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Disaster Knowledge, Skills, and Preparedness among Emergency Medical Services in Saudi Arabia

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Original Research

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Abstract

Objectives: Emergency Medical Services (EMS) workers are critical to effective disaster response. Therefore, it is important to understand their knowledge, skills, and preparedness for disasters. This study investigated factors influencing EMS workers' disaster knowledge, skills, and preparedness in the Saudi Arabian context. The study also sought to identify challenges to disaster preparedness among Saudi Arabian EMS workers.

Methods: A descriptive cross-sectional survey using *The Disaster Preparedness Evaluation Tool* was distributed to EMS workers in military and government hospitals across 3 Saudi Arabian cities. Responses were recorded on a 6-point Likert scale where higher scores indicated higher knowledge, skills, or preparedness. The results were analysed using descriptive and inferential statistical analysis.

Results: 272EMS workers participated in this study. EMS workers reported a moderate level of knowledge (3.56), skills (3.44), and preparedness (3.73) for disasters. Despite this, EMS workers reported a high level of involvement in regular disaster drills ($M = 4.24$, $SD = 1.274$) and a strong interest in further disaster education opportunities ($M = 5.43$, $SD = 1.121$). Participants also reported a high skill level with the triage principles used in their workplace during a disaster ($M = 4.06$, $SD = 1.218$). The study findings revealed a significant positive correlation between disaster preparedness levels and age, years of experience, education level, and the facility worked in.

Conclusions: EMS workers have moderate disaster knowledge, skills, and preparedness levels. Knowledge, skill, and preparedness have a significant relationship on the EMS workers' demographics. These findings demonstrate the need to invest in preparing Saudi Arabian EMS workers to effectively respond to bioterrorism disasters.

The Centre for Research on Epidemiology of Disaster defines a disaster as "an occurrence that disrupts the society's socio-economic wellbeing and results in more than 10 deaths or over 100 injuries, respectively" (p.423).[1] There have been over 22 000 disasters recorded globally since 1900, according to The United Nations Office for Disaster Risk Reduction. This is followed by 7348 disaster events between 2000 to 2019 that impacted over 4.2 billion people.[2] This demonstrates a growing human cost when compared to the 20 years between 1980-1999 that affected 3.25 million people.

The burden of disasters varies by nation and region. Flooding is the most common natural disaster in Saudi Arabia, with 7 of 10 significant disasters being floods.[3] Since 1980, at least 4660 people have died, 32 000 have been adversely affected, and $US 4.65 billion in damages have been incurred due to disasters in Saudi Arabia.[4] For example, more than 122 people died and approximately 350 people were reported missing in 2009 due to floods in Jeddah.[5–6]

The World Health Organization (WHO) stresses the importance of disaster preparedness to enhance the health care worker response.[7] Emergency medical services (EMS) workers in Saudi Arabia are the critical front-line responders dispatched to manage a disaster. EMS workers are educated on best practices and approaches to respond to, and mitigate, disasters of various types, contexts, and magnitude.[7–8] However, little is known about EMS workers' perceived knowledge, skills, and preparedness for disasters.[9–10]

A preliminary analysis of literature identifies a paucity of literature investigating EMS workers' knowledge, skills, and preparedness in Saudi Arabia.[8,11] However, most studies focus on other health care workers, such as nurses, and few include EMS workers in their study population.[4,12–14] It is essential to understand this population's disaster knowledge, skills, and preparedness needs. So, this study aims to assess the perceived disaster knowledge, skills, and preparedness among EMS workers in Saudi Arabia.

Methods

Collection Tool

This study used the Disaster Preparedness Evaluation Tool (DPET).[15–17] in a cross-sectional survey to understand the knowledge, skills, and preparedness of EMS workers in Saudi Arabia. The DPET is increasingly adapted to assess the disaster preparedness of all emergency workers.[4,18] The tool is validated in assessing and reporting disaster self-perceived preparedness levels (Cronbach's α = 0.90) and has been validated for Middle Eastern populations using principal component analysis (PCA) with Varimax (Cronbach's α = 0.90).[15]

The DPET is a 65-item instrument that measures participants perceptions of their preparedness for disaster management. Forty-five items are Likert-type questions with 6 response options ranging from strongly disagree to strongly agree.[19] Of these, the first 25 items relate to Pre-Disaster Preparedness grouped into 3 categories: knowledge, disaster skills, and personal preparedness. The next 16 items related to response were grouped into knowledge and patient management. The final 6 items relate to the Recovery stage of the disasters and are grouped into knowledge and management, and the professional specialty title "RN" (for registered nurse) and "Nurse Practitioner" has been replaced with "EMS."

Sample

EMS workers from government and military hospitals in the 3 largest cities of Saudi Arabia (Riyadh, Jeddah, and Dammam) were approached as sites to recruit participants in the study to complete the DPET survey. The survey was distributed in English, as this is the medium of communication among Saudi EMS workers. The sample size was estimated using the following formula validated to estimate sample size in cross-sectional studies (add ref).

$$n = Z1\text{-}\alpha/2^2[p(1-p)]/d^2$$

Where "n" is the sample size, $Z1\text{-}\alpha/2^2$ is the standard normal variate (at 5% Type 1 error and 95% CI [$p < 0.05$] it is 1.96), P is the expected proportion in population based on previous studies, and d is the absolute error or precision. According to this formula, with an expected proportion of 80% based on previous studies and a precision of 5%, a minimum sample of 245 EMS workers was needed to produce statistically accurate results.

Data Collection Process

EMS workers were recruited to the study by receiving an email from their EMS department supervisors in each hospital. The email had the study flyer, which included a URL hyperlink with information about the study and a link to the survey. The study questionnaire was provided through the research electronic data capture (REDCap) platform. [21, 20]Participant responses to the survey were collected between January and April 2021.

Ethics and Analysis

Ethical approval was obtained from the relevant committees with the ethical approval number (H-2020-0350). Findings were analysed with descriptive and inferential statistics using the SPSS (version 21) software. The data were analysed descriptively using means, standard deviation, percentages, and frequencies. A regression analysis was conducted on the survey response to identify the relationship between the EMS demographic and knowledge, skills, and preparedness levels. The findings were also analysed through a correlation analysis model. Comparison and correlation between (i) the dependent variables and (ii) the independent and dependent variables was investigated (ANOVA and Independent T-test analysis).

Results and Findings

Descriptive Analysis and Summary

A total of 358 responses were received. Of these, 86 responses were incomplete and excluded, leaving 272 responses included in the analysis. Participants' demographics are shown in Table 1.

Most participants were male 84.6% ($n = 230$), aged between 26-35 years (63.6%, $n = 173$), and held a bachelor's degree (72.4%, $n = 197$). More than half the participants had between 1 to 6 years of experience as an EMS worker (50.7%, $n = 138$), worked in a government hospital (69.5%, $n = 189$) between 35–60 hours per week (91%, $n = 247$), and had worked in a disaster situation 90.4% ($n = 246$).

Disaster Knowledge

EMS workers reported moderate knowledge levels regarding disasters. A high level of involvement in regular disaster drills was reported ($M = 4.24$, $SD = 1.274$). A strong level of interest was demonstrated for further disaster education opportunities ($M = 5.43$, $SD = 1.121$). A summary of the questions analysed is provided in Table 2 below.

Table 1. EMS worker participants demographic analysis

Variable	Elements	Frequency f	Percentage %
Gender	Male	230	84.6%
	Female	42	15.4%
Age	18–25 years	59	21.7%
	26–35 years	173	63.6%
	36–45 years	40	14.7%
Experience	1 to 6 years	138	50.7%
	7 to 12 years	108	39.7%
	13 to 18 years	26	9.6%
Educational	Diploma degree EMT	51	18.8%
	Bachelor's degree EMS	197	72.4%
	Master's degree EMS	16	5.9%
	Master's degree Other	8	2.9%
Experience/ Participation in Disaster Situation	Yes	246	90.4%
	No	26	9.6%
Facility Worked in	Government Hospital	189	69.5%
	Military Hospital	83	30.5%
Area of Residence	Riyadh	125	46.0%
	Jeddah	98	36%
	Dammam	49	18.0%
Weekly working Hours	20–34 hours/week	25	9.2%
	35–60 hours/week	247	90.8%

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Table 2. EMS workers' level of knowledge for disaster management

Item	Question	Mean	Std. Dv	Level
Q1	I have participated in emergency plan drafting and emergency planning for disaster situations in my community.	3.53	1.347	Moderate
Q2	I participate in disaster-related educational activities on regular basis (e.g., Continuing education classes, seminars, or conferences dealing with disaster preparedness)	3.79	1.235	Moderate
Q3	I am aware of classes about disaster preparedness and management that are offered (e.g., at my workplace, the university, or community)	3.74	1.203	Moderate
Q4	I find that the research literature on disaster preparedness and management is easily accessible.	3.58	1.150	Moderate
Q5	I know who to contact (chain of command) in disaster situations in my community.	3.78	1.213	Moderate
Q6	I find that the research literature on disaster preparedness is understandable.	3.59	1.187	Moderate
Q7	I know where to find relevant research or information related to disaster preparedness and management to fill in gaps in my knowledge.	3.53	1.190	Moderate
Q8	I have a list of contacts in the medical or health community in which I practice for use in case of a disaster (e.g., health department).	3.66	1.173	Moderate
Q9	I would be interested in educational classes on disaster preparedness that relate specifically to my community situation	5.43	1.121	High
Q10	I read journal articles related to disaster preparedness.	3.21	1.213	Moderate
Q11	Finding relevant information about disaster preparedness related to my community needs is an obstacle to my level of preparedness	3.64	1.157	Moderate
Q12	In case of a disaster situation, I think that there is sufficient support from local officials on the local or national level.	3.66	1.213	Moderate
Q13	I participate in disaster drills or exercises at my workplace (clinic, hospital, etc.) on a regular basis.	4.24	1.274	High

Disaster Skills

Respondents reported a high skill level with the triage principles used in their workplace during a disaster (M = *4.06,* SD = *1.218*). While most respondents reported a moderate level of disaster skills, low level skills were reported for performing isolation during bioterrorist/biological attack (M = 2.92, SD = 1.306), and decontamination procedures in bioterrorism/biological attack (M = 2.99, SD = 1.323). A summary of the questions in this category is provided in Table 3.

Table 3. EMS workers' level of skills for disaster management

Item	Question	Mean	Std. Dev	Level
Q14	In case of a bioterrorism/biological attack I know how to execute decontamination procedures.	2.99	1.323	Low
Q15	I have an agreement with loved ones and family members on how to execute our personal/ family emergency plans.	3.18	1.297	Moderate
Q16	I consider myself prepared for the management of disasters.	3.74	1.129	Moderate
Q17	I participate/have participated in creating new disaster guidelines, emergency plans, or lobbying for improvements on the local or national level.	3.28	1.232	Moderate
Q18	In case of a bioterrorism/ biological attack, I know how to use personal protective equipment.	3.22	1.417	Moderate
Q19	I believe I would be considered a key leadership figure in my community in a disaster situation.	3.52	1.273	Moderate
Q20	I am aware of what the potential risks in my community are (e.g., earthquake, floods, terror, etc).	3.75	1.229	Moderate
Q21	In a case of bioterrorism/biological attack I know how to perform isolation procedures so that I minimise the risks of community exposure	2.92	1.306	Low
Q22	I am familiar with the local emergency response system for disasters.	3.77	1.191	Moderate
Q23	I am familiar with accepted triage principles used in disaster situations.	4.06	1.218	High
Q24	I have personal/family emergency plans in place for disaster situations.	3.43	1.310	Moderate

Disaster Preparedness

EMS disaster preparedness level showed a non-significant positive associated with level of experience, age, and education level. Participants in military hospitals registered a higher disaster preparedness index than their peers in government public hospitals. There was a significant positive correlation between disaster preparedness levels and age (P = 0.00), experience in years (P = 0.00), education level (P = 0.000), facility worked in (P = 0.001), and the hours worked (P = 0.01). Respondents reported moderate preparedness for disasters in most preparedness items. Low preparedness was reported in relation to familiarity with signs, symptoms, and effective treatments for biological weapons (M = 2.90, SD = 1.199). A summary of the questions in this category is provided in Table 4.

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Table 4. EMS workers' level of preparedness for disaster management

Item	Question	Mean	Std. Dev	Level
Q25	I feel confident managing (treating, evaluating) emotional outcomes for Acute Stress Disorder or PTSD following disaster or trauma in a multi-disciplinary way such (e.g. referrals and follow-ups), knowing what to expect in ensuing months.	3.18	1.271	Moderate
Q26	I am familiar with the main Groups (A, B, C) of biological weapons (Anthrax, Plague, Botulism, Smallpox, etc.), their signs and symptoms, and effective treatments.	2.90	1.199	Moderate
Q27	I know the limits of my knowledge, skills, and authority as an EMS to act in disaster situations, and I would know when I exceed them.	3.94	1.183	Moderate
Q28	I am familiar with the organizational logistics and roles among local, state, and federal agencies in disaster response situations.	3.64	1.207	Moderate
Q29	As an EMS, I would feel confident as a manager or coordinator of a disaster shelter.	3.92	1.232	Moderate
Q30	I am familiar with post disaster psychological interventions, e.g., behavioral therapy, support groups and incident debriefing for patients who experience emotional or physical trauma.	3.49	1.187	Moderate
Q31	I would feel confident providing education on coping skills and training for patients who experience traumatic situations so they are able to manage themselves.	3.76	1.221	Moderate
Q32	I can identify possible indicators of mass exposure evidenced by a clustering of patients with similar symptoms	3.46	1.086	Moderate
Q33	I can manage the common symptoms and reactions of disaster survivors that are affective, behavioral, cognitive, or physical in nature.	3.54	1.104	Moderate
Q34	I am able to describe my role in the response phase of a disaster in the context of my workplace, the general public, media, and personal contacts.	3.68	1.151	Moderate
Q35	I feel confident recognizing deviations in health assessments indicating potential exposure to biological agents.	3.19	1.163	Moderate
Q36	As an EMS, I would feel confident in my abilities as a direct care provider and first responder in disaster situations.	3.89	1.187	Moderate
Q37	As an EMS, I would feel reasonably confident in my abilities to be a member of a decontamination team.	3.74	1.234	Moderate
Q38	In case of a bioterrorism/biological attack, I know how to perform a focused health history and assessment, specific to the bioagents that are used.	3.03	1.245	Moderate
Q39	I feel reasonably confident I can treat patients independently, without supervision of a physician, in a disaster situation.	3.92	1.361	Moderate
Q40	I would feel confident implementing emergency plans, evacuations procedures and similar functions	3.66	1.273	Moderate
Q41	I would feel confident providing patient education on stress and abnormal functioning related to trauma.	3.81	1.231	Moderate
Q42	I am able to recognize the signs and symptoms of Acute Stress disorder and Post Traumatic Stress Syndrome (PTSD).	3.43	1.301	Moderate
Q43	I participate in peer evaluation of skills on disaster preparedness and response.	3.52	1.221	Moderate
Q44	I am familiar with how to perform a focused health assessment for PTSD.	3.35	1.226	Moderate
Q45	I am familiar with what the scope of my role as an EMS in a post-disaster situation would be.	3.88	1.192	Moderate

Table 5. T test for the EMS workers' socio-demographic variables with 2 levels, gender and participation in disaster

			Levene's Test for Equality of Variances		t-test for Equality of Means						
										95% Confidence interval of the Difference	
Variable relationship to facility worked in			*F*	Sig.	*t*	*Df*	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Gender	Disaster Knowledge	Equal Variences Assumed	2.876	.091	.817	270	.415	.10834	.13263	–.15279	.36947
		Equal Variences Not Assumed			.938	65.566	.352	.10834	.11549	–.12227	.33895
	Disaster Skills	Equal Variences Assumed	4.266	.040	1.691	268	.092	.23098	.13659	–.0395	.49990
		Equal Variences Not Assumed			1.981	67.449	.052	.23098	.11660	–.00172	.46367
	Disaster Preparedness	Equal Variences Assumed	4.848	.029	1.159	266	.248	.16854	.14546	–.11786	.45495
		Equal Variences Not Assumed			1.364	68.146	.177	.16854	.12359	–.07807	.41515

(*Continued*)

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Table 5. (*Continued*)

Variable relationship to facility worked in			Levene's Test for Equality of Variances		t-test for Equality of Means						
										95% Confidence interval of the Difference	
			F	Sig.	*t*	*Df*	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Participation in Disaster	Disaster Knowledge	Equal Variences Assumed	.508	.477	–4.321	270	.000	–.68194	.15784	–.99269	–.37119
		Equal Variences Not Assumed			–3.435	28.067	.002	–.68194	.19855	–1.08861	–.27527
	Disaster Skills	Equal Variences Assumed	7.736	.006	–5.235	268	.000	–.84117	.16069	–1.15755	–.52478
		Equal Variences Not Assumed			–3.658	27.198	.001	–.84117	.22996	–1.31284	–.36949
	Disaster Preparedness	Equal Variences Assumed	2.565	.110	–4.849	266	.000	–.83259	17169	–1.17063	–.49455
		Equal Variences Not Assumed			–3.696	27.787	.001	–.83259	22529	–1.29423	–.37095

Table 6. One Way ANOVA analysis for independent EMS workers' socio-demographic variables with more than 2 levels

Variable relationship to facility worked in			Findings				
			Sum of Squares	*Df*	Mean Square	*F*	Sig.
Age	Disaster Knowledge	Between Group	2.417	2	1.208	1.950	.144
		Within Group	166.690	269	.620		
		Total	169.106	271			
	Disaster Skills	Between Group	11.939	2	5.969	9.527	.000
		Within Group	167.290	267	.627		
		Total	179.229	269			
	Disaster Preparedness	Between Group	12.889	2	6.444	9.110	.000
		Within Group	187.468	265	.707		
		Total	200.356	267			
Experience Years	Disaster Knowledge	Between Group	4.860	2	2.430	3.980	.020
		Within Group	164.246	269	.611		
		Total	169.106	271			
	Disaster Skills	Between Group	6.094	2	3.047	4.699	.010
		Within Group	173.135	267	.648		
		Total	179.229	269			
	Disaster Preparedness	Between Group	13.346	2	6.673	9.456	.000
		Within Group	187.010	265	.706		
		Total	200.356	267			
Education Level	Disaster Knowledge	Between Group	6.743	3	2.248	3.710	.012
		Within Group	162.363	268	.606		
		Total	169.106	271			
	Disaster Skills	Between Group	12.562	3	4.187	6.683	.000
		Within Group	166.667	266	.627		
		Total	179.229	269			
	Disaster Preparedness	Between Group	13.343	3	4.448	6.279	.000
		Within Group	187.013	264	.708		
		Total	200.356	267			

(*Continued*)

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Table 6. (*Continued*)

Variable relationship to facility worked in			Findings				
			Sum of Squares	*Df*	Mean Square	*F*	Sig.
City of Residence	Disaster Knowledge	Between Group	.352	2	.176	.281	.755
		Within Group	168.754	269	.627		
		Total	169.106	271			
	Disaster Skills	Between Group	1.321	2	.660	.991	.372
		Within Group	177.908	267	.666		
		Total	179.229	269			
	Disaster Preparedness	Between Group	.480	2	.240	.318	.728
		Within Group	199.877	265	.754		
		Total	200.256	267			
Working Hours	Disaster Knowledge	Between Group	1.209	1	1.209	1.944	.164
		Within Group	167.887	270	.622		
		Total	169.106	271			
	Disaster Skills	Between Group	4.433	1	4.433	6.797	.010
		Within Group	174.795	268	.652		
		Total	179.229	269			
	Disaster Preparedness	Between Group	8.741	1	8.741	12.134	.001
		Within Group	191.615	266	.720		
		Total	200.356	267			

Table 7. Pearson Correlation between the dependent variables: disaster knowledge, skills, and preparedness

		Disaster Knowledge	Disaster Skills	Disaster Preparedness
Disaster Knowledge	Pearson Correlation	1	.766**	.764**
	Sig. (2-tailed)		.000	.000
	N	272	270	268
Disaster Skills	Pearson Correlation	.766**	1	.830**
	Sig. (2-tailed)	.000		.000
	N	270	270	266
Disaster Preparedness	Pearson Correlation	.764**	.830**	1
	Sig. (2-tailed)	.000	.000	
	N	268	266	268

**Correlation is significant at the 0.01 level (2-tailed).

Independent and Dependent Variables Relationship

A correlational analysis was undertaken between the independent variables demographics (age, gender, experience years, facility worked in, city of residence, and the number of hours worked per week) and the dependent variables around awareness and preparedness, categorized as knowledge (Q1-13), disaster skills (Q14-24), and disaster preparedness (Q25-45). The first analysis used an independent t-test analysis for the demographic variables with 2 levels (gender and participation in disaster) (Table 5).

The first evaluation variable was the level of disaster knowledge. The findings showed a significant relationship to 3 demographic variables: education level ($P = 0.012$), facility worked in ($P = 0.01$), and years of experience ($P = 0.020$) (Table 6). Level of knowledge increased with age, experience, and hospitals worked in. There were also significant findings for relationships between disaster skills age ($P = 0.00$), experience in years ($P = 0.010$), education level ($P = 0.000$), the place of work ($P = 0.001$), and working hours per week ($P = 0.010$) (Table 6). Participants working in military hospitals reported a higher skills level than those in the government hospitals. However, other demographics did not significantly correlate with disaster skills, including age, years of experience, and education levels (Table 6).

Discussion

This cross-sectional survey was performed to investigate the factors that influence Saudi Arabian EMS workers' disaster knowledge, skills, and preparedness (Table 7). Several statistically significant correlations were found between the EMS workers' demographics (age,

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experience, educational level, facility worked in, and working hours) and the level of disaster knowledge, skills, and preparedness. Overall, EMS workers have a moderate level of disaster knowledge, skills, and preparedness. This indicates room for improvement in educating EMS workers on handling and managing disasters in Saudi Arabia. These findings are consistent with existing literature on disaster knowledge, skills, and preparedness. Corrigan and Samrasinghe[22] and Jafari et al.[23] found average levels of disaster knowledge, skills, and preparedness among EMS workers.[24]

Age had a significant positive correlation on the knowledge and skills level. EMS workers with higher age had a higher disaster knowledge and skills levels. This maybe due to EMS workers having more experience with disaster situations as they advanced in age. This makes the older EMS workers self-report better skills, knowledge, and preparedness for disasters than their younger peers. Existing literature found that increasing age is associated positively with workers' knowledge, skills, and preparedness.[19,23,28] The older the EMS workers are, the more opportunities they have to engage in training, practice exercises, and improve their disaster skills and preparedness through real-world experience.[19,23,25,26,28] Brewer et al.[29] and Al khalaileh et al.[19] reported similar findings. They found that with increasing age, workers had opportunities to engage and participate in different disaster situations, thus positively influencing their knowledge and preparedness level.

Participants with a bachelor's or higher degree in the EMS profession recorded a significantly higher knowledge, skills, and preparedness level than their peers without the diploma. Participants with a bachelor's or higher degree showed an interest in undertaking disaster education-related activities such as classes, conferences, seminars, and drills to increase their disaster preparedness (Table 2). Existing literature supports these findings by noting that combining educational sessions with hands-on skills training better equips EMS workers for disasters and increases their disaster preparedness.[4,6,12–15,17–19] As per previous studies, participants reported lower skills in performing isolation during bioterrorist/biological attacks.[4,19,31] This finding is common, as this type of disaster is rare in many countries.[31]

The type of hospital where EMS workers are employed significantly impacts their knowledge, skills, and preparedness levels. Those working in military hospitals had more opportunities to participate in disaster management drills than those in governmental hospitals. Workplace determines the level of exposure EMS workers have in coordinating, planning, and/or executing a disaster management plan and activity. The findings align with those of Tzeng et al.[32] and Al Thobaity et al.,[4] who demonstrated that participants working in a military hospital had a higher level of disaster knowledge, skills, and preparedness than those working in governmental hospitals. Other studies found that the availability of equipment and facilities determine the type of skills in managing and responding to disaster situations.[19,33–34]

Strengths and Limitations

This study had several strengths. First, the study recruited EMS workers from 3 different cities and facilities in Saudi Arabia. This allowed a broad representative sample of EMS workers in Saudi Arabia. An additional strength is the use of quantitative data. This helps with the ease of validation and a higher threshold for reliability and objectivity of the findings. Finally, this study used the validated DPET instrument to explore the EMS workers' preparedness. The study also had limitations. The study only focused on regional cities, so it did not capture rural communities in Saudi Arabia. Secondly, the survey did not assess the perceived level of knowledge, skills, and preparedness for a specific type of disaster. Therefore, it is impossible to generalize the findings to prepare for different types of disasters.

Conclusion

Effective disaster response relies on the effective preparation of skilled workers. This study found that Saudi Arabian EMS workers had a moderate level of knowledge, skills, and preparation for disaster. However, there was a low level of preparedness for biological and radiological events, where skills and knowledge levels were significantly low. This is one of very few studies to assess the preparedness of EMS workers. Further studies are required to understand the facilitators and barriers among EMS workers in Saudi Arabia toward disaster preparedness.

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