KNOWLEDGE, ATTITUDE AND READINESS TO PRACTICE DISASTER PREPAREDNESS AMONG HEALTHCARE PROFESSIONALS IN MYANMAR: ADAPTATION AND VALIDATION OF DISASTER PREPAREDNESS EVALUATION TOOL

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Abstract. Disaster management globally emphasizes the need for effective preparedness and response strategies, particularly within the healthcare systems, to mitigate the impact of disasters. Myanmar is highly vulnerable to disasters, underscoring the need to assess healthcare professionals' knowledge, attitude and readiness to practice (KAP) in alignment with the national framework named Myanmar Action Plan on Disaster Risk Reduction (MAPDRR). However, Myanmar lacks the assessment tool for disaster preparedness of healthcare professionals. The Disaster Preparedness Evaluation Tool (DPET) was adapted into a Myanmar version (DPET-M) to fill the research gap. The adapted DPET-M was then evaluated by seven experts using a scale-level content validity index (S-CVI). To assess its psychometric properties, 303 healthcare professionals from public and private healthcare institutions participated in a cross-sectional survey in August 2024. The findings demonstrated that 62% of participants had moderate knowledge, 38% had high knowledge and no participant was in the low category. Attitude scores showed 54% and 46% of the participants with high and moderate score respectively, indicating a strong willingness to engage in disaster preparedness activities. Readiness to practice among the participants was moderate (54%), with low readiness only in 1% and the remaining with high readiness. Prior disaster training and workplace settings were significantly found to influence KAP scores. The adapted DPET-M demonstrated strong reliability, with a Cronbach's Alpha of 0.94 and high Composite Reliability, confirming its suitability for assessing healthcare professionals' disaster preparedness and offering a critical tool to strengthen Myanmar's disaster resilience.

Keywords: attitude, disaster preparedness, healthcare professional, knowledge, readiness to practice

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INTRODUCTION

Around the world, the unpredictability and uncertainty of both natural and man-made disasters have dramatically increased. The latest Emergency Event Database (EM-DAT) recorded 399 natural hazards and disasters globally, affecting 93.1 million people, causing 86,473 fatalities, and resulting in an economic loss of USD 202.7 billion (CRED, 2024). Myanmar is one of the disaster-prone countries beset by numerous disasters, such as cyclones, earthquakes, floods, and wildfires. The INFORM Risk Index 2024 ranks Myanmar as the 11th most disaster-prone country globally, while the Asian Disaster Reduction Centre places it second among 184 countries most affected by climate change (Tun, 2022; IOM, 2024). Recent disasters, such as cyclone Mocha in May 2023 and flooding caused by typhoon Yagi in 2024, have underscored the devastating impacts, with the former causing damage equivalent to 3.4% of Myanmar's 2021 GDP and the latter affecting over one million people and causing 360 deaths (World Bank, 2023; United Nations Myanmar, 2024). Such alarming disaster-related events call for an urgent need to review the disaster preparedness level of the healthcare sector in Myanmar.

Recognizing the urgency of disaster management, the Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) was established in 2017 (National Disaster Management Committee, 2017), aligning it with the Hyogo Framework (2005-2015) (ISDR, 2005) and Sendai Framework for Disaster Risk Reduction (2015-2030) (UNDRR, 2015). Among MAPDRR 6 targets and 32 priorities, 11 focus on the healthcare sector (Table 1). Priority 4.7 emphasizes "health sector preparedness for

response and recovery through disaster risk management plans, mass casualty management and psychosocial support". With Phase II of MAPDRR concluding in 2025, healthcare professionals with adequate knowledge, attitude and readiness will be the key factors in achieving these goals.

Healthcare professionals, such as doctors, nurses and pharmacists, are critical responders providing lifesaving care to victims during disaster situations (Gillani *et al*, 2021). As integral members of the healthcare workforce, these individuals make important decisions and deliver emergency care during disaster situations. In these situations, health professionals working at healthcare facilities must have a certain level of necessary knowledge, attitude and practice to successfully and efficiently react to such events (Tassew *et al*, 2022).

Knowledgeable healthcare providers can thus help minimize the devastating effects of disasters by applying the learned concepts of providing relevant care (Azizpour *et al*, 2022). Disaster preparedness refers to "knowledge and capacities developed by governments, response and recovery organizations, communities, and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disaster" (UNDRR, n.d.). Since the disaster preparedness definition involves the ability to anticipate and respond to emergencies, assessing healthcare professionals' knowledge, attitude and readiness to practice (KAP) provides critical insights into their preparedness.

In Myanmar, one of the low to middle-income countries, the healthcare system faces significant challenges such as inadequate funding for health infrastructure and a lack of qualified healthcare personnel (Kyaw *et al*, 2023). Furthermore, compared to other disaster-prone countries such as Indonesia and the Philippines in Southeast Asia, Myanmar remains behind in conducting analysis and research on this topic. Significant disaster-related research activity in Myanmar emerged only after cyclone Nargis in 2008 (Tun and Lassa, 2023), and based on the

Table 1

Healthcare sector involvement in disaster risk management and preparedness of Myanmar Action Plan on Disaster Risk Reduction (MAPDRR)

Serial number	Priority	Priority action	Healthcare sector direct and indirect involvement
Pillar 1: Assessing disaster risk, including extreme weather events and creating public awareness on disaster risk reduction in Myanmar			
1.	1.1	Central coordination mechanism and repository of disaster risk information in Myanmar.	Supporting disaster preparedness through the Healthcare Work Committee under the National Disaster Management Committee.
2.	1.2	National comprehensive multi-hazard probabilistic risk assessment of Myanmar: Periodic updating of the risk assessment.	Providing input on health-related risks, developing health-specific risk maps, and ensuring that the healthcare sector is adequately prepared for disaster response, relief, and recovery efforts.
3.	1.4	Assessment of dam safety and reservoir, critical infrastructure and vital government and lifeline buildings in Myanmar.	Evaluating the vulnerability of health facilities to dam failures, disasters, and climate change risks, ensuring that hospitals and health centers classified as critical infrastructure and essential lifeline buildings are equipped to continue operations during emergencies.
4.	1.8	Nation-wide disaster awareness program with focus on people at most risk.	Providing disaster awareness activities to the general public and giving training to caregivers.

Table 1 (cont)

Serial number	Priority	Priority action	Healthcare sector direct and indirect involvement
Pillar 2: Strengthening disaster risk governance to reduce and manage risk			
5.	2.3	Myanmar's disaster rehabilitation and reconstruction framework/ strategy using Build Back Better.	Ensuring health systems are integrated into "build-back-better" principles, focusing on restoring healthcare infrastructure, supporting vulnerable populations, and providing disaster recovery training.
6.	2.5	Strengthening fire risk management systems in Myanmar.	strengthening fire risk management by collaborating with fire services ensuring health services are integrated into disaster response protocols.
Pillar 3: Mainstreaming disaster risk reduction for resilient development in Myanmar			
7.	3.6	Building urban resilience to address disaster and climate risk in selected urban centers of Myanmar.	Building urban resilience to address disaster and climate risks in selected urban centers of Myanmar, with the Ministry of Health as a partner, by creating awareness of disaster-related dos and don'ts.
8.	3.7	Integration of disaster risk reduction in health facilities and other infrastructure.	Developing guidelines for integrating hazard-specific structural considerations into health facilities and establishing monitoring and evaluation mechanisms to ensure adherence to these guidelines.

Table 1 (cont)

Serial number	Priority	Priority action	Healthcare sector direct and indirect involvement
Pillar 4: Enhancing disaster preparedness for effective response and resilient rehabilitation and reconstruction in Myanmar			
9.	4.2	Improved disaster response system in Myanmar.	Establishing rapid disaster response teams at the regional/state level and developing a web-based inventory of resources (equipment, facilities, manpower).
10.	4.3	Capacity development on disaster resilience in a systematic, effective and sustainable manner and strengthening Disaster Management Training Centre (DMTC).	Integrating disaster risk reduction and climate change adaptation into civil service training to build resilience and enhance preparedness among public sector professionals.
11.	4.7	Health sector preparedness for response and recovery through disaster risk management plans including epidemics and disease control, mass casualty management system and psychosocial support.	Developing hospital disaster risk management plans, updating mass casualty protocols, enhancing health emergency operations, training staff on early warning alert and response system, disaster risk management, epidemic control, and psychosocial support, including toolkit development and simulation exercises.

authors' review of the literature, the majority of the research studies focused on leadership, governance and community resilience. Only two studies were explicitly conducted on healthcare workers and first responders to emergency disaster preparedness, but the studies mostly concentrated on mental health aspects instead of individual readiness for disasters (Htay, 2006; Ringstad *et al*, 2017). This gap emphasizes how crucial it is to evaluate the KAP of healthcare professionals to improve their overall preparedness for disasters.

Although many internationally and locally accepted assessment tools for disaster management exist, such as the WHO and PAHO Safe Hospitals Checklist, Emergency Preparedness Information Questionnaire (EPIQ), Simple Triage and Rapid Treatment (START) by Hoag Hospital and Newport Beach Fire Department in California, USA, most of these tools mainly focus on the healthcare facilities and management rather than the individuals' preparedness (Benson *et al*, 1996; WHO-PAHO, 2019; Wisniewski *et al*, 2004). Myanmar also uses the Safe Hospitals Checklist self-assessment tool for facility-level evaluations but lacks a standardized tool for healthcare professionals (Myanmar Ministry of Health and Ministry of Social Welfare, Relief and Resettlement, 2011).

The disaster preparedness evaluation tool (DPET) developed by Tichy *et al* (2008) stands out as one of the most popular evaluation tools for disaster preparedness by healthcare workers. It has been widely adopted and validated in various countries (Al Khalaileh *et al*, 2010; Chen *et al*, 2015; Al Thobaity *et al*, 2015; Rizqillah and Suna, 2018; Han and Chun, 2021; Krongthaeo *et al*, 2022; Beckert *et al*, 2024; Wang *et al*, 2023). The original DPET tool consists of 47 Likert-type questions with a score of 1 denoting "strongly disagree" and 6 "strongly agree", aiming to evaluate how nurse practitioners acquire preparedness knowledge and how they feel and perceive their preparedness level for emergencies. The tool categorizes preparedness into three areas: disaster preparedness; mitigation and response preparedness; and evaluation and recovery

preparedness (Krongthaeo *et al*, 2022). DPET has since been adopted by various healthcare professionals, viz doctors, healthcare students, military healthcare personnel, paramedics, and other emergency healthcare workers (Alrazeeni, 2015; King *et al*, 2019; Al Thubaiti *et al*, 2019; Almukhlifi, 2022; Aqtam *et al*, 2024). Nearly half of the Southeast Asian countries, namely Cambodia, Indonesia, Laos and Thailand, have used the DPET tool in their research activities (Usher *et al*, 2015; Rizqillah and Suna, 2018; Martono *et al*, 2019; Krongthaeo *et al*, 2022).

Given its adaptability and alignment with MAPDRR priorities, the current study adopted and validated the DPET tool to determine disaster preparedness among healthcare professionals in Myanmar. The study aims were to i) assess healthcare professionals' current KAP towards disaster preparedness in the country, ii) adapt and validate the Myanmar version of the DPET tool, and iii) examine the psychometric properties of the translated KAP version. By validating DEPT, the results should fill an important research gap and offer valuable insights to strengthen the healthcare system and enhance disaster preparedness among healthcare professionals in Myanmar.

MATERIALS AND METHODS

Study locations and participants

A cross-sectional survey was carried out to collect and analyze the data. The study was conducted in 17 healthcare facilities in five regions of Myanma: Ayeyarwady, Bago, Mandalay, Naypyitaw, and Yangon. These facilities were public hospitals, private specialist hospitals, teaching hospitals, clinics, and laboratories (Fig 1).

The participants were medical doctors, dentists, nurses, midwives, pharmacists, medical technologists, public health supervisors, health assistants, and radiology and laboratory assistants, following the classifications described previously (Gowing *et al*, 2017). The ideal sample size ranges from 5-10 respondents per questionnaire item (Al Khalaileh *et al*, 2010; DeVellis, 2017). Given that the study

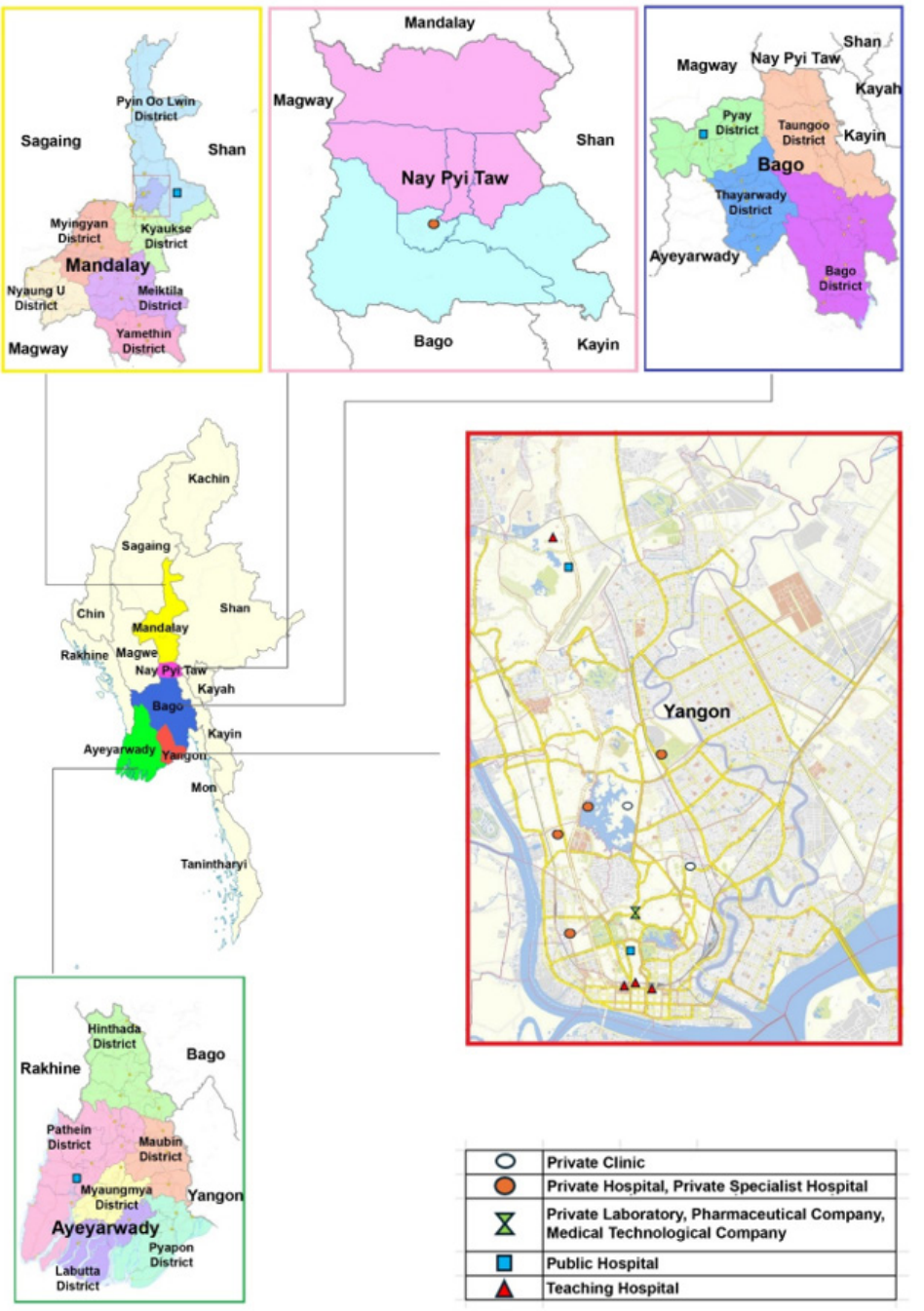

Fig 1 - Study locations of healthcare professionals in five regions of Myanmar (Ayeyarwady,Bago, Mandalay, Nay Pyi Taw, and Yangon,), representing 17 healthcare facilities

comprises 30 items, participants (n = 150-300) should be enrolled, and for the psychometric evaluation of scales, a participant size of 300 is recommended (Nunnally and Bernstein, 1994). In this study, 326 healthcare professionals were recruited, exceeding the recommended numbers. Subsequently, 15 participants were removed due to the inconsistencies in their demographic data. Additional 8 participants were excluded as outliers because their mean scores for knowledge, attitude, and readiness to practice (KAP) variables exceeded ±3.0 standard deviations from the mean. A Kaiser-Meyer-Olkin test yielded an excellent sampling adequacy value of 0.941 (Shrestha, 2021).

Content validation tool

Data were collected using a purposive sampling technique, conducted during 15-29 August 2024, and administered via a Google Form, with the distribution facilitated by healthcare professional volunteers from each healthcare center. Participants' names were not collected. To evaluate the KAP of healthcare professionals' disaster preparedness, this study used an adapted version of the original DEPT (Tichy *et al*, 2008), and it was tailored as DPET-M.

Firstly, 47 items from the original DPET were examined to ascertain they were pertinent to the study's objectives. For example, an item such as "I participate in peer evaluation of skills in disaster preparedness and response" was considered irrelevant due to its focus on internal assessment rather than the actionable preparedness emphasized by MAPDRR. The item "I am familiar with what the scope of my full name (NP) role would be in a post-disaster situation" was also considered irrelevant due to its post-disaster focus. Similar to other DPET studies, 14 items were removed due to irrelevance, redundancy and misalignment with the roles of the participant professions (Rizqillah and Suna, 2018; Han and Chun, 2021), and the decision was confirmed by the consensus of experts during the content validity process. A detailed list of the removed items and their justification is available at https://zenodo.org/records/14373486.

Secondly, based on the disaster preparation research conducted in Qatar, the remaining items were categorized according to KAP (Al-Ziftawi *et al*, 2021). Knowledge is defined as "the fact or condition of knowing about disaster preparedness with familiarity gained through experience" (Merriam-Webster's Collegiate Dictionary, 1993), attitude as "the way of behaving caused by experiences of or opinions about disasters" (Cambridge Academic Content Dictionary, 2009) and readiness to practice as "the ability to assume the roles of a provider of care, designer/manager/coordinator of care and member of the profession" (Reagor, 2010). Thus, 13 items were listed in the knowledge category, 10 in attitude and 7 in readiness to practice.

Thirdly, all the selected items were translated into the Myanma language. The translation was reviewed by a public healthcare professional to verify the clarity and accuracy of field-specific terminologies.

Six to eight experts are recommended to establish the content validity (Lynn, 1986; Beaton *et al*, 2000). In the current study validation process, a committee was formed comprising 7 experts (1 in language, 1 in methodology, 5 in public health, and 1 in natural disaster assessment). A Content Validity Index (CVI) was determined utilizing a 4-point scale: 1 (not relevant), 2 (somewhat relevant and requires revision), 3 (relevant), and 4 (highly relevant) (Madadizadeh and Bahariniya, 2023). Consequently, 3 items were eliminated and one item (A5) was modified based on an I-CVI >0.83 and S-CVI/Ave >0.90, resulting in a final questionnaire containing 30 items (Table 2). A pilot test was conducted by 30 healthcare professionals from the target population, who gave Cronbach's alpha values for all domains within the acceptable range, as values above 0.7 are considered adequate (Nunnally and Bernstein, 1994), with a total KAP score of 0.812.

Participants' KAP scores were categorized as "low," "moderate" and "high," with cutoff values based on previous studies (Al-Ziftawi *et al*, 2021; Gillani *et al*, 2021). A score <25th quartile is considered

Table 2

Knowledge, attitude and readiness to practice assessment among healthcare professionals toward disaster preparedness

	Knowledge assessment
K1	I am aware of potential vulnerabilities in my community (*eg*, earthquake, flood, terrorism).
K2	I know where to find relevant research or information related to disaster preparedness and management to fill in gaps in my knowledge.
K3	I am familiar with the local emergency response system for disasters.
K4	I know whom to contact (chain of command) in disaster situations in my community.
K5	I am aware of classes about disaster preparedness and management that are offered in my workplace, university or community.
K6	In case of a bioterrorism/biological attack, I know how to use personal protective equipment.
K7	I am familiar with accepted triage principles used in disaster situations.
K8	In the case of bioterrorism/biological attack, I know how to perform isolation procedures so that I minimize the risk for community exposure.
K9	I am familiar with psychological interventions, behavioral therapy, cognitive strategies, support groups, and incident debriefing for patients who experience emotional or physical trauma.
K10	I am familiar with the organizational logistics and roles among local, state and federal agencies in disaster response situations.
K11	I am familiar with the main groups (A, B, C) of biological weapons (eg, anthrax, plague, botulism, smallpox), their signs and symptoms, and effective treatments.
K12	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.
K13	I am able to discern signs and symptoms of acute stress disorder and post-traumatic stress disorder (PTSD).

Table 2 (cont)

	Attitude assessment
A1	I would be interested in educational classes on disaster preparedness that relate specifically to my community situation.
A2	I know the limits of my knowledge, skills and authority as a healthcare professional to act in disaster situations.
A3	I find that the research literature on disaster preparedness is understandable.
A4	In case of a disaster situation, I think there is sufficient support from local officials on the county or state level.
A5	Limited access to disaster preparedness information relevant to my community affects my level of preparedness.
A6	I consider myself prepared for the management of disasters.
A7	I can describe my role in the response phase of a disaster in the context of my workplace, the general public, medic, and personal contacts.
A8	I would feel confident working as a healthcare professional and setting up a temporary clinic in disaster situations.
A9	As a healthcare professional, I would feel confident in my abilities as a direct care provider and first responder in disaster situations.
A10	I am comfortable providing education on coping skills and training for patients who experience traumatic situations.

Table 2 (cont)

	Readiness to practice assessment
P1	I have a list of contacts in the medical or health community in which I practice. I know referral contacts in case of a disaster situation (eg, health department).
P2	I participated in one of the following educational activities on a regular basis: continuing education classes, seminars or conferences dealing with disaster preparedness
P3	I have participated in emergency planning for disaster situations in my community.
P4	I participated/have participated in creating new guidelines or emergency plans or in lobbying for improvements on the local or national level.
P5	I participate in disaster drills or exercises at my workplace (e.g., clinic, hospital) on a regular basis.
P6	I would feel reasonably confident providing patient education on stress and abnormal functioning related to trauma.
P7	I would feel reasonably confident implementing emergency plans, evaluation procedures, and similar functions.

Note: The questionnaire items were scored on a 6-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = agree, and 6 = strongly agree, with higher scores representing higher disaster preparedness).

low, between 25th and 75th quartile moderate, and >75th quartile high.

Data analysis

Descriptive statistics were used to examine the individual characteristics of participants. Content validity was assessed using the Item Content Validity Index (I-CVI) and Scale Content Validity Index (S-CVI/Ave). Shapiro-Wilk and Kolmogorov-Smirnov tests were used to assess normality, while Kruskal-Wallis and Mann-Whitney tests were applied as non-parametric tests, with a p-value <0.001. Cronbach's Alpha was employed to measure internal consistency and Composite Reliability (CR) and Average Variance Extracted (AVE) were used to ensure that the Items adequately represented KAP. Data analyses were performed using a Statistical Package for the Social Sciences (SPSS) version 27.0 and the SPSS Analysis of Moment Structures (AMOS) version 21.0 (IBM Corp, Armonk, NY).

Ethical approval

The study was approved by the Medical Ethics Review Committee of Jiangsu University, China (approval no. JSDX 20241203001). Prior written informed consent was obtained from each study participant through an online form.

RESULTS

Participants' performance

There were 303 participants consisting of a slightly higher proportion of females (56%) than males. The average age of participants (mean ± standard deviation) was 35 ± 11.31 years, with the largest proportion falling in the 18-30 year age group (Table 3). Nurses and midwives constituted the largest group of participants, accounting for 49%, followed by doctors (33%). Fifty percent of the participants held bachelor's degrees and 25% had higher education qualifications, such as Postgraduate Diploma, Master's or Doctor of Philosophy degrees. Private healthcare professionals were more represented (68%) compared to those in the public sector. The majority of participants (70%) received disaster training. Given the country's vulnerability to

Table 3

Demographic characteristics of participants and relationship with knowledge, attitude and readiness to practice (KAP) scores (N = 303)

Characteristic	Frequency *n* (%)	*p*-value			
		Knowledge score	Attitude score	Readiness to practice score	Overall KAP score
Sex*		0.670	0.959	0.796	0.653
Male	132 (44)				
Female	171 (56)				
Age†		0.874	0.778	0.498	0.878
18-30 years	121 (40)				
31-40 years	94 (31)				
41-50 years	54 (18)				
51-60 years	24 (8)				
≥61 years	10 (3)				
Profession†		<0.001	<0.001	<0.001	<0.001
Specialist, doctor, dentist	100 (33)				
Nurse, midwife	148 (49)				
Pharmacist, medical technologist	20 (7)				
Health supervisor, health assistant	18 (6)				
Radiology or laboratory assistant	17 (5)				

Table 3 (cont)

Characteristic	Frequency *n* (%)	*p*-value			
		Knowledge score	Attitude score	Readiness to practice score	Overall KAP score
Education†		<0.001	0.002	<0.001	<0.001
Professional certificate, diploma	77 (25)				
Bachelor degree	150 (49)				
Master degree, post-graduate diploma	52 (17)				
Doctoral degree, post doctorate training	24 (9)				
Experience†		0.484	0.189	0.028	0.328
1-5 years	111 (37)				
6-10 years	64 (21)				
11-20 years	55 (18)				
21-30 years	54 (18)				
≥31 years	19 (6)				
Workplace†		<0.001	0.037	<0.001	0.001
Private clinic	92 (30)				
Private hospital, private specialist hospital	85 (28)				
Private laboratory, pharmaceutical company, medical technological company	30 (10)				
Public hospital	56 (18)				
Teaching hospital	40 (14)				

Table 3 (cont)

Characteristic	Frequency *n* (%)	*p*-value			
		Knowledge score	Attitude score	Readiness to practice score	Overall KAP score
Past-disaster training*		<0.001	<0.001	<0.001	<0.001
Yes	211 (70)				
No	92 (30)				
Disaster experience*		<0.001	<0.001	<0.001	<0.001
Yes	201 (66)				
No	102 (34)				

*Mann-Whitney test; †Kruskal-Wallis test

natural disasters, a large portion of the participants (66%) experienced disasters during their careers.

KAP scores of participating healthcare professionals are summarized in Table 4. The average knowledge score was 57.5 ± 0.5, with the majority of participants (62%) categorized as having a moderate level, while 38% were in the high category and none in the low group. The average attitude score was 46.8 ± 0.5, indicating a high level of attitude, with 54% in the high category and the remaining in the moderate category. Lastly, the average readiness to practice score was 31.4 ± 0.5, with a slight majority (54%) showing a moderate level, 45% high and only 1% low.

The findings showed that gender and age are not statistically significant in all disaster-related scores of healthcare professionals. Statistically significant differences were found between professional groups for all KAP domains (all *p*-values <0.001). Education level was another significant contributor to disaster preparedness, with significant *p*-values (knowledge: *p*-value <0.001, attitude: *p*-value = 0.002, readiness to practice: *p*-value <0.001, overall KAP: *p*-value <0.001). The number of years of experience significantly impacted only readiness to practice (*p*-value = 0.028) but it did not affect knowledge (*p*-value = 0.484) or attitude (*p*-value = 0.189). Statistically significant differences in KAP scores were found in all domains (*p*-value <0.001 for knowledge and readiness to practice, 0.043 for attitude, and <0.001 for overall KAP. A Mann-Whitney U test comparing private and public healthcare facilities revealed statistically significant differences in knowledge (U = 6775.5, Z = -4.458, *p*-value <0.001), attitude (U = 8505.0, Z = -2.023, *p*-value = 0.043), readiness to practice (U = 7904.5, Z = -2.871, *p*-value = 0.004), and total KAP level (U = 7203.0, Z = -3.853, *p*-value <0.001). Median comparisons further confirmed that public healthcare professionals consistently outperformed those in private facilities in all three categories.

To demonstrate the applicability and effectiveness of the DPET tool used for KAP analysis, a comparison

Table 4

Knowledge, attitude and readiness to practice (KAP) scores of healthcare professionals in Myanmar

Domain	KAP score (mean ± SD)	Level, *n* (%)			Result
		High	Moderate	Low	
Knowledge	57.5 ± 0.5	116 (38)	187 (62)	0 (0)	Moderate
Attitude	46.8 ± 0.5	163 (54)	140 (46)	0 (0)	High
Readiness to practice	31.4 ± 0.5	138 (45)	164 (54)	1 (1)	Moderate

Note: Level of knowledge, attitude and readiness to practice is categorized as follows: low: <25th quartile; moderate: 25th - 75th quartile; high: >75th quartile.

of disaster preparedness-related KAP findings from various studies is presented (Table 5). All selected studies utilized the common conceptual framework for KAP and applied the same KAP cutoff scores. While all studies reported moderate knowledge, benchmarking allowed a clear understanding that this comparison highlights consistent knowledge scores but varying attitude and readiness levels, reflecting similarities and distinct patterns.

Content validity of the DPET-M tool

Given that previous studies have demonstrated the validity and reliability of DPET, this study performed content validity analysis

Table 5

Comparison with other knowledge, attitude and readiness to practice (KAP) studies of healthcare professionals on disaster preparedness

Study site (Reference)	Knowledge level	Attitude level	Readiness to practice level
Myanmar (this study)	Moderate	High	Moderate
United Arab Emirates (Shanableh *et al*, 2023)	Moderate	High	High
Pakistan (Gillani *et al*, 2021)	Moderate	Low	Moderate
Qatar (Al-Ziftawi *et al*, 2021)	Moderate	Moderate	Moderate

Note: All studies evaluated the psychometric aspects of disaster preparedness: knowledge (K), attitude (A), and readiness to practice (P) and used the following classification method. Scores below the 25th quartile were classified as low, scores between the 25th and 75th quartile were classified as moderate, and scores above the 75th quartile were classified as high. This study used the Disaster Preparedness Evaluation Tool-M (DPET-M), based on KAP definitions by Al-Zitawi *et al* (2021) which were also adopted by the other studies for their question items and criteria.

to reflect its research objectives. Item Content Validity Index (I-CVI) and the Scale Content Validity Index per Average (S-CVI/Ave) were calculated for 30 items of DPET-M. I-CVI is calculated from the proportion of experts who answered "relevant" or "highly relevant" on each question item. The content validity of the factor, known as S-CVI/Ave, is determined by the average of all individual I-CVI scores. This study used 7 experts, with a suggested acceptance value for I-CVI and CVI/Ave of ≥0.83 and ≥0.90 respectively. I-CVI values were between 0.86 and 1.00 for 29 items, except for 1 item (A5) that received 0.71 from 5/7 experts, a value slightly below the acceptable level. Thus, item A5 ("Finding relevant information about disaster preparedness related to my community's needs is an obstacle to my level of disaster preparedness") was modified in DEPT-M according to the experts' suggestion to read "Limited access to disaster preparedness information relevant to my community affects my level of preparedness". The result also showed excellent content validity, with an S-CVI/Ave of 0.93 while the recommended value is 0.80.

Reliability and convergent validity of the DPET-M tool

This study employed Cronbach's Alpha to measure the reliability and internal consistency of the DPET-M questions (Table 6). The item-total statistics (using the SPSS software) yielded a Cronbach's Alpha value of 0.937, indicating strong internal consistency across the 30 survey items. Reliability value of 0.877, 0.775 and 0.876 obtained for knowledge, attitude and readiness to practice respectively, demonstrated good to acceptable reliability. Removing item A5 raised Cronbach's Alpha for attitude from 0.775 to 0.861, improving the scale's reliability and reinforcing the content validity of DPET-M. The Cronbach's Alpha value for DPET-M aligned with other studies, such as the German version (0.94), the Arabic version (0.90) and the Chinese version (0.87), reflecting comparable reliability

Table 6

Results of convergent validity and reliability

Domain	AVE	CR	Cronbach's Alpha
Knowledge	0.768	0.880	0.877
Attitude	0.640	0.864	0.861
Readiness to practice	0.720	0.892	0.876

AVE: average variance extracted; CR: composite reliability

across different cultural contexts and adaptations of the tool.

Convergent validity, which focuses on internal consistency, has been used as a measure of reliability for over four decades (Cheung *et al*, 2024). The calculated AVE values showed that items adequately represented the definitions of knowledge, attitude and readiness to practice. The knowledge category showed an AVE of 0.768, indicating good construct representation. Similarly, the composite reliability (CR) was 0.880 although 2 items (K1 and K11) slightly fell below the threshold of 0.50 for acceptable convergent validity with the standard factor value of 0.351 and 0.426 respectively. The attitude category achieved a CR of 0.835 reflecting good reliability despite the negative regression weight for item A5 (-0.154). Removing item A5 improved the reliability of DPET-M, increasing the value of CR from 0.835 to 0.864 and Cronbach's Alpha from 0.775 to 0.861. The readiness to practice category received a higher CR of 0.892, indicating a strong internal consistency. Overall, all AVE and CR results supported DPET-M validity and highlighted the specific item requiring modification (A5) to enhance the overall measurement framework. If the model is tau-equivalent, CR values will match Cronbach's Alpha, meaning all items are equally reliable, as shown by the results of the current study.

DISCUSSION

Since disasters transcend boundaries, building a resilient healthcare system requires the preparedness of healthcare professionals and underscores the importance of assessing their KAP levels (Sauve *et al*, 2024). In the current study, the higher number of female participants reflected both the local demographic trends in Myanmar and in the global community of the increasing women's involvement in the healthcare industry (Spoorenberg, 2015; Zapata *et al*, 2021). While gender does not have statistical significance, profession and education level had a notable impact on KAP scores. The lack of significant gender differences emphasizes that male and female healthcare professionals should receive equal training. Zapata *et al* (2021) found that the majority of the healthcare workforce, such as doctors, nurses, midwives, and pharmacists, in Myanmar are under 35 years of age, followed by those 35-54 years of age. This raises concerns regarding the KAP preparedness of younger healthcare workers for disaster response. However, the current study indicated that age did not have a significant impact on KAP scores.

However, workplace settings influenced attitude scores, similar to the previous study in Yemen where the types of profession can shape the perception of disaster preparedness in providing healthcare services to patients (Naser and Saleem, 2018). The study suggests that healthcare professionals in public hospitals have better preparedness for disasters, likely due to the inclusive nature of public healthcare facilities, which serve all citizens and emphasize disaster readiness. Moreover, the years of experience impact readiness to practice, highlighting the important role of practical experience in disaster preparedness. These findings suggest that targeted training could effectively improve the disaster response capacities of the healthcare professionals in Myanmar.

The current KAP levels of healthcare professionals in

Myanmar revealed several key insights into the strengths, weaknesses and areas needing improvement. The survey showed a moderate level of knowledge about disaster preparedness, consistent with other studies in Pakistan, the UAE, Qatar, and Tanzania (Al-Ziftawi *et al*, 2021; Gillani *et al*, 2021; Shanableh *et al*, 2023; Walles *et al*, 2023). No respondent expressed a poor attitude in the current study revealing high and moderate attitude levels, suggesting that targeted disaster preparedness training may subsequently benefit their readiness to practice (Songwathana and Timalsina, 2021; Walles *et al*, 2023). This finding is similar to that in the UAE but is different from that in Pakistan, where a study reported low attitudes among healthcare professionals (Gillani *et al*, 2021; Shanableh *et al*, 2023). The readiness to practice results in the current study were also promising, with only 1% reporting a low level, while 45% and 54% of participants achieved high and moderate level respectively. This result is similar to the findings in Pakistan and Qatar (Gillani *et al*, 2021; Shanableh *et al*, 2023). Additionally, the respondents who received the prior disaster training received higher scores across all KAP categories, suggesting that university and college teaching on disaster preparedness should be enhanced and supplementary on-the-job training should be included in the curriculum. As a knowledge gap in bioterrorism and treatment for biological weapons was found, it highlights a critical area in need of improvement, such as specialized modules on disaster management and biological hazards.

The data analysis confirmed the reliability and validity of DPET-M. Construct validity was supported by Average Variance Extracted (AVE) and Composite Reliability (CR) values, which demonstrated strong internal consistency. These findings are in agreement with previous DPET studies carried out in other countries (Chen *et al*, 2015; Han and Chun, 2021), reinforcing the tool's robustness for assessing disaster preparedness in the healthcare settings of Myanmar.

Adapting the DPET-M to Myanmar's cultural context is a strength of the current study, although the reliance on self-reported data may introduce potential biases, such as the Dunning-Kruger effect (Dunning, 2011). Since the volunteers from different healthcare facilities assisted in distributing the online survey link, high participation from individuals with a strong interest in disaster-related topics can potentially result in volunteer bias and data skewness, compromising the generalization of the findings. Furthermore, the findings aligned with the Myanmar Action Plan for Disaster Risk Reduction (National Disaster Management Committee, 2017) but did not consider additional policies or non-government viewpoints. Only five regions of the country were included, so future research should encompass a broader range of healthcare facilities. Despite these limitations, the study offered valuable insights into the disaster preparedness of healthcare professionals in Myanmar. Given shared disaster risks and healthcare challenges, DPET-M can be adapted for some ASEAN countries, especially those that have not yet validated the tool. For instance, the Philippines, frequently hit by typhoons and located in the Pacific Ring of Fire, as well as Cambodia and Vietnam, prone to flooding from typhoons, could use DPET-M as a national disaster preparedness measurement tool to adapt and implement a context-specific version for measuring knowledge, attitude, and practices (KAP) related to disaster preparedness among ASEAN healthcare professionals, thereby benchmarking the nation's baseline capacity for disaster response in its healthcare sector.

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CONFLICT OF INTEREST DISCLOSURE

The authors declare no conflict of interest.

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