第 49 卷 第 9 期
2022 年 9 月

湖南大学学报（自然科学版）
Journal of Hunan University（Natural Sciences）

Vol. 49 No. 9
September 2022

Open Access Article https://doi.org/10.55463/issn.1674-2974.49.9.22

Disaster Management and Preparedness among Future Jordanian Health Professionals: Exploring Knowledge, Attitude, and Readiness to Practice

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Abstract: Healthcare students as volunteers and future healthcare providers must be prepared to manage disasters. Disasters occurred worldwide and are highly prevalent in the recent time. We examined the level of knowledge (K), attitude (A), and readiness to practice (rP) among Jordanian healthcare university students regarding disaster medicine preparedness. The research goal is to establish a university educational course and training program for the healthcare profession students. A cross-sectional study assessed Jordanian medical, pharmacy, and health science students' KArP levels using pretested and validated questionnaires. Cronbach's alpha for the final tool was K = 0.586; A = 0.814, rP = 0.542; KArP = 0.730. Statistical methods to compare means and explore the association were used with an alpha level of 0.05. Participants (n = 267) had a median age of 20 (IQR: 19.0 – 22.0). More female respondents than males; more respondents are in the pharmacy degree program and in the final year of their program. The median (IQR) of the total K, A, rP, and overall KArP scores were K [10.0 (7.0 – 12.0)]; A [39.0 (32.0 – 46.0)]; rP [31.0 (27.0 – 34.0)]; and overall KArP [80.0 (71.0 – 88.5)]. Knowledge and attitude were significant predictors of readiness to practice. Students from Jordan's public and private health colleges have moderate disaster medicine preparedness levels. Knowledge and attitude of students are determinants of readiness to practice. This research has confirmed the findings carried out in other countries (i.e., Qatar, China, Pakistan, Yemen, UAE) and it has used a validated tool that was earlier established in Qatar. Thus, it is evident that a course and training program are required for the healthcare university students.

Keywords: disaster, preparedness, healthcare students, Jordan, university students.

未來約旦衛生專業人員的災害管理和準備：探索知識、態度和實踐準備

摘要：作為志願者和未來醫療保健提供者的醫療保健學生必須準備好應對災難。災難發生在世界範圍內，並且在近期非常普遍。我們檢查了約旦醫科大學學生在災害醫學準備方面的知識水平(K)、態度(一个)和實踐準備程度(rP)。研究目標是為醫療保健專業的學生建立大學教育課程和培訓計劃。一項橫斷面研究使用預先測試和驗證的問卷評估了約旦醫學、藥學和健康科學專業學生的卡尔普水平。最終工具的克朗巴赫阿爾法為K = 0.586；一个 = 0.814，rP = 0.542；卡尔普 = 0.730。使用統計方法來比較平均值和探索關聯性，α水平為0.05。參與者(n = 267)的中位年齡為20歲(IQR:19.022.0)。女性受訪者多於男性；更多的受訪者參加了藥學學位課程和課程的最後一年。總K、一个、rP和總體卡尔普得分的中位數(IQR)為K [10.0 (7.0 – 12.0)]；一个[39.0 (32.0 – 46.0)]; 反相[31.0 (27.0 – 34.0)]; 和整體卡尔普[80.0 (71.0 – 88.5)]。知識和態度是準備實踐的重要預測因素。約旦公立和私立衛生學院的學生具有中等的災害醫學準備水平。學生的知識和態度是準備實踐的決定因素。這項研究證實了在其他國家

Received: June 16, 2022 / Revised: July 10, 2022 / Accepted: August 11, 2022 / Published: September 30, 2022

Fund Project: The Qatar University (Student Grant Number: QUST-2-CPH-2022-742)

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（即卡塔爾、中國、巴基斯坦、也門、阿聯酋）進行的調查結果，並使用了早期在卡塔爾建立的經過驗證的工具。因此，很明顯，醫療保健大學生需要課程和培訓計劃。

关键词：災難; 準備； 保健學生； 約旦; 大學生。

1. Introduction

Over the last decades, more attention has been given to planning the healthcare system (HCS) response to disasters, including natural and human-made [1, 2]. Disaster can be defined as "a serious disruption of the functioning of a community or a society causing widespread human, material, economic, or environmental losses, which exceed the ability of the affected community or society to cope using its resources" [3, 4]. The effect of any disaster is highly noticeable and valuable on the HCS [5]. Hence, many challenges include access to healthcare, rational drug selection, medication prices affordability, reliable health and supply systems, and sustainable medication supply by pharmaceutical supply chains [6)]. The successful response to these challenges will reflect the level of HCS disaster preparedness [7].

For instance, the world is living with a COVID-19 pandemic [8]. The current status of this virus places a considerable strain and more challenges than expected on HCS [8].

In line withthee challenges, the World Health Organization (WHO) has recognized how fragile many of the world's healthcare systems and services [8] and provided some guidelines for maintaining and providing essential health services throughout the pandemic [9]. Therefore, this is vital when healthcare providers encounter various challenges at all stages of the outbreak [10]. Besides, more responsibilities and roles for healthcare providers have emerged, such as the stable medication supply and preventative products, the provision of information about the COVID-19 [11, 12].

The study [8] highlighted the HCS practices and pharmacists' contribution to managing chronic disease patients in the pandemic period. The authors have also emphasized whose role in retaining the essential services during the outbreak to prevent non-COVID disease burden on HCS. [8, 10]. Additionally, the pharmacists' readiness to deal with this pandemic has been assessed by [10]. Pharmacists and pharmacy students showed adequate awareness of performing during the COVID-19 pandemic [10].

Consequently, healthcare professionals' disaster preparedness assessment is needed, which has already been studied in some countries [7]. For example, a recent study [7] assessed the readiness to practice levels regarding disaster medicine and preparedness among health profession students at Qatar University. The findings indicated that the respondents' knowledge scores correlated positively with their readiness to practice scores.

Ensuring pharmacy education and research align with pharmacists' readiness and preparedness in disaster events is essential [13]. Disaster preparedness training should start early from the undergraduate level and continue throughout their career [14]. Previous studies have documented that medical students do not believe they have received adequate training to respond to disasters [7, 8]. In Pakistan, asimilar weres found among healthcare students with a moderate score of knowledge, attitude, and readiness to practice [15]. Knowledge and attitude levels were significant predictors of readiness to practice [15]. Therefore, a strong curriculum, including courses in disaster medicine management and preparedness to prepare competent future healthcare professionals worldwide is needed [14, 15].

To date, the number of published studies in the area of disaster medicine preparedness and management by future healthcare professionals is limited. Thus, this study assesss the level of disaster medicine preparedness among Jordanian healthcare students. We examined the level of knowledge (K), attitude (A), and readiness to practice (rP) regarding disaster medicine preparedness. The research goal is to establish a university educational course and training program for healthcare students before they join the profession.

2. Research Methods

2.1. Study Design and Participants

The study was a descriptive cross-sectional survey and was conducted in Jordan. Eligible participants were randomly selected among health-related university students from public and private universities.

2.2. Ethical Considerations

Ethics approval for the study was obtained from the Faculty of Pharmacy, Applied Science Private University. Participation in the study did not pose any risk of harm to participants and was anonymous. Potential students who completed the survey were considered to have informed consent to participate in the study.

2.3. Sample Size

Based on the number of accepted students in Jordan

in the health-related programs (n = 12,029), the sample size was calculated using a margin of error of 5%, confidence level of 95%, and the response distribution of 50%. A minimum sample size of 373 students was required. The calculation was performed using Rasoft® online calculator http://www.raosoft.com/samplesize.html.

2.4. Tool Development and Quality Measures

A validated and pre-tested self-administered questionnaire was developed and used in Pakistan [15] and Qatar [7] and used to measure knowledge (K), attitude (A), and readiness to practice (rP) among students. The study tools involved three sections. The first section was developed to assess the knowledge, including 22 yes/no questions within a range of 0–22 points. The second section was used to assess the attitude, had 16 Likert scale questions (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree), with a minimum of 16 and a maximum of 80 possible points. Scores of less than 42 points were considered low, scores between 42 and 56 points were considered moderate (25–75th quartiles), and scores of more than 56 points were considered high. The third section consisted of 11 Likert scale questions to assess the readiness to practice (strongly agree (1), agree (2), neither agree nor disagree (3), disagree (4), strongly disagree (5), and not applicable (6)) that could reach 55 points. Scores below 31 points, 31–38 points, and higher than 38 points were considered low (25th quartile), moderate (higher than the 25th quartile and lower than the 75th), and high (75th quartile), respectively. Cronbach's alpha for the final tool was K = 0.586; A = 0.814, rP = 0.542; KArP = 0.730.

2.5. Data Collection Procedure

Students were recruited through social media (Facebook and WhatsApp) or by assigning a representative from each university to approach the respondents to increase participation in completing the self-administered survey.

2.6. Data Analysis Method

The data collected for this research were analyzed using the Statistical Package for the Social Sciences v26. (Armonk, NY: IBM Corp.). The normality of the results was checked using the Kolmogorov–Smirnov test. Descriptive analysis, frequency (%) for noncontinuous variables, and mean (SD) or median (IQR) for continuous variables were used. Because the data were not normally distributed, nonparametric tests (i.e., Kruskal–Wallis, and Mann–Whitney) were used. Pearson's correlation test examined the correlation among the three parameters (K, A, and rP). Linear regression was performed to predict the readiness to practice (dependent variable) from knowledge and attitude (independent variables). All tests were carried out at a priori alpha level of 0.05.

3. Results

Table 1 shows the backgrounds of the respondents. The median average age was 20 years (IQR: 19.0 – 22.0). The findings showed more female respondents than males; more respondents were in the pharmacy degree program and the final year.

Table 1 Demographic information of the respondents

Item		Frequency (%)	Mean (sd)
Age (years)			20. 9 (3.4)
Gender	Female	143 (69.4)	
	Male	63 (30.6)	
University	Applied Sc Private University	65 (31.6)	
	Hashemite	41 (19.9)	
	University	39 (18.9)	
	Mutan University	61 (29.6)	
	Others		
Degree major	Pharmacy	116 (56.3)	
	Medicine	82 (39.8)	
	Others: (Dental, Laboratory, Nursing)	8 (3.9)	
Academic level (year)	Year 1	44 (24.4)	
	Year 2	28 (15.6)	
	Year 3	26 (14.4)	
	Year 4	19 (10.6)	
	Year 5	63 (35.0)	

The knowledge of the respondents is illustrated in Table 2. A few items were rated 'yes' close to or more than fourth-fifth by the respondents: *I think Jordan is at risk of disasters (natural or human-made); Disasters come in many shapes and sizes; realistic on-scene training is vital to an efficient and effective disaster medicine plan, and Disaster medicine is genuinely a systems-oriented specialty* and *involves multiple responding agencies*. However, respondents identified 'no' around fourth-fifth and higher on the following items: *I have previous exposure to this topic (Disaster Medicines Preparedness); I have previous experience in dealing with disasters; Disaster medicine is the sole responsibility of pharmacy organization; I read journal articles related to medicines disaster preparedness; I am aware of classes about disaster medicines preparedness and management that are offered for example at either my college or community; I am familiar with the local emergency response system for medicine disasters,* and *I am familiar with the organizational logistics and roles among local and national agencies in disaster medicine response (i.e., taking decisions and measures) situations.*

Table 2 Knowledge assessment of the respondents

Item	Yes n (%)	No n (%)
1. I have previous exposure to this topic (*Disaster Medicines Preparedness*).	41 (19.9)	165 (80.1)
2. I have previous experience of dealing with disasters.	40 (19.4)	166 (80.6)
3. I think Jordan is at risk of disasters (natural or human-made).	167 (81.1)	39 (18.9)
4. Disasters come in many shapes and sizes.	205 (99.5)	1 (0.5)
5. Disaster medicine is the sole responsibility of the pharmacy organization.	36 (17.5)	170 (82.5)
6. I have read journal articles related to medicines disaster preparedness.	21 (10.2)	185 (89.8)
7. I am aware of classes about disaster medicine preparedness and management offered, for example, at either my college or community.	43 (20.9)	163 (79.1)
8. I discovered that the research literature on disaster medicine preparedness and management is easily accessible.	86 (41.7)	120 (58.3)
9. I found that the research literature on disaster medicine preparedness is understandable.	76 (36.9)	130 (63.1)
10. Finding relevant information about disaster medicine preparedness related to this country's needs is an obstacle to my level of preparedness.	98 (47.6)	108 (52.4)
11. I know where to find relevant research or information related to disaster medicine preparedness and management to fill in the gaps in my knowledge.	69 (33.5)	137 (66.5)
12. I know the referral contacts in case of a disaster medicine situation (e.g., health department).	77 (37.4)	129 (62.6)
13. In the case of a disaster medicine situation, I think there is sufficient support from local officials at the governance level.	75 (36.4)	131 (63.6)
14. I am aware of the potential risks of emergencies in this country (e.g., natural disaster, embargo, terror, war…etc.).	158 (76.7)	48 (23.3)
15. I know how such emergencies or disasters can affect the medication supply system (selection, quantification, procurement, storage, distribution).	150 (72.8)	56 (27.2)
16. I know the limits of my knowledge, skills, and readiness as a university/Medical student to act in disaster medicine situations, and I know when I exceed them.	146 (70.9)	60 (29.1)
17. In the case of the war, I know how to overcome the access to medicines problem to benefit my society.	53 (25.7)	153 (74.3)
18. I am familiar with the local emergency response system for medical disasters.	37 (18.0)	169 (82.0)
19. I am familiar with the accepted process of 'examining problems to decide which ones are the most serious and must be dealt with first (triage principles)' used in disaster medicine situations.	61 (29.6)	145 (70.4)
20. I am familiar with the organizational logistics and roles among local and national agencies in disaster medicine response (i.e., taking decisions and measures) situations.	32 (15.5)	174 (84.5)
21. Realistic on-scene training is vital to an efficient and effective disaster medicine plan.	185 (89.8)	21 (10.2)
22. Disaster medicine is genuinely a systems-oriented specialty and involves multiple responding agencies.	188 (91.3)	18 (8.7)

Table 3 and preparedness. They showed their agreement (strongly agree and agree combined for more than 50%) on the following items: *I would feel confident in my abilities as a healthcare student in disaster medicines situation; I would be interested in educational classes on disaster medicines preparedness that relates specifically to the country situation; I would feel confident as a future manager or coordinator of a shelter/healthcare/ medication supply facility; I would be willing to be a future member of a healthcare facility/team in case of a medicines disaster; I would feel confident implementing emergency and disaster medicine plans and procedures; I would feel confident in providing medicine-related education in case of disaster or emergency; As a University health or medical student, I would feel confident in my abilities as a future healthcare provider and first responder in a medicines disaster situation;* and *I need more workshops and simulated training to be ready for dealing with disaster medicines*. In contrast, more than 50% of the respondents were disagreed (strongly disagree and disagree combined for more than 50%) on only one item: *There's enough awareness of "ways to stand wars and other humanity and natural emergencies among undergraduate students in University/Medical college*.

Table 3 Attitude assessment of the respondents

Item	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
1. I consider myself prepared for managing disaster medicines.	19 (9.2)	42 (20.4)	65 (31.6)	51 (24.8)	29 (14.1)
2. I would feel confident in my abilities as a healthcare student in disaster medicine situation.	148 (71.8)	50 (24.3)	5 (2.4)	0 (0)	3 (1.5)
3 I would be interested in educational classes on disaster medicine preparedness that are explicitly related to the country's situation.	138 (67.0)	56 (27.2)	8 (3.9)	1 (0.5)	3 (1.5)
4 I would be considered a key leadership	46 (22.3)	50 (24.3)	68 (33.0)	25 (12.1)	17 (8.3)

	figure in my community in a disaster medicine situation.					
5	I have personal/family emergency plans in place for disaster medicine situations.	23 (11.2)	47 (22.8)	67 (32.5)	52 (25.2)	17 (8.3)
6	I have an agreement with loved ones and family members on how to execute our personal/family emergency and disaster medicine plans.	18 (8.7)	44 (21.4)	59 (28.6)	62 (30.1)	23 (11.2)
7	I can describe my role in the response phase of disaster medicine in the context of my college, the public, media, and personal contacts.	27 (13.1)	66 (32.0)	56 (27.2)	43 (20.9)	14 (6.8)
8	I would feel confident as a future manager or coordinator of a shelter/healthcare/ medication supply facility.	90 (43.7)	83 (40.3)	20 (9.7)	10 (4.9)	3 (1.5)
9	I would be willing to be a future member of a healthcare facility/team in a medicine disaster.	98 (47.6)	77 (37.4)	26 (12.6)	3 (1.5)	2 (1.0)
10	I feel reasonably confident that I can care for patients independently without the supervision of a physician in a medicine disaster situation.	44 (21.4)	57 (27.7)	55 (26.7)	41 (19.9)	9 (4.4)
11	I would feel confident in implementing emergency and disaster medicine plans and procedures.	41 (19.9)	69 (33.5)	49 (23.8)	37 (18.0)	10 (4.9)
12	I would feel confident in providing medicine-related education in case of disaster or emergency.	54 (26.2)	65 (31.6)	45 (21.8)	31 (15.0)	11 (5.3)
13	As University health or medical student, I consider myself prepared for managing medicine disasters.	29 (14.1)	44 (24.1)	57 (27.7)	43 (20.9)	33 (16.0)
14	As University health or medical student, I would feel confident in being a future health provider and the first responder in a medicines disaster situation.	47 (22.8)	72 (35.0)	42 (20.4)	27 (13.1)	18 (8.7)
15	There's enough awareness of "ways to stand wars and other human and natural emergencies among undergraduate students in University/Medical college.	16 (7.8)	32 (15.7)	43 (21.1)	77 (37.7)	36 (17.6)
16	I need more workshops and simulated training to be ready for dealing with disaster medicines.	150 (72.8)	44 (21.4)	8 (3.9)	1 (0.5)	3 (1.5)

Readiness to practice toward disaster medicine and preparedness is presented in Table 4. Respondents rated agreement (a combined between strongly agree and agree) as more than 50% for the following items: *I am willing to attend the emergency medicine education incorporated in the undergraduate coursework; I am ready to practice under disaster knowing that some essential medications may not be available because of the disaster situation; I need to be more trained on providing patient-centered care under the situation of disaster medicines,* and *it requires effort and time to be prepared*. However, respondents rated disagreement (a combined between strongly disagree and disagree) as more than 50% for the following items: *I attended workshops/seminars about disaster medicine and it is enough for me to practice in the actual situation; Lack of knowledge about medication disaster. → being unfamiliar with the new medications appearing during disasters. (The previous few questions are dealing with the same issue);* and *disaster medicines are unlikely to occur in Jordan*.

Table 4 Readiness to practice assessment of the respondents

Item	Strongly Agree	Agree	Neither Agree Nor Disagree	Disagree	Strongly Disagree
1. My role in disaster medicine situations is clear.	14 (6.8)	42 (20.4)	74 (35.9)	60 (29.1)	16 (7.8)
2. I am ready to handle whatever potential risk emergencies exist in the community.	33 (16.0)	62 (30.1)	56 (27.2)	36 (17.5)	19 (9.2)
3. I am willing to attend the emergency medicine education incorporated in the undergraduate coursework.	100 (48.5)	75 (36.4)	19 (9.2)	9 (4.4)	3 (1.5)
4. I have attended workshops/seminars about disaster medicine, and it is sufficient for me to practice in an actual situation.	18 (8.7)	24 (11.7)	34 (16.5)	88 (42.2)	42 (20.4)
5. My undergraduate coursework enables me to be ready to practice in the settings of disasters (natural: e.g., earthquakes and floods; or human-made: e.g., embargo or wars).	19 (9.2)	46 (22.3)	48 (23.3)	54 (26.2)	39 (18.9)

Continuation of Table 4

6. Other extracurricular resources (e.g., internet, TV, radio, and newspapers) enable me with a sufficient degree of readiness to practice under disaster.	21 (10.2)	71 (34.5)	68 (33.0)	33 (16.0)	13 (6.3)
7. I'm ready to practice under a disaster, knowing that some essential medications may not be available because of the disaster situation.	24 (11.7)	84 (40.8)	62 (30.1)	26 (12.6)	10 (4.9)
8. I need to be more trained on providing patient-centered care under the situation of disaster medicines.	107 (51.9)	79 (38.3)	14 (6.8)	2 (1.0)	3 (1.5)
9. The following are barriers that reduce my readiness to practice:					
(i) The lack of knowledge about medication disaster. → being unfamiliar with the new medications appearing during disasters. (The previous few questions are dealing with the same issue).	14 (6.8)	22 (10.7)	63 (30.6)	77 (37.4)	30 (14.6)
(ii) Disaster medicines are unlikely to occur in Jordan	9 (4.5)	11 (5.4)	58 (28.7)	83 (41.1)	41 (20.3)
(iii) It requires effort and time to prepared.	71 (35.1)	96 (47.5)	6 (12.9)	6 (3.0)	3 (1.5)

The mean (SD) and median (IQR) of the total K, A, rP, and overall KArP scores were K [10.0 (3.6); 10.0 (7.0 – 12.0)]; A [39.1 (11.4); 39.0 (32.0 – 46.0)]; rP [30.4 (6.1); 31.0 (27.0 – 34.0)]; and overall KArP [79.6 (13.9); 80.0 (71.0 – 88.5)]. Further categorization of the scores based on the IQR indicated that slightly above half of the respondents for the domains were in the moderate level (Table 5).

Table 5 Low, moderate, and high categories of K, A, rP, and Overall KArP scores

Item	Knowledge	Attitude	Readiness to Practice	Overall KArP
Low score	34 (16.5)	46 (22.5)	43 (21.4)	48 (23.9)
Moderate score	112 (54.4)	102 (50.0)	107 (53.2)	103 (51.2)
High score	60 (29.1)	56 (27.5)	51 (25.4)	50 (24.9)

Table 6 Relationship between demographic profiles and individual K, A, rP, and total KArP scores

Item		Total Knowledge Score	Total Attitude Score	Total Readiness to Practice Score	Overall scores of the KArP
Age (years)		r = -0.10 p = 0.152	r = 0.166 p = 0.017	r = 0.106 p = 0.136	r = 0.155 p = 0.028
Gender	Female Male	p = 0.731	p = 0.695	p = 0.012	p = 0.334
Degree major	Pharmacy Medicine Others (Dental Laboratory Nursing)	p = 0.497	p = 0.170	p = 0.516	p = 0.413
Academic level (year)	Year 1 Year 2 Year 3 Year 4 Year 5	p = 0.128	p = 0.009	p = 0.011	p = 0.011
University	Applied Sc Private University Hashemite University Mutan University Others	p = 0.205	p = 0.449	p = 0.488	p = 0.336

Table 7 Association between K, A, and rP scores

Correlations			Total Knowledge Score	Total Attitude Score	Total Readiness to Practice Score
Spearman's rho	Total Knowledge Score	Correlation Coefficient Six. (2-tailed) N		-0.487 0.000 204	-0.440 0.000 201
	Total Attitude Scores	Correlation Coefficient Six. (2-tailed) N			0.600 0.000 201

Note: The correlation was significant at the 0.01 level (2-tailed).

Further analysis using multiple linear regression analysis illustrated moderate effects of knowledge and attitude on readiness to practice, as shown in Equation 1 (R^2 = 0.303; P < 0.001). The regression equation estimated the level of readiness to practice based on the knowledge and attitude levels.

Regression model: (Formula 1)

$$rP = (-0.269)\ K + (0.243)\ A + 23.600 \quad (1)$$

4. Discussion

Disaster management is critical and important [16]. Health providers should be prepared to protect themselves and the community during disasters [16, 17]. This study supports the notion that healthcare profession students are willing and ready to practice under disasters, reflecting their essential role in controlling the disasters and ensure public safety [18]. The results of this study highlight that above half of the respondents have average overall KArP scores. Also, the effects of knowledge and attitude on readiness to practice were significant. The median average age of the study participants was 20 years (IQR: 19.0 – 22.0). More female respondents than males; more respondents are in the pharmacy degree program and in the final year of their program.

Assessing the participants' knowledge, almost close fourth-fifth and more of the respondents answered positively that Jordan is at risk of disasters; disasters come in many shapes and sizes; realistic on-scene training is vital to an efficient and effective disaster medicine plan, and disaster medicine is genuinely a systems-oriented specialty and involves multiple responding agencies. In comparison, most participants, 80.1% had no previous exposure to the disaster medicines preparedness topic; 80.6% had no previous experience in dealing with disasters; 80.2% did not find that disaster medicine is the sole responsibility of the pharmacy organization; about 90.% did not read journal articles related to medicine disaster preparedness, and 79.1% were not aware of classes about disaster medicines preparedness and management that are offered for example at either my college, or community. A moderate knowledge score among health profession students was found in our study. Similarly, it was reported by [19]. They found a moderate level of knowledge among healthcare providers in Jordan [19]. Also, our findings are congruent with other pieces of literature and studies indicating that most HCPs and health professional students have a moderate knowledge level of their preparedness for disaster management [7, 15, 19–24].

They showed moderate attitude scores in evaluating participants' attitudes toward disaster medicine and preparedness. In comparison with a previously conducted study, [25] found that students who studying in the medical field had minimal knowledge and attitude toward disaster preparedness and management.

Besides, in our study, students stated their agreement (strongly agree and agree combined for more than 50%) on the following: feeling confident in their abilities as a healthcare students in disaster medicine situation; implementing emergency and disaster medicine plans and procedures, and providing medicine-related education in case of disaster or emergency. Additionally, they showed that they are interested in educational classes on disaster medicine preparedness that relate specifically to the country's situation; and are willing to be a future members of a healthcare facility/team in case of a medicine's disaster. They also agreed that they need more workshops and simulated training to be ready to deal with disaster medicines. A similar positive attitude was reported among nursing and medical personnel in Malaysia [17]. More than 80% of respondents had a positive attitude to disaster management [17]. Likewise, another study [26] evaluated KArP of healthcare workers regarding disaster preparedness at Johannesburg hospital. The participants demonstrated a positive attitude and believed that there is a need for insight into disaster preparedness and management [26].

In contrast, 55.3% of the study participants strongly disagreed and disagreed that there is enough awareness of stand wars and other human and natural emergencies among undergraduate students in University/Medical colleges. [24] supported this finding and showed the students' attitude toward disaster preparedness was moderate, and they have inadequate abilities to participate in and manage any disastrous events [24]. [27] reported similarly. They conducted a survey in the United States among allopathic medical students to evaluate their levels of preparedness in the event of a disaster. The students did have skills that could be useful in disaster response [27].

Readiness to practice disaster medicine and preparedness were also assessed. Students rated agreement (a combined between strongly agree and agree) as more than 50% for the following items: willing to attend the emergency medicine education incorporated in the undergraduate coursework; ready to practice under disaster knowing that some essential medications may not be available because of the disaster situation. Besides, 90.2% agreed/strongly agreed that they need to be more trained in providing patient-centered care under disaster medicines. Likewise, an Italian study [28] was conducted to evaluate Italian medical students' perceptions and awareness of disaster preparedness. More than four-fifths (91.4%) students reported that they would be happy to have a course on disaster medicine in their core curriculum, and most respondents (94.1%) considered knowledge of disaster medicine necessary for their future careers [28]. A Belgian study supported the above results that the respondents want to enhance

their knowledge in disaster management and welcome introducing specific courses into their curriculum [29].

In the contrast, more than 50% of respondents in the current study rated disagreement with attending workshops/seminars on disaster medicine. It is enough for them to practice in real situations, and lack of knowledge about disaster preparedness and disaster medicines is unlikely to occur in Jordan.

The mean (SD) and median (IQR) of the total K, A, rP, and overall KArP scores were K [10.0 (3.6); 10.0 (7.0 – 12.0)]; A [39.1 (11.4); 39.0 (32.0 – 46.0)]; rP [30.4 (6.1); 31.0 (27.0 – 34.0)]; and overall KArP [79.6 (13.9); 80.0 (71.0 – 88.5)]. Further categorization of the scores based on the IQR indicated that slightly above half of the respondents for the domains were moderate. This study also showed that the effects of knowledge and attitude on readiness to practice were significant. Similar findings by [15] and [7] were found. Healthcare Profession Students in Pakistan [15] and Qatar [7] had moderate knowledge, attitude, readiness to practice, and total KArP scores.

It is worth mentioning that Jordan's disaster management and preparedness are new topics of concern. Different organizations highlight this concern and plan for disasters, especially with the recent COVID-19 outbreaks [10, 19]. Additionally, educational institutions should start integrating and launching courses in disaster management into their curricula to prepare health professional students to face any disastrous events [10, 19].

Notably, the results of this study have important international applicability, as pharmacists and pharmacy students worldwide share similar fears in facing outbreaks and disaster management while must perform their responsibilities and engage with public society. Moreover, assessing the baseline data of healthcare professional students about their capabilities and readiness to respond to disaster events is essential. It has many implications for practice, education and research. These implications emphasize that disaster-related education, workshops, and training are crucial and beneficial for improving KArP of healthcare profession students. This study's results can guide policymakers and stakeholders in developing emergency plans and guidelines.

5. Conclusion

This research perspective has focuses on disaster management and preparedness among future healthcare professional practitioners. Further, the outcomes of this study intend to establish relevant educational initiatives for the students. In summary, Jordan's students from different public and private health colleges have moderate disaster medicine preparedness. Significant moderate correlations were found among the 3 KArP parameters. Knowledge, attitude, and readiness levels were moderate concerning the practice of health profession students in Jordan concerning disaster medicine management and preparedness. This study has confirmed the findings from other studies (i.e. Qatar, China, Pakistan, Yemen). The observations are very consistent. It is evident that colleges must take appropriate action. First, the preparedness level should be addressed and improved at the undergraduate level by integrating a course with an experiential training program into the study curriculum and educational strategy. Secondly, this study has confirmed the usefulness of the tool to evaluate K, A, and P regarding disaster medicine management and preparedness, which was earlier developed in Qatar. This study calls on all relevant stakeholders (e.g. students, educators, policymakers, and practitioners) to build a proper and quality educational program for university students.

6. Study Limitations

Although this study reported important data regarding disaster management and preparedness among Jordanian health professional students, few limitations were found. Firstly, the result only reflects the current situation and no proof of actual readiness in disaster management and techniques concerning the study design. Secondly, data were collected using a self-reported questionnaire; thus, a personal bias i.e., social desirability, may be found. Finally, the response rate was only 71.5% due to the students' unwillingness to participate in the study.

Acknowledgment

We appreciate the help of the individuals who assisted in collecting data.

Funding

The Qatar University Student Grant (Number: QUST-2-CPH-2022-742) funded the publication fee.

References

[1] WHO. *Risk reduction and emergency preparedness: WHO six-year strategy for the health sector and community capacity development.* Geneva: World Health Organization; 2007 (http://www.who.int/hac/techguidance/preparedness/emergency_preparedness_eng.pdf; accessed 24 May 2020).

[2] PANOS E.D.P., KOSTAS G., and ZACHAROULA M. Crisis management in the health sector; qualities and characteristics of health crisis managers. *International Journal of Caring Sciences*, 2009, 2(3): 105-107.

[3] INTERNATIONAL FEDERATION OF RED CROSS AND RED CRESCENT SOCIETIES. *About disasters.* Geneva, 2008. [Online] Available from: (http://www.ifrc.org/what/disasters/about/index.asp, accessed 24 May 2020). .

[4] UNITED NATIONS OFFICE FOR DISASTER RISK REDUCTION. *Terminology: basic terms of disaster risk reduction.* Geneva, 2004. [Online] Available from:

http://www.unisdr.org/we/inform/terminology
[5] WHO. *Essential Laws for Medicines Access: A Pilot Study on National Legislation. Report to the WHO-EMP Department on work undertaken in Geneva*.WHO, Geneva, Switzerland, 2010.
[6] UNITED NATIONS HUMAN RIGHTS OFFICE OF THE HIGH COMMISSIONER. *Access to Medicines - A Fundamental Element of the Right to Health*. 2018. [Online] Available from: https://www.ohchr.org/EN/Issues/Development/ Pages/AccessToMedicines.aspx (Accessed 24 May, 2020). .
[7] AL-ZIFTAWI N.H., ELAMIN F.M., and MOHAMED IBRAHIM M.I. Assessment of Knowledge, Attitudes, and Readiness to Practice Regarding Disaster Medicine and Preparedness Among University Health Students. *Disaster Medicine and Public Health Preparedness*. 2020:1-9.
[8] KRETCHY I.A., ASIEDU-DANSO M., and KRETCHY J.-P. Medication management and adherence during the COVID-19 pandemic: Perspectives and experiences from low-and middle-income countries. *Research in Social and Administrative Pharmacy*, 2020, 17(1): 2023-2026.
[9] WHO. *Guidelines to Help Countries Maintain Essential Health Services during the COVID-19 Pandemic*. World Health Organization Department of Communications, 2020.
[10] BASHETI I.A., NASSAR R., BARAKAT M., ALQUDAH R., ABUFARHA R., MUKATTASH T.L., and SAINI B. Pharmacists' readiness to deal with the coronavirus pandemic: Assessing awareness and perception of roles. *Research in Social and Administrative Pharmacy*, 2021, 17(3): 514-522.
[11] NAZAR Z., and NAZAR H. Exploring the experiences and preparedness of humanitarian pharmacists in responding to an emergency-response situation. *Research in Social and Administrative Pharmacy*, 2020, 16(1): 90-95. DOI: 10.1016/j.sapharm.2019.03.146
[12] SONG Z., HU Y., ZHENG S., YANG L., and ZHAO R. Hospital pharmacists' pharmaceutical care for hospitalized patients with COVID-19: Recommendations and guidance from clinical experience. *Research in Social and Administrative Pharmacy*, 2021, 17(1): 2027–2031.
[13] FATHELRAHMAN A., IBRAHIM M., and WERTHEIMER A. *Pharmacy practice in developing countries: Achievements and Challenges*. 1st ed. Academic Press, 2016.
[14] BASHETI I.A., NASSAR R., BARAKAT M., ALQUDAH R., ABUFARHA R., MUQATASH T., TAREQ L., and SAINI B. Pharmacists' readiness to deal with the coronavirus pandemic: Assessing awareness and perception of roles. *Research in Social and Administrative Pharmacy*, 2020, 17(3): 514-522.
[15] GILLANI H., MOHAMED I.M.I., AKBAR, J., and FANG Y. Evaluation of Disaster Medicine Preparedness among Healthcare Profession Students: A Cross-Sectional Study in Pakistan. *International Journal of Environmental Research and Public Health*, 2020, 17(6): 2027.
[16] GOWING J.R., WALKER K.N., ELMER S.L., and CUMMINGS E.A. Disaster Preparedness among Health Professionals and Support Staff: What is Effective? An Integrative Literature Review. *Prehospital and Disaster Medicine*, 2017, 32(3): 321-328.
[17] AHAYALIMUDIN N., and OSMAN N.N. Disaster management: Emergency nursing and medical personnel's knowledge, attitude and practices of the East Coast region hospitals of Malaysia. *Australasian Emergency Nursing Journal*, 2016, 19(4): 203-209.
[18] LI H., ZHENG S., LIU F., LIU W., and ZHAO R. Fighting against COVID-19: Innovative strategies for clinical pharmacists. *Research in Social and Administrative Pharmacy*, 2020, 17(1): 1813-1818.
[19] AL-ALI N.M., and IBAID A.H. Healthcare providers' perception of knowledge, skills and preparedness for disaster management in primary healthcare centres in Jordan. *Eastern Mediterranean Health Journal*, 2015, 21(10): 713-721.
[20] AL KHALAILEH M.A., BOND E., and ALASAD J.A. Jordanian nurses' perceptions of their preparedness for disaster management. *International Emergency Nursing*, 2012, 20(1): 14-23.
[21] CRANE J.S., MCCLUSKEY J.D., JOHNSON G.T., and HARBISON R.D. Assessment of community healthcare providers ability and willingness to respond to emergencies resulting from bioterrorist attacks. *Journal of Emergencies, Trauma, and Shock*, 2010, 3(1): 13-20.
[22] O'SULLIVAN T.L., DOW D., TURNER M.C., LEMYRE L., CORNEIL W., KREWSKI D., PHILLIPS K.P., and AMARATUNGA C.A. Disaster and emergency management: Canadian nurses' perceptions of preparedness on hospital front lines. *Prehospital and Disaster Medicine*, 2008, 23(3): 11-18.
[23] SWITALA C.A., COREN J., FILIPETTO F.A., GAUGHAN J.P., and CIERVO C.A. Bioterrorism – a health emergency: do physicians believe there is a threat and are they prepared for it? *American Journal of Disaster Medicine*m 2011m 6(3): 143-152.
[24] ALRAZEENI D., and SAUDI E.M.S. Students' Perception of and Attitudes toward their Preparedness for Disaster. *Management Journal of Education and Practice*, 2015, 6(35): 110-116.
[25] SINHA A., PAL D.K., KASAR P.K., TIWARI R., and SHARMA A. Knowledge, attitude and practice of disaster preparedness and mitigation among medical students. *Disaster Prevention and Management: An International Journal*, 2008, 17(4): 503-507.
[26] MOABI R.M. *Knowledge, attitudes and practices of health care workers regarding disaster preparedness at Johannesburg Hospital in Gauteng Province, South Africa*. *A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg,* In partial fulfilment of the requirements for the degree of Master of Public Health. Johannesburg, 2008.
[27] SAUSER K., BURKE R.V., FERRER R.R., GOODHUE C.J., CHOKSHI N.C., and UPPERMAN J.S. Disaster preparedness among medical students: a survey assessment. *American Journal of Disaster Medicine*, 2010, 5(5): 275-284.
[28] RAGAZZONI L., INGRASSIA P.L., GUGLIOTTA G., TENGATTINI M., FRANC J.M., and CORTE F.D. Italian medical students and disaster medicine: awareness and formative needs. *American Journal of Disaster Medicine*, 2013, 8(2): 127-136.
[29] MORTELMANS L.J., DIELTIENS G., ANSEEUW K., and SABBE M.B. Belgian senior medical students and disaster medicine, a real disaster? *European Journal of Emergency Medicine*, 2014, 21(1): 77-78.

参考文:

[1]世界衛生組織。減少風險和應急準備：世衛組織衛生部門和社區能力發展六年戰略。日內瓦：世界衛生組織；2007年（http://www.who.int/hac/techguidance/preparedness/emergency_preparness_eng.pdf；2020 年 5 月 24 日訪問）。

[2] PANOS E.D.P.、KOSTAS G. 和 ZACHAROULA M. 衛生部門的危機管理；健康危機管理人員的素質和特點。國際關懷科學雜誌, 2009, 2(3): 105-107.

[3]紅十字會與紅新月會國際聯合會。關於災難。日內瓦，2008年。[在線] 可從：（http://www.ifrc.org/what/disasters/about/index.asp，2020 年 5 月 24 日訪問）。.

[4]聯合國減災辦公室。術語：減少災害風險的基本術語。日內瓦，2004年。[在線] 可從：http://www.unisdr.org/we/inform/terminology

[5]世界衛生組織。藥品獲取基本法律：國家立法試點研究。向世界衛生組織基本藥物和保健品部門報告在日內瓦開展的工作。世界衛生組織，瑞士日內瓦，2010。

[6] 聯合國人權事務高級專員辦事處。獲得藥物——健康權的基本要素。2018. [在線] 來自：https://www.ohchr.org/EN/Issues/Development/Pages/AccessToMedicines.aspx（2020 年 5 月 24 日訪問）。.

[7] AL-ZIFTAWI N.H.、ELAMIN F.M. 和 MOHAMED IBRAHIM M.I. 評估大學健康學生在災難醫學和準備方面的知識、態度和實踐準備情況。災害醫學和公共衛生準備。 2020：1-9。

[8] KRETCHY I.A.、ASIEDU-DANSO M. 和 KRETCHY J.P。新冠肺炎大流行期間的藥物管理和依從性：低收入和中等收入國家的觀點和經驗。社會與行政藥學研究, 2020, 17(1): 2023-2026.

[9]世界衛生組織。在新冠肺炎大流行期間幫助各國維持基本衛生服務的指南。世界衛生組織通訊部，2020。

[10] BASHETI I.A.、NASSAR R.、BARAKAT M.、ALQUDAH R.、ABUFARHA R.、MUKATTASH T.L. 和 SAINI B. 藥劑師應對冠狀病毒大流行的準備情況：評估對角色的認識和認知。社會與行政藥學研究, 2021, 17(3): 514-522.

[11] NAZAR Z. 和 NAZAR H. 探索人道主義藥劑師應對緊急情況的經驗和準備情況。社會與行政藥學研究, 2020, 16(1): 90-95. DOI: 10.1016/j.sapharm.2019.03.146

[12] SONG Z., HU Y., ZHENG S., YANG L. 和 ZHAO R. 醫院藥劑師對新冠肺炎住院患者的藥學護理：臨床經驗的建議和指導。社會與行政藥學研究, 2021, 17(1): 2027-2031.

[13] FATHELRAHMAN A.、IBRAHIM M. 和 WERTHEIMER A. 發展中國家的藥學實踐：成就和挑戰。第1版。學術出版社，2016。

[14] BASHETI I.A., NASSAR R., BARAKAT M., ALQUDAH R., ABUFARHA R., MUQATASH T., TAREQ L. 和 SAINI B. 藥劑師應對冠狀病毒大流行的準備情況：評估對角色的認識和認知.社會與行政藥學研究, 2020, 17(3): 514-522.

[15] GILLANI H., MOHAMED I.M.I., AKBAR, J. 和 FANG Y. 醫療專業學生災難藥物準備情況的評估：巴基斯坦的一項橫斷面研究。國際環境研究與公共衛生雜誌, 2020, 17(6): 2027。

[16] GOWING J.R., WALKER K.N., ELMER S.L. 和 CUMMINGS E.A. 衛生專業人員和支持人員的備災：什麼是有效的？綜合文獻綜述。院前和災難醫學，2017，32（3）：321-328。

[17] AHAYALIMUDIN N. 和 OSMAN N.N.災害管理：馬來西亞東海岸地區醫院急診護理和醫務人員的知識、態度和實踐。澳大利亞緊急護理雜誌，2016，19（4）：203-209。

[18] LI H., ZHENG S., LIU F., LIU W. 和ZHAO R. 抗擊新冠肺炎：臨床藥師的創新策略。社會與行政藥學研究, 2020, 17(1): 1813-1818.

[19] AL-ALI N.M. 和 IBAID A.H. 醫療保健提供者對約旦初級醫療保健中心災害管理知識、技能和準備情況的看法。東地中海健康雜誌，2015，21（10）：713-721。

[20] AL KHALAILEH M.A.、BOND E. 和 ALASAD J.A. 約旦護士對其災害管理準備情況的看法。國際緊急護理，2012，20(1)：14-23。

[21] CRANE J.S.、MCCLUSKEY J.D.、JOHNSON G.T. 和 HARBISON R.D. 評估社區醫療保健提供者應對生物恐怖襲擊造成的緊急情況的能力和意願。緊急情況、創傷和休克雜誌，2010年，3(1)：13-20。

[22] O'SULLIVAN T.L.、DOW D.、TURNER M.C.、LEMYRE L.、CORNEIL W.、KREWSKI D.、PHILLIPS K.P. 和 AMARATUNGA C.A. 災難和應急管理：加拿大護士對醫院前線準備工作的看法。院前和災難醫學，2008，23（3）：11-18。

[23] SWITALA C.A.、COREN J.、FILIPETTO F.A.、GAUGHAN J.P. 和 CIERVO C.A.生物恐怖主義——一種健康緊急情況：醫生是否相信存在威脅，他們是否做好了應對準備？美國災害醫學雜誌 m 2011m 6(3): 143-152。

[24] ALRAZEENI D. 和 SAUDI E.M.S. 學生對災難準備的認知和態度。教育與實踐管理學報, 2015, 6(35): 110-116.

[25] SINHA A.、PAL D.K.、KASAR P.K.、TIWARI R. 和 SHARMA A. 醫學生備災和減災的知識、態度和實踐。災害預防與管理：國際期刊，2008，17（4）：503-507。

[26] MOABI R.M. 南非豪登省約翰內斯堡醫院衛生保健工作者的備災知識、態度和實踐。提交給約翰內斯堡金山大學健康科學學院的研究報告，部分滿足公共衛生碩士學位的要求。約翰內斯堡，2008年。

[27] SAUSER K.、BURKE R.V.、FERRER R.R.、GOODHUE C.J.、CHOKSHI N.C. 和 UPPERMAN J.S.醫學生的備災：一項調查評估。美國災害醫學雜誌, 2010，5(5): 275-284。

[28] RAGAZZONI L.、INGRASSIA P.L.、GUGLIOTTA G.、TENGATTINI M.、FRANC J.M. 和 CORTE F.D.意大利醫學生和災難醫學：意識和形成性需求。美國災害醫學雜誌，2013年，8(2)：127-136。
[29] MORTELMANS L.J.、DIELTIENS G.、ANSEEUW K. 和 SABBE M.B. 比利時高級醫學生和災難醫學，真正的災難？歐洲急診醫學雜誌，2014，21（1）：77-78。