affect the incidence of events during religious mass gatherings. Several studies have shown that important factors such as population congestion, equipment and facilities, weather conditions, the event time and location, site safety, moving population size, and participant behavior during incidents that occur in mass gatherings are factors that planners must consider to ensure adequate preparedness. Identifying the variables that affect events as well as the injury patterns and patterns of morbidity and mortality can improve the effectiveness of the medical response system, care level, and preparedness program. Therefore, in addition to identifying effective components, comprehensive planning and rapid diagnosis are needed. Understanding these key factors can help policymakers and custodians to prevent incidents and their consequences (1,5,12,36,37). It is important to note that in the Sendai framework for disaster risk reduction 2015–2030, risk perception is the first priority for reducing the risk of disasters that have been identified, and comprehensive participation at national and local levels as well as formal and informal education and public awareness of disaster risk factors can help to prevent and mitigate the risk of disasters (38). Holding mass gatherings in countries involved with numerous internal and external wars is associated with an increased likelihood of risk for pilgrims, and thus identifying the risks and preparing to respond to them is essential for pilgrims, policymakers, and administrators. Understanding the risks at both the individual and public levels are crucial according to the present study of the Arbaeen mass gathering, as well as for other types of mass gathering and mass casualty incidents. Identifying the key factors related to incidents can help to reduce the risk of injury, change behavior, and improve preparedness, but this is not possible without education and the participation of people, authorities, and policymakers. Improving the awareness and skills of pilgrims will enhance the culture of safety. However, according to the participants, a lack of education is one of the main challenges for the health system because it prevents the dissemination of sufficient knowledge regarding the contributory factors and the risk of travel.

Organizational resources are essential requirements when holding an event. Human resources also influence the readiness of health systems for all types of mass gathering. The aim of enterprise resources is the proper use of human capital, facilities, financial resources, and operations. Allocating and organizing resources, especially in the human dimension, should be cost effective but it should be noted that sudden changes will reduce the provision of desirable services in organizations with minimal resources. A lack of resources as well as expert personnel can lead to crises in mass gatherings (1,6). Thus, it is important to determine the facilities required for mass gatherings, as well as identifying the number of pilgrims, the mean time of the event, and the average time required to use the facilities (10). Numerous studies of religious mass gatherings, such as the Hajj and Kumbh Mela in India, as well as the Athens Olympic Games, have demonstrated the importance of managing and supplying adequate human resources and equipment before a ceremony (12,14,39). The primary goal of medical preparedness in mass gatherings is planning for rapid access and triage for probable injuries, which are important for planning and estimating the requirements for specialist human resources. There are no international standards for determining the number of treatment teams, the required training, and level of care in mass gatherings, but previous experiences from the same or similar events can provide more reliable estimates of the needs in terms of human resources and equipment (40,41). Similar to other mass gatherings, the management of organizational resources, including specialized staff and facilities, should be considered before organizing a ceremony. Available records and previous experiences of the event can help to estimate the manpower and equipment required to provide appropriate and fair healthcare services. Previous studies indicate that the readiness for organized mass gatherings depends on investment in the health infrastructure and the size of the gathering, but strengthening the infrastructure and coordination should continue after the mass gathering. Inappropriate locations for gatherings, poor facilities, or a lack of infrastructure and medical services can increase the vulnerability of communities. The remoteness of health facilities and the lack of necessary road infrastructure will make medical services and emergency assistance ineffective.

Poor health facilities and road infrastructure are consequences of infrastructure constraints, and low standard medical care may increase the likelihood of injuries caused by mass gathering incidents (4,42,43). Based on the findings obtained in the present study, the establishment of specialized medical centers with expert personnel is a requirement considering the frequency of road traffic crashes and the shortcomings of the patient transfer process. Political consultations between governments involved in mass gatherings may eliminate some shortcomings by exchanging experienced medical personnel. In addition, the provision of part of the required infrastructure can also be achieved via popular contributions and charitable organizations. The lack of dedicated financial credits can also be addressed to improve the efficiency and effectiveness of human resources. The creation of infrastructure requires large amounts of financial resources and investments, which sometimes occurs outside of the country, but

sponsors could help to finance mass gatherings and the availability of resources is mainly dependent on financial donors (41). Occasionally, some mass gatherings overlap with natural hazards, terrorist incidents, and mass casualty incidents, and thus planning to be prepared for these incidents is vital in order to prevent disaster from becoming a catastrophe (44). Relying on limited government resources alone cannot meet the costs of mass gatherings, so it is essential to win the trust of sponsors and manage financial donors. Religious mass gatherings are an opportunity to improve the level of health system readiness through the development of infrastructure and facilities, as well as equipping and employing experienced staff in border provinces with multiple goals for both the native people and pilgrims.

Limitation and strength of the study

This is the first qualitative study of a religious mass gathering in Iran. Therefore, valuable results were obtained but the findings were based on semi-structured interviews so they are considered subjective (44). However, for future studies, we recommend that a tool should be designed to facilitate quantitative research based on the results of the present study. The limitations of this study include the lack of female managers and policymakers responsible for planning in preparation for the Arbaeen ceremony. However, we consider that there would have been no difference in the experiences of men and women in terms of the factors that affected the preparedness of the health system for traumatic events, or their suggestions for improving the response to traumatic events.

Conclusion

Religious mass gatherings need to be planned, organized, and managed by multiple groups and internationally. The features and conditions of the site may increase the likelihood of incidents occurring and the vulnerability. In addition, due to the annual increase in the number of pilgrims and the changes in the Arab calendar, the type and probability of the risks vary among religious mass gatherings. Therefore, education focused on risk perception and changing the attitudes and behavior of pilgrims can help to improve the level of readiness. Similarly, developing a national strategic plan with a focus on health system readiness for policymakers can be effective. Implementing scenario-based exercises for executive managers can also help to improve the level of preparedness. The next step based on this study is constructing an instrument by combining our qualitative findings with a systematic review of previous research, which is currently underway. The findings of this study will help policymakers and executive managers to improve their coordination through drills and exercises.

Competing interests

No conflicts of interest have been expressed by the authors.

Fund

Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Author contribution

AK and DKZ have made substantial contributions to the conception and design of the study, data generation, results from interpretation and writing-up the manuscript. AK took responsibility for and coordinated the acquisition of data, which she gathered and analyzed. She took an active part in the analysis of the data, its abstraction and the writing-up of the manuscript. DKZ and ZGH were involved in the data analysis process and supervised it. All authors read and approved the final manuscript.

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