

# Disaster Preparedness in Hospitals in the Middle East: An Integrative Literature Review

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## ABSTRACT

Disasters occur rarely but have significant adverse consequences when they do. Recent statistics suggest that millions of lives and billions of US dollars have been lost in the last decade due to disaster events globally. It is crucial that hospitals are well prepared for disasters to minimize their effects. This integrative review study evaluates the preparedness level of hospitals in the Middle East for disasters using the Preferred Reporting Items for Systematic and Meta-Analyses (PRISMA) guidelines. The key terms include *disaster preparedness* OR *disaster management* OR *emergency response* AND *Middle East* AND *hospitals*. The study reviews articles published between January 2005 and December 2015, which focused on the hospitals' preparedness for disasters in the Middle East nations. Based on their meeting 5 eligibility criteria, 19 articles were included in the review. Twelve of the articles focused on both natural and man-made disasters, whereas 6 of them were based on mass casualty events and 1 on earthquake. Thirteen of the reviewed articles ranked the level of preparedness of hospitals for disasters to be generally "very poor," "poor," or "moderate," whereas 6 reported that hospitals were "well" or "very well prepared" for disasters. Factors affecting preparedness level were identified as a lack of contingency plans and insufficient availability of resources, among others. (*Disaster Med Public Health Preparedness*. 2019;13:806–816)

**Key Words:** disaster, hospital, Middle East, preparedness

Countries around the world, as well as Middle Eastern countries, such as Saudi Arabia, Iran, Qatar, and United Arab Emirates, have faced tremendous problems arising from disasters in recent times. Disasters are defined as those abrupt and unpredictable events that occur due to natural or man-made interventions with a consequence capable of adversely affecting human lives and properties, putting significant demand on resources.<sup>1</sup> The United Nations International Strategy for Disaster Reduction (UNISDR) estimates that between 2000 and 2012, disasters, both natural and man-made, cost US\$1.7 trillion in damages, affected 2.9 billion people, and killed 1.2 million globally.<sup>2</sup> According to the UNISDR report,<sup>2</sup> countries around the world experienced 3,455 floods, 2,689 storms, 470 droughts, and 395 extreme temperature-related disasters between 1980 and 2011. Given the increase in these events and their associated costs, it is imperative for hospitals and community services to be adequately prepared to manage these events if they occur.<sup>3</sup> Hospital preparedness is the development of knowledge and capacity in every area required by hospitals to effectually anticipate, respond to, and deal successfully with the negative consequences associated with potential disaster situations.<sup>1</sup>

Four stages of managing disasters have been identified as mitigation, preparedness, response, and recovery.<sup>4</sup>

Abd elazeem et al.<sup>4</sup> indicate that the mitigation phase focuses on reducing the effects of a disaster; preparedness is about getting ready for its actual occurrence; response centers act appropriately to preserve lives and properties; and the recovery stage concentrates on bringing normal life to the affected society. The significance of hospitals' preparedness for disasters cannot be overemphasized. A hospital's capacity and its preparedness to respond to disaster events are crucial to preserving lives through the provision of primary emergency medical attention to victims of such disasters.<sup>5</sup> According to Li et al.,<sup>6</sup> lives that may have been lost could be saved if hospitals are sufficiently ready for disasters. Li et al.<sup>6</sup> highlight that the effective preparedness of hospitals includes structural furnishings, human resource, appropriate policies, protocols, equipment, and supplies. Hospitals should also be adequately prepared and equipped to care for the additional patients arising from disasters without compromising their usual health care delivery service to their community.<sup>6</sup>

Although countries in the Middle East have stepped up their public awareness of the need for hospitals to be adequately prepared for disasters, especially after the event of the terrorist attack of September 11, 2001, empirical evidence suggests that more still needs to be done in this area.<sup>6–8</sup> Several previous

studies have suggested that the preparedness of hospitals in the Middle East nations for disaster events is generally inadequate.<sup>9–11</sup> For example, an assessment of preparedness of hospitals in Jeddah, Saudi Arabia, for disaster by Bajow and Alkhalil<sup>12</sup> shows that practical training and management are required for the efficient management of such incidents. According to Mahdaviyazad and Abdolahifar,<sup>10</sup> hospitals must invest in areas such as personnel capacity and other valuable resources to enhance their preparedness to respond adequately to disasters that can occur when least expected.

The primary aims of this integrative literature review are to investigate the level of preparedness, the factors influencing the preparedness level, and the measures that could be used to improve the preparedness for disasters among hospitals in the Middle East.

## METHODS

This study was conducted using an integrative review methodology based on the Preferred Reporting Items for Systematic and Meta-Analyses (PRISMA) guidelines.<sup>13</sup> This approach is being adopted widely within health research to facilitate the synthesis of the existing empirical literature on particular issues with the goal of improving the quality of health care.<sup>14</sup> This study adopted the processes recommended by Whittemore and Knafl,<sup>14</sup> which include problem identification, literature search, data evaluation, data analysis, and presentation. The advantage of conducting an integrative literature review over other related techniques (eg, systematic literature review) is that it can be applied effectively to examine the findings of studies that have used diverse research methodologies.<sup>15</sup> This research method has been described as the most rigorous means of conducting a diverse literature review and deducing important evidence for further studies.<sup>16</sup>

The comprehensive literature search was conducted primarily by drawing on articles indexed in 4 main databases, including Health and Medical Complete (PROQUEST), PubMed, Google Scholar, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL). The search strategy was based on searching for several primary key terms that include *disaster preparedness* OR *disaster management* OR *emergency response* AND *Middle East* AND *hospitals*. For all of the databases, the publication date was set between 1/1/2005 and 31/12/2015 to ensure a large pool of potential studies. Furthermore, references used in the articles searched originally were also checked through Google Scholar online databases for additional empirical evidence. The process of searching for the articles followed the suggestion of Whittemore and Knafl,<sup>14</sup> which is the combination of computerized databases, journal hand searching, and searching research registries. According to Whittemore and Knafl,<sup>14</sup> it is crucial to combine multiple methods to address irregular search terminology

and indexing issues that are particular to computerized databases.

The articles were included if (1) they have been indexed in the chosen databases, (2) they have been written in English language, (3) their titles related to hospitals' preparedness for disasters in any of the Middle East countries, (4) they have been published in peer-reviewed journals, (5) they were published between 2005 and 2015, and (6) they have findings that could be widely generalized. Those articles that did not meet the above inclusion criteria were removed from the review. For example, articles that had only their abstracts available were published in Arabic only, were based on expert opinions, and were previous literature reviews; studies that covered disaster preparedness in a single hospital setting were not included. Consideration was not given to whether the articles reported on natural or man-made disasters.

Following the preliminary search of the relevant databases undertaken by the researcher by reading through the abstracts, 5,427 articles were identified. Figure 1 presents the summary of the search strategy.

## Grading and Quality Assessment

The level of evidence is necessary to determine the validity of study designs and their degree of being free from bias.<sup>16</sup> Several methods are used to measure the quality of evidence presented in empirical articles. For example, the Strength of Recommendation Taxonomy method has been suggested for determining the level of evidence published in the medical science literature.<sup>17</sup> Also, Burls<sup>18</sup> recommends an assessment tool known as the Critical Appraisal Skills Programme (CASP). However, the 19 reviewed articles in this study were graded according to the level of evidence recommended by the National Health and Medical Research Council (NHMRC) in Australia.<sup>19</sup> The grading criteria are depicted in Table 1. In addition, Table 2 presents an overview of the articles according to the levels of evidence in line with NHMRC guidelines. Even though many of the articles were evaluated as less than a moderate level of evidence, all were included due to the small number of articles that met the inclusion criteria.

## Background of the Reviewed Studies

### *Types of Designs Used in the Studies*

The reviewed studies used a broad range of valid methods to determine the level of preparedness for disasters within the examined hospitals. Seven of the reviewed studies were based on quantitative research methodology in which questionnaire surveys were administered to the respondents that included senior hospital managers, medical practitioners, registered nurses, and other levels of health professionals<sup>9,12,20–24</sup>; Quantitative research, regarded as experimental, empiricist,

FIGURE 1

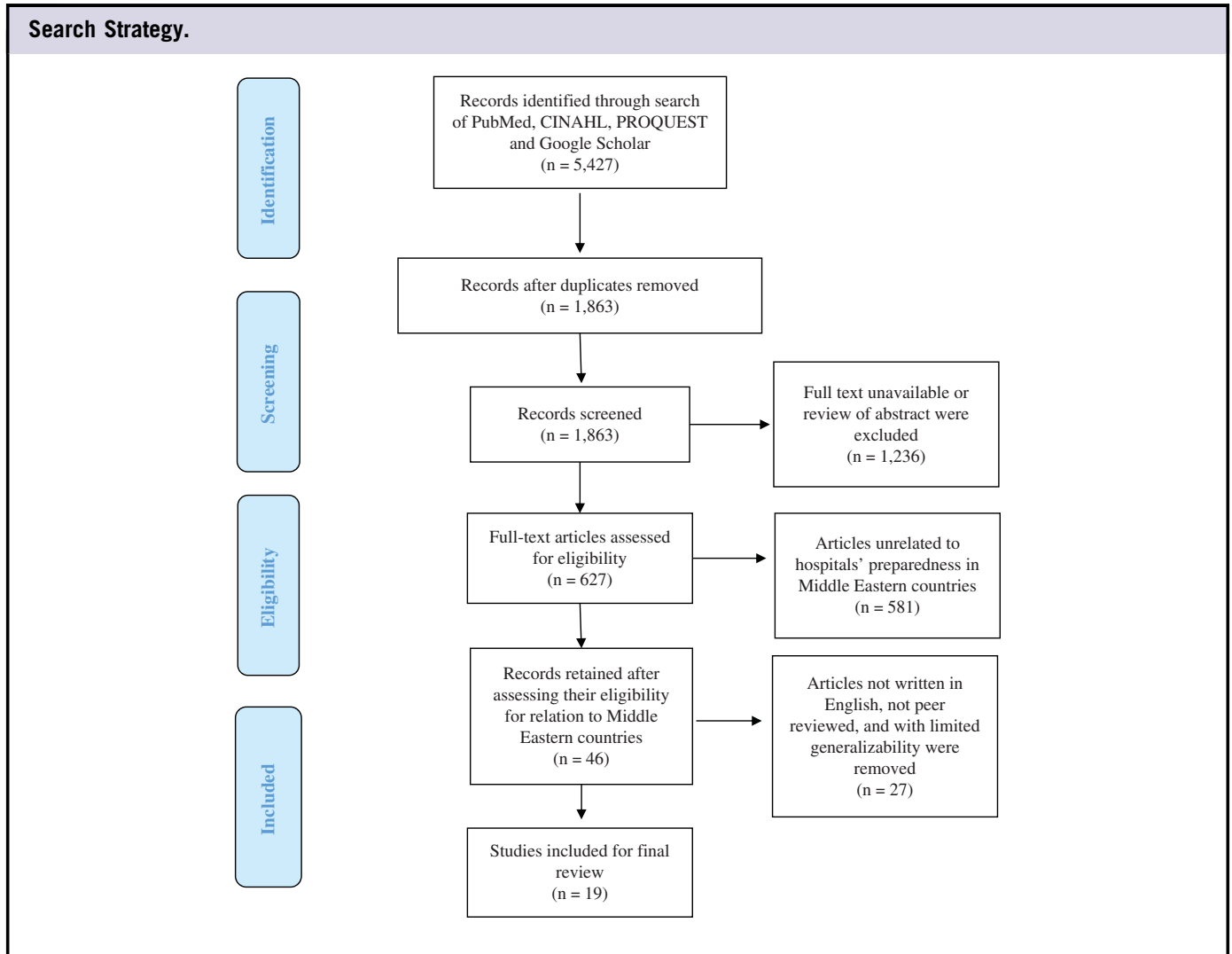


TABLE 1

NHMRC Levels of Evidence Criteria		
Design	Characteristics	Level of Evidence
Systematic review	Evidence from a review of several relevant randomized controlled trials	I
Critically appraised topics individual articles	Evidence from at least an accurately designed randomized controlled trial	II
Critically appraised topics (evidence syntheses and guidelines)	Evidence from accurately designed controlled trials without randomization	III
Randomized controlled trials (RCTs)	Evidence from case control studies	III-1
Cohort studies	Evidence gathered from cohort studies, systematic reviews of descriptive and qualitative studies	III-2
Case-controlled /qualitative studies	Evidence from case series; reports, single descriptive, and qualitative studies	III-3
Background information	Expert opinion	IV

or deductive,<sup>25-28</sup> involves the collection of quantifiable data to describe a specific situation or occurrence,<sup>27</sup> or to examine relationships between variables to determine cause-and-effect connections.<sup>29</sup>

The six qualitative studies used mainly interview techniques.<sup>30-35</sup> In qualitative methodology, the experiences of the participants captured in words and actions are described in a narrative or descriptive manner to explain the phenomenon

TABLE 2

Table of Evidence: An Overview of Reviewed Articles

Author (year)	Study Title	Location, Population, and Design	Methods	Evidence Level
Fares et al. <sup>20</sup>	Health care system hazard vulnerability analysis: an assessment of all public hospitals in Abu Dhabi	Emirate of Abu Dhabi 12 hospitals HVA conducted from September to November 2008	Quantitative study (HVA)	III-3
Al Thobaity et al. <sup>21</sup>	Perceptions of knowledge of disaster management among military and civilian nurses in Saudi Arabia	Saudi Arabia 396 registered nurses ages ≥ 20 years 6 hospitals (3 military and 3 government) Probability sample	Quantitative Descriptive Research	III-3
Sobhani et al. <sup>30</sup>	Investigation of the preparedness level of the hospitals against disasters in Bandar Abbas, Iran, in 2012	Iran 9 hospitals Data collected through interviews Cross-sectional study	Qualitative study	III-3
Djalali et al. <sup>38</sup>	Hospital Incident Command System (HICS) performance in Iran; decision making during disasters	Iran 23 hospitals Job action sheets used	Observation and qualitative study	III-3
Adini et al. <sup>22</sup>	Factors affecting preparedness and capacity to manage pandemic influenza: perceptions of health care managers	Israel 23 general hospitals All general managers surveyed A quasi-experiment	Quantitative study	III-3
Djalali et al. <sup>32</sup>	Hospital disaster preparedness as measured by functional capacity: a comparison between Iran and Sweden	Iran and Sweden 5 Iranian and 4 Swedish hospitals Cross-sectional study Convenience sampling	Observation and evaluative study	III-3
Aladhrai et al. <sup>31</sup>	Impact of the 2011 revolution on hospital disaster preparedness in Yemen	Yemen 11 hospitals Comparative study Heads of emergency departments interviewed mostly	Qualitative study	III-3
Adini et al. <sup>39</sup>	Improving hospital mass casualty preparedness through ongoing readiness evaluation	Israel 24 acute care hospitals Evaluation tool and survey of experts	Evaluative and quantitative study	III-3
Al Khalaileh et al. <sup>9</sup>	Jordanian nurses' perceptions of their preparedness for disaster management	Jordan 5 hospitals 474 registered nurses Cross-sectional study	Quantitative study	III-3
Adini et al. <sup>8</sup>	Factors that may influence the preparation of standards of procedures for dealing with mass-casualty incidents	Israel 22 hospitals Evaluation tool used	Observation and evaluative study	III-3
Bajow and Alkhalil <sup>12</sup>	Evaluation and analysis of hospital disaster preparedness in Jeddah	Jeddah, Saudi Arabia 6 hospitals Employees surveyed	Quantitative study	III-3
Rassin et al. <sup>23</sup>	Emergency department staff preparedness for mass casualty events involving children	Israel 1 hospital 104 physicians and nurses in emergency departments surveyed Cross-sectional study	Quantitative study	III-3
Zaboli and Sajadi <sup>11</sup>	Assessing hospital disaster preparedness in Tehran: lessons learned on disaster and mass casualty management system	Iran 21 hospitals Focus group meetings Purposive sampling Descriptive-sectional study	Qualitative and quantitative study	III-2
Najafbagy <sup>33</sup>	The crisis management capabilities and preparedness of organizations: a study of Iranian hospitals	Iran 41 Iranian hospitals Directors and general managers interviewed	Qualitative study	III-3

TABLE 2

(Continued)

Author (year)	Study Title	Location, Population, and Design	Methods	Evidence Level
Al-Ali and Abu Ibaid <sup>24</sup>	Health care providers' perception of knowledge, skills, and preparedness for disaster management in primary health care centers in Jordan	Jordan 57 health centers 207 participants including physicians and nurses surveyed	Quantitative study	III-3
Mahdaviazad and Abdolahifar <sup>10</sup>	Assessing hospital disaster preparedness in Shiraz, Iran 2011: teaching versus private hospitals	Iran 24 hospitals Evaluation tool	Evaluation and qualitative study	III-3
Shojaei et al. <sup>34</sup>	Studying preparedness in teaching hospitals affiliated with Iran University of Medical Sciences, 2006	Iran 10 teaching hospitals Observation and interviews with hospital managers	Descriptive and qualitative study	III-3
Yarmohammadian et al. <sup>35</sup>	Are hospitals ready to respond to disasters? Challenges, opportunities and strategies of Hospital Emergency Incident Command System (HEICS)	Iran Senior hospital managers, physicians, and specialists interviewed in Isfahan Province	Qualitative study	III-3
Shokouh et al. <sup>40</sup>	Prerequisites of preparedness against earthquake in hospital system: a survey from Iran	Iran 15 hospitals Data collected using observation of documents and survey of hospitals' managers Cross-sectional study	Observation and quantitative study	III-2

being studied.<sup>36</sup> The major strength of qualitative research is its ability to provide complex textual descriptions of how people experience a specific research issue.<sup>37</sup>

A number of the reviewed studies ( $n=6$ )<sup>8,10,11,38-40</sup> used a mixed-methods approach, which involves combining 2 or more approaches such as focus groups, interviews, questionnaire survey, evaluation tools, and observation to explore the research objectives and questions.<sup>37</sup>

### Participants and Methodologies

Various numbers of hospitals were covered and participants involved in the reviewed studies. However, in 1 study, Yarmohammadian et al.,<sup>35</sup> neither indicated the number of hospitals or health centers covered nor participants involved. This study only suggested that they interviewed senior hospital managers, physicians, and specialists without mentioning the size. For those studies that indicated the number of hospitals or health centers covered, Al-Ali and Abu Ibaid<sup>24</sup> included the highest number of 57, with the lowest number of 1 being reported in Rassin et al.<sup>23</sup> Also, the numbers of participants in the reviewed studies ranged from 28 in Adini et al.<sup>22</sup> to 474 in Al Khalaileh et al.<sup>9</sup> Table 3 provides a detailed summary of the demographic characteristics of the reviewed studies.

The reviewed studies used a broad range of valid methods to determine the level of preparedness for disasters within the examined hospitals. The highest number of the reviewed studies ( $n=7$ ) used quantitative research methodology in which questionnaire surveys were administered to the respondents that included senior hospital managers, medical

practitioners, registered nurses, and other levels of health professionals. These 7 studies are Al Khalaileh et al.,<sup>9</sup> Bajow and Alkhalil,<sup>12</sup> Fares et al.,<sup>20</sup> Al Thobaity et al.,<sup>21</sup> Adini et al.,<sup>22</sup> Rassin et al.,<sup>23</sup> and Al-Ali and Abu Ibaid.<sup>24</sup> The method used mostly by this group of reviewed studies for collecting their quantitative data was survey (eg, Al Khalaileh et al.,<sup>9</sup> Adini et al.,<sup>22</sup> and Shokouh et al.<sup>40</sup>), whereas only Fares et al.<sup>20</sup> conducted their study by adopting a hazard vulnerability analysis. Quantitative research is regarded as traditional, essentialist, objectivist, positivist, experimental, empiricist, or deductive.<sup>26-28</sup> The quantitative methodology involves the collection of quantifiable data to describe a specific situation or occurrence scientifically.<sup>28</sup> The significance of this method is that it describes as well as examines the relationships between variables and determines cause-and-effect connections between them.<sup>29</sup>

Six of the studies were qualitative because they collected their data using mainly interview techniques. The studies in this category include Sobhani et al.,<sup>30</sup> Aladhrai et al.,<sup>31</sup> Djalali et al.,<sup>32</sup> Najafbagy,<sup>33</sup> Shojaei et al.,<sup>34</sup> and Yarmohammadian et al.<sup>35</sup> Qualitative methodology is also known as constructivist, relativist, naturalistic, phenomenal, experimental, interpretive, post-positivist, postmodern, or inductive.<sup>25-28</sup> In qualitative methodology, experiences of the participants captured in words and actions are described in a narrative or descriptive manner to explain the phenomenon being studied.<sup>36</sup> The major strength of qualitative research is its ability to provide complex textual descriptions of how people experience a specific research issue.<sup>37</sup>

Similarly, a number of the reviewed studies ( $n=6$ ) used a mixed-methods approach, which involves combining 2 or

**TABLE 3**

Demographic Characteristics of the Incorporated Studies							
Studies	No. of Participants	Gender		Specialty			No of Hospitals <sup>c</sup>
		Male	Female	Physicians	Nurses <sup>a</sup>	Managers <sup>b</sup>	
Al-Ali and Abu Ibaid <sup>24</sup>	207	145	62	56	151	–	57
Rassin et al. <sup>23</sup>	104	51	53	46	58	–	1
Al Thobaity et al. <sup>21</sup>	396	32	364	–	396	–	6
Adini et al. <sup>22</sup>	23	–	–	–	–	23	23
Al Khalaileh et al. <sup>9</sup>	474	183	291	–	474	–	5
Najafbagy <sup>33</sup>	41	–	–	31	–	10	41
Sobhani et al. <sup>30</sup>	–	–	–	–	–	–	9
Aladhray et al. <sup>31</sup>	–	–	–	–	–	–	11
Djalali et al. <sup>32</sup>	–	–	–	–	–	–	5
Shojaei et al. <sup>34</sup>	–	–	–	–	–	–	10
Yarmohammadian et al. <sup>35</sup>	–	–	–	–	–	*	–
Bajow and Alkhalil <sup>12</sup>	–	–	–	–	–	–	6
Fares et al. <sup>20</sup>	–	–	–	–	–	–	12
Djalali et al. <sup>38</sup>	–	–	–	–	–	–	23
Adini et al. <sup>39</sup>	–	–	–	–	–	–	24
Adini et al. <sup>8</sup>	–	–	–	–	–	–	22
Zaboli and Sajadi <sup>11</sup>	–	–	–	–	–	–	21
Mahdaviazad and Abdolahifar <sup>10</sup>	–	–	–	–	–	–	24
Shokouh et al. <sup>40</sup>	15	–	–	–	–	15	15

<sup>a</sup>Includes midwife.

<sup>b</sup>Includes senior managers, directors.

<sup>c</sup>Includes health centers.

**TABLE 4**

Methodologies Used by Reviewed Studies		
Qualitative	Quantitative	Mixed Methods
Sobhani et al. <sup>30</sup>	Adini et al. <sup>22</sup>	Djalali et al. <sup>38</sup>
Aladhray et al. <sup>31</sup>	Al Khalaileh et al. <sup>9</sup>	Adini et al. <sup>39</sup>
Djalali et al. <sup>32</sup>	Bajow and Alkhalil <sup>12</sup>	Adini et al. <sup>8</sup>
Najafbagy <sup>33</sup>	Rassin et al. <sup>23</sup>	Zaboli and Sajadi <sup>11</sup>
Shojaei et al. <sup>34</sup>	Al-Ali and Abu Ibaid <sup>24</sup>	Mahdaviazad and Abdolahifar <sup>10</sup>
Yarmohammadian et al. <sup>35</sup>	Al Thobaity et al. <sup>21</sup>	Shokouh et al. <sup>40</sup>
	Fares et al. <sup>20</sup>	

more instruments such as focus groups, interviews, questionnaire survey, evaluation tool, and observation to explore the research objectives and questions.<sup>37</sup> The 6 studies identified to have used this approach are Adini et al.,<sup>8</sup> Mahdaviazad and Abdolahifar,<sup>10</sup> Zaboli and Sajadi,<sup>18</sup> Djalali et al.,<sup>38</sup> Adini et al.,<sup>39</sup> and Shokouh et al.<sup>40</sup> These studies used 2 or more techniques to investigate disaster management issues. For example, Djalali et al.<sup>38</sup> used evaluation tool and observation, whereas Adini et al.<sup>39</sup> used evaluation and survey. Table 4 presents an overview of the methods used in the reviewed studies.

**RESULTS**

The results of this integrative review are summarized in this section. Essentially, the main results reported in the reviewed articles are examined and compared. The outcomes reported in relation to the nature of disasters, level of preparedness, factors influencing, as well as the measures for improving the level of preparedness are discussed.

**Nature of Disasters**

The majority of the reviewed articles (n=12) reported on both natural and man-made disasters (see Table 5).

TABLE 5

Nature of Disasters			
All Disasters	Mass Casualty	Earthquake	Pandemic Influenza
Al-Ali and Abu Ibaid <sup>24</sup> Mahdaviyazad and Abdolahifar <sup>10</sup> Al Thobaity et al. <sup>21</sup> Najafbagy <sup>33</sup> Sobhani et al. <sup>30</sup> Aladhrai et al. <sup>31</sup> Djalali et al. <sup>32</sup> Shojaei et al. <sup>34</sup> Yarmohammadian et al. <sup>35</sup> Bajow and Alkhalil <sup>12</sup> Fares et al. <sup>20</sup> Djalali et al. <sup>38</sup>	Rassin et al. <sup>23</sup> Zaboli and Sajadi <sup>11</sup> Adini et al. <sup>39</sup> Al Khalaileh et al. <sup>9</sup> Adini et al. <sup>8</sup>	Shokouh et al. <sup>40</sup>	Adini et al. <sup>22</sup>

### Level of Preparedness

The summary of the level of hospital preparedness reported by the authors of the studies reviewed is displayed in Table 6. Thirteen, representing 68% of the reviewed articles, clearly ranked the level of preparedness for disasters among their examined hospitals to be generally *very poor*, *poor*, or *moderate* using different factors such as staff's knowledge and training on disaster, command and control, disaster management plan, and control, among others. The studies in this class include Al Khalaileh et al.,<sup>9</sup> Zaboli and Sajadi,<sup>11</sup> Bajow and Alkhalil,<sup>12</sup> Fares et al.,<sup>20</sup> Al Thobaity et al.,<sup>21</sup> Rassin et al.,<sup>23</sup> Al-Ali and Abu Ibaid,<sup>24</sup> Sobhani et al.,<sup>30</sup> Aladhrai et al.,<sup>31</sup> Djalali et al.,<sup>32</sup> Najafbagy,<sup>33</sup> Yarmohammadian et al.,<sup>35</sup> and Djalali et al.<sup>38</sup> Fares et al.<sup>20</sup> rated most of the 12 hospitals covered in their study as poor and not at all prepared for natural disaster. Also, they established the level of preparedness of the hospitals to be moderate, poor, or zero for man-made disasters such as technological and human hazards based on the participants' overall assessment. Sobhani et al.<sup>29</sup> reported the level of disaster preparedness to be generally poor in the areas of reception, evacuation plans, traffic, safety and security, communication, human resources management, and command and control. However, the study found the hospitals' preparedness as moderate in terms of emergency services, and training and logistics.

Furthermore, based on interviews with heads of emergency departments, Aladhrai et al.<sup>31</sup> found the preparedness of 7 out of the 11 included hospitals to be unacceptable in the aspects of efficiency of contingency plans, resources availability, training of staff members, drills, availability of funds, and disaster management guidelines. Moreover, Shojaei et al.<sup>34</sup> measured the level of preparedness in terms of security, supplies and equipment, evacuation, and communication to be poor among the hospitals investigated. In the study conducted by Djalali et al.,<sup>38</sup> disaster preparedness of the studied hospitals was found to be poor, using determinants that included information management, local databases, and disaster handling procedures.

The remaining 6 reviewed articles reported the level of preparedness for disasters to be very good or good in most of the hospitals assessed. Three of the studies that found the preparedness level to be positive in their examined hospitals were conducted in Israel. Likewise, the remaining 3 studies in this category were carried out in Iran. This outcome indicates that hospitals in Iran and Israel are making good progress in their level of preparedness for disasters when compared with other Middle East nations. Adini et al.<sup>22</sup> suggested the level of preparedness for pandemic influenza by 91% of the 23 Israeli hospitals included in their study to be very good in the capacity to manage disaster and the staff's knowledge and training. According to the study, 87% of the hospitals were identified as fully capable of dealing with the outbreak whenever it occurs. In addition, 86.7% of the 15 hospitals considered in Shokouh et al.<sup>40</sup> were found to be highly prepared for earthquake disaster using factors comprising safety of equipment, evacuation and field treatment effectiveness, management of environmental health proceedings, workers' training on disasters, and support services. The study established that these hospitals were highly ready for mitigation of construction hazards while their level of preparedness for providing vitals services was also assessed as good.

### Factors Influencing Level of Preparedness

Five (26%) of the reviewed articles suggested several factors influencing the level of preparedness for disasters among the studied hospitals. Djalali et al.<sup>32</sup> suggested that the moderate level of preparedness among the Iranian hospitals studied was due to a lack of contingency plans as well as the insufficient availability of resources. Resources of both human and non-human (such as equipment, management plans) are crucial in forging an excellent response to natural and artificial disasters.<sup>5</sup> Also, Djalali et al.<sup>32</sup> discussed the importance of a hospital having effective contingency plans that can be used to deal with changing the dynamics of disasters. Aladhrai et al.<sup>31</sup> identified issues relating to command and control communication as impacting on the preparedness level of the

TABLE 6

Disaster Preparedness		
Studies	Countries	Preparedness Level
Fares et al. <sup>20</sup>	Abu Dhabi	Majority of the evaluated hospitals poorly prepared or not at all prepared for natural disasters Moderately, poor, or not at all prepared for human-made disasters
Najafbagy <sup>33</sup>	Iran	Preparedness level for disasters among the majority of the hospitals was ranked as poor
Shokouh et al. <sup>40</sup>	Iran	87.7% of the hospitals were found to have good level of preparedness for disasters; the hospitals were found to be specifically prepared for mitigating construction hazards
Yarmohammadian et al. <sup>35</sup>	Iran	The hospitals assessed were rated as mostly poorly prepared for disasters
Shojaei et al. <sup>34</sup>	Iran	Teaching hospitals were found to be more prepared for disasters than private The level of preparedness reported being moderate. Preparedness for different areas was ranked between 51.4% and 88.4% for security; 60% and 66.6% for supplies and equipment; 47% to 64.2% for evacuation; 36.6% and 63.2% for communication
Mahdaviyazad and Abdolahifar <sup>10</sup>	Iran	Preparedness level of the hospitals was found to be very good, good, or moderate; 73.9%, 67.3%, 52.6%, and 49% of the hospitals had excellent incident command systems, communication, human resources, and surge capacity respectively.
Najafbagy <sup>33</sup>	Iran	Preparedness level for disasters among the majority of the hospitals was ranked as poor
Zaboli and Sajadi <sup>11</sup>	Iran	Most of the hospitals were found to be poorly prepared for disasters
Djalali et al. <sup>38</sup>	Iran	83% of hospitals moderately prepared; none of the hospitals had very good or good level of preparedness.
Sobhani et al. <sup>30</sup>	Iran	Poor preparedness level for disasters put at 39% Poor preparedness in the areas of reception, evacuation, traffic, security, communication, human resources, and commanding and management
Djalali et al. <sup>32</sup>	Iran and Sweden	Excellent level of preparedness for all Swedish hospitals; Iranian hospitals moderately prepared
Adini et al. <sup>22</sup>	Israel	91% of the hospitals rated as having very good or good level of preparedness for pandemic influenza; 87% of them identified as having high or very high capacity to deal with pandemic influenza
Adini et al. <sup>39</sup>	Israel	21% and 42% of the hospitals' preparedness level rated excellent in first and second cycles, respectively. In both cycles, 25% and 29% had a very good and moderate level of preparedness.
Adini et al. <sup>8</sup>	Israel	50% of the hospitals were judged to be very highly prepared for disasters; also, 18% were ranked as good, whereas another 18% were rated poor; 14% were rated very poor in preparing for disasters.
Rassin et al. <sup>23</sup>	Israel	The participants identified the hospital's preparedness level to be poor for mass casualty events involving children.
Al Khalaileh et al. <sup>9</sup>	Jordan	65% of the hospitals rated their preparedness level as poor, 18% moderately poor, 12% good, and 5% very good
Al-Ali and Abu Ibaid <sup>24</sup>	Jordan	Majority of the health centers assessed were found to be moderately prepared
Bajow and Alkhalil <sup>12</sup>	Saudi Arabia	Majority of the hospitals were ranked as having good levels of preparedness for disasters
Al Thobaity et al. <sup>21</sup>	Saudi Arabia	Hospitals were moderately prepared for all disasters
Aladhrai et al. <sup>31</sup>	Yemen	7 hospitals were assessed as moderately prepared, whereas 4 were assessed as poorly ready for disasters

assessed hospitals in their study. According to the study, these problems can lead to a situation where the studied hospitals are unable to meet the required safety and security standards.

Another factor indicated as affecting the hospitals' level of preparedness for disasters was the lack of adequate training for the personnel to handle effectively such emergency situations.<sup>39</sup> The study by Adini et al.<sup>39</sup> found large hospitals to have adequate training in place for their staff unlike small ones. The authors suggested that this disparity accounted for why the large and medium-sized hospitals studied were better prepared for disasters than small hospitals. This factor is also echoed by Al Khalaileh et al.,<sup>9</sup> who found the lack of sufficient training and education of personnel as influencing the preparedness level of the hospitals included in the study.

Al-Ali and Abu Ibaid<sup>24</sup> also examined several factors impacting the preparedness level of hospitals analyzed in their

research. They concluded that 3 factors were critical, the first issue being the personnel's lack of awareness of emergency management and operational emergency procedures in the hospitals. Al-Ali and Abu Ibaid<sup>24</sup> indicated that hospitals whose staff are aware of emergency management plans and its operational processes are more prepared to confront disasters. The second factor identified by Al-Ali and Abu Ibaid<sup>24</sup> was lack of experience. The study indicated that most of the staff of the hospitals assessed had little or no previous experience about disaster situations, and therefore do not have basic knowledge of how to assist disaster victims. The last determinant mentioned by Al-Ali and Abu Ibaid<sup>24</sup> was the absence of disaster training programs for hospital staff.

#### Measures for Improving Preparedness for Disaster

Ten of the reviewed articles, representing 53%, recommended a number of measures that can be used to improve the level of



preparedness in the Middle East hospitals. Most of these studies ( $n=6$ ) suggested that professionals involved in the management of disasters, such as nurses, physicians, occupational health and safety officers, and paramedics, should be provided with ongoing training, education, and drilling exercises to enhance their preparedness for disasters. The studies identified to have made this suggestion include Al Khalaileh et al.,<sup>9</sup> Bajow and Alkhalil,<sup>12</sup> Al Thobaity et al.,<sup>21</sup> Aladhrai et al.,<sup>31</sup> Adini et al.,<sup>39</sup> and Yarmohammadian et al.<sup>35</sup> Other studies reviewed in this current research did not make any recommendations on how the hospitals could develop or improve their disaster preparedness.

Four of the studies suggested that hospitals' level of preparedness for disasters can be significantly improved if an effective hospital incident command system is put in place. This was proposed by Fares et al.,<sup>20</sup> Sobhani et al.,<sup>30</sup> Aladhrai et al.,<sup>31</sup> and Yarmohammadian et al.<sup>35</sup> According to Fares et al.,<sup>20</sup> hospitals with highly functional incident command systems are better organized and fully aware of the dynamics of a disaster's occurrence. For instance, such systems can promote effective communication and assist staff to respond rapidly to disasters with much clarity and accountability.<sup>20</sup> This opinion was also expressed by Sobhani et al.<sup>30</sup> with an additional suggestion that incident command systems can enhance division of labor across hospitals toward responding better to disasters.

Other actions were recommended by the reviewed studies for improving the preparedness level for disasters. For example, Fares et al.<sup>20</sup> stressed the importance of better risk assessment, engagement of external stakeholders such as the communities, and provision of disaster management programs. Like Fares et al.,<sup>20</sup> Bajow and Alkhalil<sup>12</sup> emphasize the need for local communities to be sensitized about their potential exposure to disasters, and that their capacity to be able to interpret early warning signs to take timely actions and gather necessary resources for rapid response should be enhanced. Moreover, Sobhani et al.<sup>30</sup> added that disaster preparedness of hospitals could be improved through proper organization of human resources, an effective division of labor, and the establishment of a single line of control. Aladhrai et al.<sup>31</sup> also suggested that a uniform protocol be set up to address any disparity that may exist in the methods and processes being used in disaster management. The study also underscored the importance of practical communication strategy toward improving the preparedness level for disasters. However, the study did not provide details of issues that should be addressed within the communication plans.

### DISCUSSION

This integrative literature critiqued a total of 19 articles to evaluate the preparedness for disasters among the hospitals in the Middle East. In addition, the review of the literature aimed to establish the factors influencing the preparedness

level of the hospitals, and the measures that could be used to improve their preparedness. Given the high cost of disasters in the Middle East, both direct and indirect, it is important to develop a deeper understanding of the related issues as a means of developing practical strategies for improving hospital preparedness for disasters in the future.

Key findings from this review suggest that limited research has covered the issue of the hospitals' preparedness for disasters in the Middle East, despite the importance of this area to this region. This problem was brought to the fore with only 19 articles identified to have addressed issues relating to hospital disaster preparedness in Middle East countries, as well as meeting inclusion criteria for review. Most of the research studies on hospitals' preparedness for disasters in the Middle East have emanated from Iran (9) and Israel (4). Only 2 studies have been conducted in Saudi Arabia while there was no publicly accessible research carried out in other Middle East countries such as Oman, Bahrain, and Kuwait. This outcome suggests that more studies focusing on hospital preparedness in Middle East countries are still required. Conducting more studies in this area would reveal more issues that need to be addressed toward improving the preparedness and capacity of hospitals in Middle East nations to better deal with potential natural and man-made disasters in this region.

Many of the reviewed studies indicated the level of preparedness for disasters to be inadequate across the hospitals assessed in the Middle East nations in the areas like staff's knowledge and training on disaster, command and control, disaster management plan, evacuation plans, traffic, safety and security, drills, communication, and human resources management (eg, Fares et al.,<sup>20</sup> Bajow and Alkhalil<sup>12</sup>). This finding is similar to those of other global studies (eg, Kaji et al.,<sup>41</sup> Barbera et al.<sup>42</sup>), which reported that current preparedness of hospitals for disasters to be insufficient with a recommendation for an improved disaster management system. Only a few of the studies included in this review suggested that the preparedness level was adequate among their examined hospitals in aspects including safety of equipment, evacuation and field treatment effectiveness, management of environmental health proceedings, workers' training on disasters, and support services.<sup>10,31,40</sup> The overall finding of this review gives an indication that there is a need for hospitals in the Middle East countries to enhance their level of preparedness for disasters because this is very crucial for the management of future disasters. This outcome appears to reflect the reality of preparedness for disasters among hospitals in this region. The affected hospitals may have to develop concerted efforts and seek for improved funding to build their capacity to deal with unexpected disaster events.

Of all 19 studies reviewed in this study, only 5 examined factors influencing the level of preparedness among the hospitals in the Middle East region, which are Al Khalaileh et al.,<sup>9</sup> Djalali et al.,<sup>32</sup> Aladhrai et al.,<sup>31</sup> Adini et al.,<sup>39</sup> and

Al-Ali and Abu Ibaid.<sup>37</sup> This finding suggests that research has not adequately explored the issues contributing to the preparedness of hospitals for disasters in these countries. Without broadly establishing matters affecting the preparedness levels of hospitals, effective measures for addressing this issue cannot be formulated. In this sense, more studies are required to investigate the factors contributing to the inadequate level of preparedness for disasters among hospitals in the Middle East countries. There has been an increase in research studies that have examined the issues affecting the hospital preparedness level for disasters around the world following the September 11 terrorist attack in the United States.<sup>43</sup> Studies by O'Sullivan et al,<sup>43</sup> Manley et al.,<sup>44</sup> Fung et al.,<sup>45</sup> and Hammad et al.<sup>46</sup> have examined hospital disaster preparedness in Canada, United States, Hong Kong, and Australia.

Last, 10 of the studies reviewed recommended measures that hospitals in the Middle East could use to improve their preparedness level for disasters. It should be noted that most of the suggestions provided have been based on the opinions of the authors and not derived from health care professionals. This finding reflects the need for more studies that engage the health care industry professionals and other important stakeholders toward designing appropriate and validated measures that can be effectively applied to improve the hospitals' preparedness for disasters in the region. It is apparent that evidence-based improvement methods are required to stimulate the preparedness of hospitals for disasters. Similar recommendations have also been put forward in studies conducted outside of the Middle East region such as O'Sullivan et al.,<sup>43</sup> Manley et al.,<sup>44</sup> Fung et al.,<sup>45</sup> and Hammad et al.<sup>46</sup> According to them, there is need to seek unique collaborative efforts among core local stakeholders toward developing workable strategies to deal with disasters in each community around the world.

## CONCLUSIONS

Despite the importance of hospitals in responding effectively to disasters, limited research has examined the preparedness level for disasters among those hospitals based in the Middle East nations. The objective of this integrative study was to determine how the preparedness of hospitals toward dealing with disaster events has been reported in the literature. All 19 studies reviewed have been conducted in Iran, Israel, Saudi Arabia, Jordan, Abu Dhabi, and Yemen, whereas other Middle East nations have not been covered in the existing literature. This indicates that there is still need for more studies that include other countries across this region. This review has also highlighted the importance of conducting more studies that utilize extensive data to provide a more accurate position on the preparedness of hospitals for disasters. Last, the review suggests that research should focus on identifying factors influencing the preparedness for disasters

among hospitals in the Middle East to develop approaches to improving emergency management in this region.

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