



# The Participation of Disaster Medical Assistance Team Members in Response to Disasters and Related Factors

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## Abstract

**Background:** The purpose of this study was to assess the presence of Disaster Medical Assistance Team (DMAT) members at the site of disasters and related factors.

**Methods:** This quasi-experimental study was conducted on all 178 DMAT members in Iran in 2020. A researcher-made questionnaire was used to collect data, which consisted of 20 questions. On a pre-appointed time, DMAT members were called for disaster by receiving a text message and asked to come to a pre-appointed place. Data analysis was performed using descriptive and inferential statistics, included chi-square test.

**Results:** Only 29% of the members responded to the call and showed up at the place. There were significant relationships between being a clinical member, membership in similar organizations, experience of work in disasters, worries about the health of the child, responsibility for taking care of an old family member, believing the disaster site's safety and security and the availability of personal protective equipment in the disaster site with the status of response to disaster call.

**Conclusion:** Overall, the response rate to call was very low, which indicates the need to take measures to improve it. Continuing training and providing safety at disaster areas and support for family members will increase the presence at work in disasters.

**Keywords:** Disasters, Disaster medical assistance team, Field hospital, Report, Willingness, Work

## Introduction

Epidemiological studies showed that disasters have been on the rise over the last years (1). Consequently, the focus on disaster management has increased over the past decade (2). The main goal of disaster management in health systems is to save people's lives and maintain the health of society (3). To achieve this, a continuous flow of health services should be planned from the scene of the disaster to the medical centers (4). Disaster Medical Assistance Teams (DMATs) is one of the main groups that delivers health care to casualties at the site of disaster (5). DMATs work with different patterns in various countries (6). Members' expertise, team's facilities, and tasks vary in different patterns (7-9). Regarding DMATs, no matter their differences, what is important is the presence of team members in the site of incidence at the time of disasters (10). It is obvious if the DMAT members do not report at work at the scene of disasters, even with the best composition and structure, no medical care will be provided to the casualties.

Previous studies indicated that being absent from the work at the time of disasters is a common problem that could seriously affect the quantity and quality of health services (11,12). In order to reduce the rate of non-response to disaster's call and absenteeism from work during disasters among the DMAT members, it is necessary to know the factors affecting it. Although some studies are conducted in this field, almost all of them were on health centers' staff and not staff of mobile units such as DMAT members (13,14). One of these studies was conducted by Cone and Cummings. In that survey study, attitudes of 1711 hospital employees from 9 hospitals working during disasters were assessed (14). Results of the study demonstrated that having the responsibility of taking care of children and pets affect the attitude to work during disasters. Only one study was found in this field that was conducted on DMAT members. In this study, Iyama *et al* assess the intention to participate in different types of disasters' activity among DMAT members in Japan (15). The results of the study indicated that age is an influential factor in the decision to engage in disasters' activity. In general, considering the gap of knowledge in this field and the importance of DMATs in providing vital cares for casualties of disasters, this study aimed to assess the presence of DMAT

members in site of disasters and related factors. The findings of this research can help managers in the health system to better plan for response operations and design evidence-based interventions to increase the probability of DMAT members' presence at the scene of disasters.

## Materials and Methods

This quasi-experimental study was conducted on DMAT members of Mashhad University of Medical Sciences (MUMS). All of the study population were enrolled in the study by using census method. There was no inclusion or exclusion criteria.

## Setting

Iran is a developing country located in Southwest Asia with a population of about 80 million. Iran is at risk of disasters (16). Khorasan Razavi province is the second most populated province in Iran and its disaster profile is like other areas of the country (17). MUMS is responsible to manage and provide health care services for residents of the province in case of disasters. It do it according to the I.R. Iran National Health Disaster and Emergency Response Operations Plan (NEOP) and National Response Framework (NRF) (18,19). Although in NEOP and NRF it is mentioned that DMATs should be sent to the scene after the disasters, there is no additional explanation about the characteristics of DMATs such as composition of members, duties, *etc*. In this way, some Universities of Medical Sciences in Iran have formed their own DMAT/s (20). MUMS have three DMATs, with similar structure, duties and careers/disciplines. Each DMAT consists of two sub-teams: operational team and logistic team. The operational sub-team includes 52 clinical members including: two general physicians, four emergency medicine specialists, two surgery specialists, and so on. The logistics sub-team comprises 16 non-clinical members (21). These DMATs are assigned to deliver medical care/interventions in the field hospital of MUMS, which will launch in the site of disaster. In total, DMATs of MUMS have 178 members (some members are common between all three DMATs). The tool used to collect data in this study was a questionnaire designed based on literature. The questionnaire's content validity and internal

consistency were approved and Cronbach's alpha coefficient with the participation of 20 members in one measurement. We did the survey with a group of respondents and repeated it with the same group at a later point in time. We then compared the responses at the two time points. Reliability coefficient value was 0.8, which indicates that the research questionnaire has an acceptable reliability.

The questionnaire consisted of three parts. At the first part, demographic variables of participants were measured by four questions. The second part of the questionnaire was dedicated to measure the variables that were assumed to be related to attendance (obtained from literature review). This part had 16 questions. The third part had one question: "Was the DMAT member present at the venue (the conference hall of X hospital)?"

To collect the data, on a pre-appointed day (which was previously arranged by disaster managers of MUMS for disaster training), a text message was sent to the cell phone of members about the occurrence of a disaster and the need to operate in the field hospital and for this purpose, they should be present at the conference hall of X hospital as soon as possible. Then, the questionnaires were distributed among the members who were present in the hall

and filled. Those who did not show up in the hall were contacted by the researcher and were asked to answer the questionnaire. In case of no response, the questionnaire was sent three times by e-mails. For both groups, who were present and absent, the third part of the questionnaire was answered by the researcher.

Descriptive and analytical statistical methods were utilized to analyze the data. Descriptive statistics methods included mean, standard deviation and percentage. According to the result of the Kolmogorov-Smirnov test, the distribution of all the quantitative variables is non-normal. Chi-Square test was used to measure the relationship between variables of the study. Data analysis was done using IBM's Statistical Package for the Social Sciences (SPSS) version 20 software.

## Results

178 members of the DMATs were called. In total, 52 (29.2%) members participated in the call (appeared at the appointed site). Demographic characteristics of the members and the relationship between demographic characteristics and the members' participation status in the call are shown in table 1. The mean age of the members was  $38 \pm 5.2$  years.

**Table 1.** Demographic characteristics of the members and the relationship between demographic characteristics and the members' participation status in the call

Demographic variables		Participation in the call?		Sum n (%)	p-value*
		Yes n (%)	No n (%)		
Gender	Man	32 (28.1)	82 (71.9)	114 (100)	0.634
	Woman	20 (31.3)	44 (68.7)	64 (100)	
Age (year)	20-29	5 (38.5)	8 (61.5)	13 (100)	0.067
	30-39	26 (28.9)	64 (71.1)	90 (100)	
	40-49	12 (20.7)	46 (79.3)	58 (100)	
	Older than 50	9 (52.9)	8 (47.1)	17 (100)	
Marital status	Married	43 (27.7)	112 (72.3)	155 (100)	0.656
	Single	7 (43.8)	11 (61.1)	18 (100)	
	Divorced	1 (25)	3 (75)	4 (100)	
Work experience (year)	Less than 5	7 (43.8)	9 (56.3)	16 (100)	0.092
	5-25	30 (23.1)	100 (76.9)	130 (100)	
	More than 25	10 (37)	17 (63)	27 (100)	

\* Chi-Square test.

**Table 2.** The relationship between study variables and the members' participation status in the call

Study variables		Participation in the call?		Sum n(%)	p-value*
		Yes n(%)	No n(%)		
Being a clinical member	Yes	21 (18.3)	94 (81.7)	115 (100)	0.001
	No	25 (43.9)	32 (56.1)	57 (100)	
Experience of participating in disaster relief projects	Yes	27 (37.5)	45 (62.5)	72 (100)	0.030
	No	24 (22.9)	81 (77.1)	105 (100)	
Membership in similar organizations such as Red Cross Crescent (RCC)	Yes	45 (36)	80 (64)	125 (100)	0.001
	No	6 (11.5)	46 (88.5)	52 (100)	
Having a car	Yes	28 (25)	84 (75)	112 (100)	0.198
	No	22 (34.9)	41 (65.1)	63 (100)	
Having family responsibilities	Yes	33 (29.7)	78 (70.3)	111 (100)	0.833
	No	19 (28.4)	48 (71.6)	67 (100)	
Having a child younger than 7 years	Yes	15 (25.4)	44 (74.6)	59 (100)	0.481
	No	37 (31.1)	82 (68.9)	119 (100)	
Worries about the health of the child	Yes	21 (43.8)	27 (56.3)	48 (100)	0.003
	No	27 (21.4)	99 (78.6)	126 (100)	
Having responsibility for taking care of an old family member	Yes	4 (30.8)	9 (62.2)	13 (100)	0.003
	No	47 (28.7)	117 (71.3)	164 (100)	
Having the spouse in the team	Yes	2 (22.2)	7 (77.8)	9 (100)	0.841
	No	48 (28.7)	119 (71.3)	167 (100)	
Suffering a chronic disease	Yes	0	2 (100)	2 (100)	0.669
	No	52 (29.5)	124 (70.5)	176 (100)	
Having special responsibilities at work	Yes	21 (30)	49 (70)	70 (100)	0.377
	No	27 (26)	77 (74)	104 (100)	
Disagreements at work	Yes	5 (31.3)	11 (68.8)	16 (100)	0.511
	No	47 (29)	115 (71)	162 (100)	
Disagreements at home	Yes	0	9 (100)	9 (100)	0.890
	No	52 (30.8)	117 (69.2)	169 (100)	
Crisis training background	Yes	29 (28.4)	73 (71.6)	102 (100)	0.355
	No	22 (29.3)	53 (70.7)	75 (100)	
Believing on the disaster site's safety and security	Yes	9 (39.1)	14 (60.9)	23 (100)	0.0415
	No	43 (27.7)	112 (72.3)	155 (100)	
Believing on the availability of personal protective equipment in the disaster site	Yes	7 (53.8)	6 (46.2)	13 (100)	0.001
	No	45 (27.3)	120 (72.7)	165 (100)	

\* Chi-square test.

As it is shown in table 1, women participated in the call more than men. Moreover, the single participated in the call more than the married and divorced. Over 50% of the respondents who were in the age group of 50 and above participated in the call. Less than half (43.8%) of the participants with less than 5 years of work experience participated in the call. There was no statistically significant difference between demographic characteristics and the members' participation status in the call.

Study variables and the relationship between study variables and the members' participation status in the call are presented in table 2.

According to table 2, out of clinical members, 21 (18.3%) and from non-clinical members, 25 (43.9%) took part in the call. There was a significant relationship between being a clinical member and participating in the call ( $p\text{-value}\leq 0.001$ ). Of those who had an experience of participating in a disaster response before, 27 (52.9%) and from people without such an experience, 24 (47.1%) participated in the call. There was a significant relationship between having an experience of participating in a disaster response and participating in the call ( $p\text{-value}\leq 0.05$ ). Among those who had a membership in similar organizations, 45 (36.0%) and of those who were not members of similar organizations, 6 (11.5%) took part in the call. The relationship between the membership in similar organizations and participating the call was statistically significant ( $p\text{-value}\leq 0.001$ ).

Among the individuals who were concerned about the safety of their child, 21 (43.8%) and from who did not have concerns about children, 27 (21.4%) participated in the call. There was a significant relationship between having concerns about the child and participating in the call ( $p\text{-value}\leq 0.05$ ).

Out of members who had responsibility for taking care of an old family member, 4 (30.8%) and from who had not such responsibility, 47 (28.7%) took part in the call. There was a significant relationship between having the responsibility for taking care of an old family member and participating in the call ( $p\text{-value}\leq 0.05$ ). Of those who believed that the disaster site is safe and secure, 9 (39.1%) and of those who did not have such a belief, 43 (27.7%) participated in the call. The relationship between believing on the disaster site's safety and security and participation in

the call was significant ( $p\text{-value}\leq 0.05$ ). Among those who believed that personal protective equipment is available in the disaster site, 7 (53.8%) and of those who did not have such a belief, 45 (27.3%) took part in the call. The relationship between believing on the availability of personal protective equipment in the disaster site and participating in the call was statistically significant ( $p\text{-value}\leq 0.001$ ).

## Discussion

The purpose of the study was to assess the presence of DMAT members in scene of disasters and related factors. The results showed that less than one-third (29.2%) of the members participated in the call, which is not consistent with the findings of the study by Iyama *et al*. They investigated the intention of DMAT members in Japan to engage in activities during different types of disasters. Their results showed that the intention to participate in activities in natural, human-made, chemical, biological, radiological/nuclear, and explosive were 82%, 82%, 50%, 47%, 58% and 52%, respectively. This difference in participation rate can be due to the difference in the type of two studies. Study of Iyama *et al* was cross-sectional, but our study was quasi-experimental. It is well known that the findings of experimental or quasi-experimental studies are more accurate and valid than observational studies such as cross-sectionals (22).

The findings of the study demonstrated that there is a relationship between having a responsibility for taking care of an old family member and participating in the call ( $p\text{-value}\leq 0.003$ ). Consistent with our study, the results of a study conducted by Ghavami *et al* also indicated that having a responsibility for the care of elderly people of the family is significantly related to decision to come to work during disasters (17). The aim of the study was to identify the predictors of nurses' reporting for work at the time of three types of disasters included epidemic of an unknown contagious respiratory disease, earthquake and flood. This cross-sectional study was performed on 350 nurses of hospitals in Iran. Our study also showed that concerns about children is one of the factors related to taking part in the call. Regarding this, our results are consistent with the results of a study aimed to assess willingness of Australasian emergency nurses to attend their workplace in a disaster (23). Logically,

someone who is concerned about the safety and health of her family members, especially about the more vulnerable members such as children and the elderly, or has responsibilities regarding this, has less desire and ability to participate in disasters.

According to our findings, there was a significant relationship between having an experience of participating in a disaster response and participating in the call ( $p\text{-value}\leq 0.05$ ), which is in line with the results of the study of Yuen *et al* (24). The purpose of Yuen's study was to investigate the factors affecting Chinese nurses' willingness to report to work in a disaster. They found that participants with experience of working in emergencies and disasters were more willing to work in such situations ( $p\text{-value}\leq 0.05$ ). Previous training and experience in dealing with disasters can have a direct impact on staff's competencies (25), which in turn increases the sense of being effective in dealing with emergency situations, and the desire to be present at workplace (26). Our study indicated that the membership in similar organizations is related to response to call to attend the disaster scene ( $p\text{-value}\leq 0.001$ ). Those who, apart from being members of MUMS' DMATs, were also members of other similar organizations such as RCC, participated more in the call. This seems to be in contrast with the findings of Adams and Berry's study (27). It aimed to identify ability, willingness, and barriers regarding the reporting of hospital staff to the work setting following a disaster. That was a survey. Having concurrent work or voluntary obligations was one of the identified barriers to report to work in disasters. This inconsistency could be caused by the difference in the method of these two studies. This duality in obligations and work, or in other words the need to be present in two places at the same time, becomes an obstacle to being present when the person is not sure whether he/she is called to be present in both places or not, that is, whether his/her presence in both places is equally necessary and obligatory or not. This is the situation that existed in this survey study, and other similar studies. But in our study, the person was clearly told to attend one of the places and one has less doubts about being in one of the two places. On the other hand, with the premise that those who are members of more than one organization in the field of disaster operations have received more training in

dealing with disasters, and based on the relationship between training and presence in disasters that was discussed above, people with dual duties are more likely to participate in disaster's call.

Results of the study showed that believing on the disaster site's safety and security and availability of personal protective equipment are significantly related to participation in disaster call. In this case, our findings are consistent with the findings of the study of Rebmann *et al* (28). The purpose of that study was to identify determinants of paramedic's willingness to work during an influenza pandemic. The feeling of safety at work was presented as a factor affecting willingness to work during a bio-natural disaster. It has also been proven in previous studies that the feeling of insecurity and safety is one of the important obstacles to attending and working in disasters (29,30).

Not specifying the type of occurred disaster in the recall announcement can be the main limitation of this study. But it was inevitable because, firstly, we did not want to limit our study on few disasters, and also if the call announced that an earthquake or flood had occurred, it would be proven that it was not a real call. Recommendation for future research is assessing the presence of DMAT members in disaster exercises that are implemented in peripheral and remote areas.

## Conclusion

It can be concluded that in real time in the field, the participation of DMAT members will be low. This can lead to serious problems in the response of the health system to disasters and requires special attention and taking measures to eliminate or reduce it. In addition to conducting periodic scheduled maneuvers, continuous training and providing safety at disaster areas and the availability of protection equipment and also support for family members will increase the participation of DMAT members in disaster's operation in the field.

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## Conflict of Interest

The authors declare no conflict of interests.

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