

Cross-Culture Adaptation and Validation of Knowledge, Attitude and Practice Regarding Disaster Preparedness among Community in Indonesia

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OPEN ACCESS

Jurnal Keperawatan Padjadjaran (JKP)

Volume 11(2), 141-149
© The Author(s) 2023
<http://dx.doi.org/10.24198/jkp.v11i2.2141>

Article Info

Received : February 25, 2023
Revised : July 18, 2023
Accepted : July 24, 2023
Published : August 15, 2023

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Citation

Fatoni, F., Panduragan, S.L., Sansuwito, T., & Pusporini, L.S. (2023). Cross-culture adaptation and validation of knowledge, attitude and behavior regarding disaster preparedness among community in Indonesia. *Jurnal Keperawatan Padjadjaran*, 11(2), 141-149. <http://dx.doi.org/10.24198/jkp.v11i2.2141>

Website

<http://jkp.fkep.unpad.ac.id/index.php/jkp>

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E-ISSN: 2442-7276
P-ISSN: 2338-5324

Abstract

Background: At the time of the research, there were only a limited number of instruments accessible for recognizing the knowledge, attitude, and behavior of the Indonesian population concerning disaster preparedness.

Purpose: The goal of this study was to modify and evaluate the reliability and uniformity of a survey that individuals can complete on their own, focusing on their knowledge, attitude, and behavior related to disaster preparedness.

Methods: The translation of this tool into Bahasa Indonesia went through four phases: first translation, back-translation by experts, pre-testing, and cognitive interviews. The evaluation of the tool's accuracy involved a study with 250 volunteers using a cross-sectional approach. The validity of the questionnaire was checked based on its content and structure, and its reliability was measured by looking at internal consistency and stability (Cronbach's alpha).

Results: The CVI scores for knowledge, attitude, and behaviors ranged from 0.80 to 1.00. Regarding knowledge, the exploratory factor analysis (EFA) outcomes indicated the presence of two factors with eigenvalues surpassing 1.0, collectively explaining 71.4% of the total variance. The loading factor for 25 items was observed between 0.34 and 0.65, within the acceptable threshold of 0.3. In terms of attitude, the EFA results revealed a single factor with an eigenvalue exceeding 1.0, accounting for 86.2% of the total variance. The loading factor for 18 items ranged from 0.30 to 0.50. Similarly, for behaviors, the EFA findings displayed the existence of two factors with eigenvalues greater than 1.0, explaining a cumulative 79.7% of the total variance. The loading factor for 22 items ranged from 0.30 to 0.60. The Cronbach's alpha values for knowledge regarding earthquake and tsunami preparedness stood at 0.763, for attitude it was 0.736, and for behaviors, it was 0.760.

Conclusion: The recently implemented scale designed to assess the knowledge, attitude, and behavior of communities regarding disaster preparedness has been verified to possess satisfactory validity and reliability, making it suitable for survey applications within Indonesia.

Keywords: attitude; cross-culture adaptation; disaster preparedness; Indonesia; knowledge; practice; validation

Introduction

Disasters represent intricate occurrences that encompass physical, emotional, cultural, and political dimensions, often straying from established patterns or recognized limits (World Health Organization, 2007). Both natural and human-induced disasters have brought about impacts on health, mortality, environmental integrity, property loss, and psychological well-being (Coleman, 2006; Glasser & Guha-Sapir, 2016; United Nations Environment Programme, n.d.). The degradation of natural resources that serve as

protection against disasters is exacerbated by both the growth of populations in environmentally delicate areas and the impact of climate change (Levac et al., 2012; Maurice, 2013; Mileti, 1999). Furthermore, the issue is compounded by the increasing populace residing in high-risk locales like coastal regions and flood-prone river basins (Maurice, 2013). The forces of globalization and population density expose more individuals to potential hazards (Maurice, 2013), encompassing threats such as human-induced events like terrorism and technological calamities (Godschalk, 2003). When aggregated, these elements heighten the vulnerability to disasters, consequently leading to augmented illness and loss of life within the general population.

According to the World Health Organization (2014), the majority of fatalities occurring in the midst of a disaster happen during the pre-hospital phase, which refers to the time before a patient reaches a healthcare facility. Pre-hospital care is administered at the accident site or during transportation to a hospital. Prioritizing early intervention is crucial to mitigating the consequences of trauma (National Agency for Disaster Management, 2018). In 2015, the World Health Organization (WHO) advocated for public education in essential techniques to enhance personal preparedness, particularly in regions susceptible to communal vulnerabilities. Education efforts should be concentrated in areas with the greatest impact, ensuring that all members of the community are equipped with the knowledge to be adequately prepared (WHO, 2015).

Disaster preparedness hinges on actions driven by knowledge that take into account the health and safety risks posed by disasters (Sutton & Tierney, 2006). People's views and actions in terms of disaster readiness can be influenced by what they know (Zhong et al., 2020). Ensuring that communities have sufficient information, attitudes, and skills related to disaster preparedness is crucial, but it's essential to evaluate their current readiness level before creating training programs (Bahrami et al., 2014b, 2014a).

Although there are limited tools available to evaluate community awareness, attitudes, and behaviors pertaining to disaster preparedness (Delaney et al., 2018; Subandi et al., 2019), during the study's timeframe, there were no valid instruments accessible for use within the Indonesian population (Paramita et al., 2016). Despite the significant volume of literature on spontaneous and coordinated volunteer efforts during disasters, minimal research has been directed toward comprehending the disaster system and explicitly involving volunteers in disaster preparedness efforts (Quarantelli, 1984). In light of the current situation, the aim of this research was to modify and evaluate the trustworthiness and consistency of a survey that individuals can fill out on their own. This survey focuses on understanding people's knowledge, attitude, and actions related to disaster preparedness.

Method

Instrument

A survey was created to gauge understanding, outlook, and conduct concerning disaster preparedness (Songlar et al., 2019). The survey comprised four distinct sections: introductory details about the participant; earthquake and tsunami knowledge (25 items); earthquake and tsunami preparedness attitude (18 items); and an assessment of personal behaviors during earthquake and tsunami scenarios (22-item checklist). In its initial form, the Cronbach's α values for knowledge, attitude, and behaviors were 0.83, 0.75, and 0.75, correspondingly (Songlar et al., 2019).

Translation process

This tool underwent a translation process into Bahasa Indonesia through a series of four steps: initial translation, back-translation by an expert group, pre-testing, and cognitive interviews. The ultimate goal was to acquire a definitive version of the instrument in the language of each target country or culture while maintaining conceptual equivalence (WHO, 2019). The initial phase of adaptation involved forward translation, where two bilingual translators (one holding a PhD from a foreign university (T1) and the other lacking clinical experience (T2)) generated distinct translations of the Indonesian version. The translations were then combined, addressing any disparities found in the translator's report, resulting in a merged translation (referred to as "T-12").

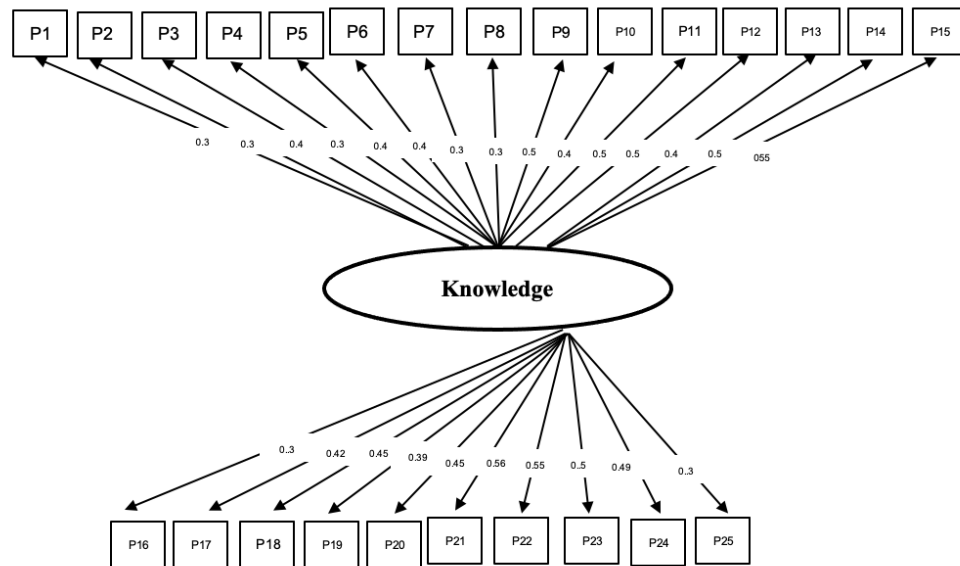
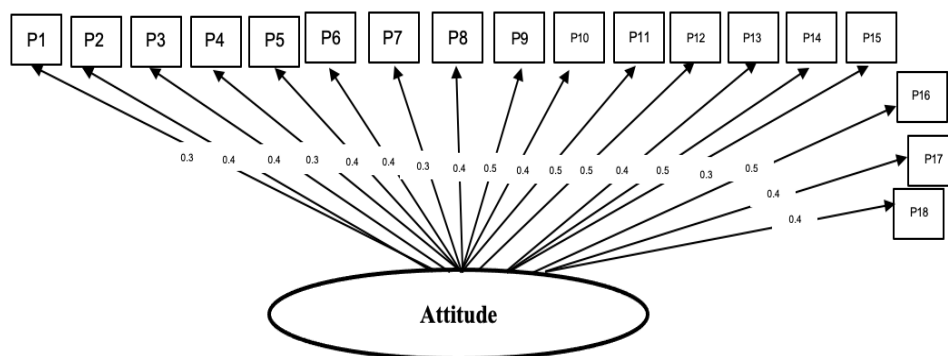
In the next step, the questionnaire was translated back into English by a separate translator who used the T-12 version, without knowing the original English version. This back-translation was a collaborative effort between two native speakers. The fourth stage involved forming an expert panel made up of psychometricians, medical professionals, linguists, and bilingual interpreters. This panel identified four crucial areas where the English and Indonesian versions needed to match: semantic equivalence, linguistic equivalence, experiential equivalence, and conceptual equivalence. They used a five-point Likert scale to assess both the clarity of the language (with 5 indicating perfect readability and comprehension, and 1 indicating complete unreadability and unintelligibility) and the cultural relevance (with 5 denoting complete cultural relevance and 1 indicating no cultural relevance). This categorization framework served to assess the overall clarity of items and their cultural pertinence across all respondents. The recorded values for linguistic clarity were 88.2%, while those for cultural relevance were 92.55%.

Validity of questionnaire

The questionnaire's validity was assessed concerning content and construct validity, while its reliability was appraised through measures of internal consistency and stability, utilizing

Table 1. Reliability Alpha Cronbach's

Instrument	Total item	Cronbach alpha
Knowledge about earthquake and tsunami preparedness	25	0.763
Attitude towards earthquake and tsunami preparedness	18	0.736
Behavior in earthquake and tsunami preparedness	22	0.760

**Figure 1. Confirmatory factor analysis for knowledge****Figure 2. Confirmatory factor analysis for attitude**

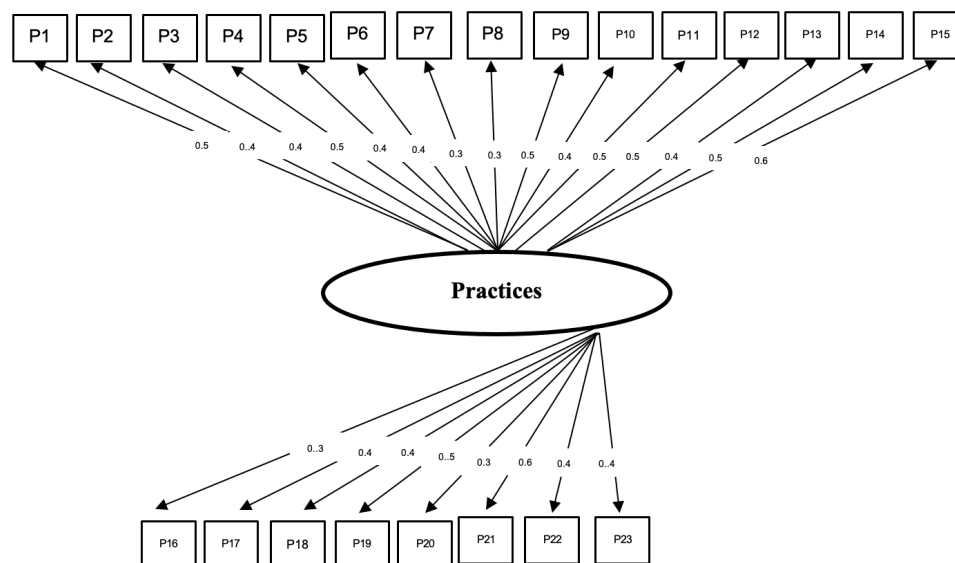


Figure 3. Confirmatory factor analysis for behaviors

Cronbach's alpha coefficient.

Content validity

The content validity was assessed by considering the instrument's relevance, appropriateness, and linguistic suitability. Expert reviewers were invited to evaluate the questionnaire, assigning scores to each item. The scoring criteria were as follows: A scoring system was used to assess the items in the evaluation process. An item could receive 1 point if it was found to be unacceptable and needed to be removed, 2 points if it was considered potentially inappropriate or irrelevant, requiring significant changes, and 3 points if the items were seen as reasonable, needing only minor adjustments. After the Expert Committee's review, the Content Validity Index (CVI) was calculated by adding up the assigned points for each element and then dividing that sum by the number of experts (Tuthill et al., 2014). Subsequently, the instrument would be improved based on the CVI scores and the overall input from the experts (Bolarinwa, 2015). Aiken's V formula was used to compute the CVI.

Construct validity

For evaluating the construct validity of the questionnaire through exploratory factor analysis, the sufficiency of the sample was assessed utilizing the Kaiser-Meyer-Olkin (KMO) technique. An acceptable sample adequacy was confirmed if the KMO value exceeded 0.6, in line with the criteria set by Kaiser and Rice in 1974. In order to ascertain construct validity, the questionnaire was administered to a group of 20 individuals. Subsequently, the Bartlett's sphericity test was employed to determine whether the obtained matrix significantly deviated from zero. Based on the

results, the utilization of factor analysis was deemed justifiable. Once the feasibility of factor analysis was confirmed, the questionnaire's constructs were determined by assessing Eigenvalues (Kaiser values) and scree plots.

Reliability

Cronbach's alpha is a measure of how well a set of items gauges a particular concept. Ideally, the Cronbach's alpha should be higher than 0.7 (Enderlein, 1988; Rebmann & Mohr, 2008). In this study, we gave the questionnaire to 250 volunteers to calculate the Cronbach's alpha. After that, we used SPSS software, version 23 (IBM Corp, Armonk, NY), for data analysis.

Procedure

The Ethics Committee associated with the university approved the ethical aspects of this research. Potential participants were clearly told that their participation was optional, and the confidentiality of their data would be ensured. Following the acquisition of necessary authorizations from national and local administrative bodies, the researchers formally presented the approval letter to the participants. They introduced themselves and elucidated the research goals. Later on, individuals who showed a desire to participate were chosen, with the understanding that they had the right to withdraw from the study whenever they wished. All individuals who engaged in the study had obtained clearance from the Ethics Committee (approval reference: 81-a/KEPK.UF/IV/2022).

Results

The CVI scores for knowledge, attitude, and

Supplementary Table 1. CVI for knowledge of earthquake and tsunami preparedness

Item	Examiner 1		Examiner 2		Examiner 3		Examiner 4		Examiner 5		$\sum s$	V	
	score (R)	S=R-Lo	score (R)	S=R-Lo	score (R)	S=R-Lo	score (R)	S=R-Lo	score (R)	S=R-Lo			
Knowledge													
1	4	3	4	3	4	3	4	3	4	3	15	1	Valid
2	4	3	4	3	4	3	4	3	4	3	15	1	Valid
3	4	3	4	3	3	2	3	2	3	2	12	0,8	Valid
4	4	3	4	3	4	3	4	3	4	3	15	1	Valid
5	4	3	4	3	4	3	4	3	4	3	15	1	Valid
6	4	3	4	3	4	3	4	3	4	3	15	1	Valid
7	4	3	4	3	4	3	4	3	4	3	15	1	Valid
8	4	3	4	3	4	3	4	3	4	3	15	1	Valid
9	3	2	4	3	4	3	3	2	3	2	12	0,8	Valid
10	4	3	4	3	4	3	3	2	4	4	15	1	Valid
11	4	4	4	3	4	3	4	3	3	2	15	1	Valid
12	4	3	4	3	4	3	4	3	4	3	15	1	Valid
13	4	3	4	3	4	3	4	3	4	3	15	1	Valid
14	4	3	4	3	4	3	4	3	4	3	15	1	Valid
15	4	3	4	3	4	3	4	3	4	3	15	1	Valid
16	4	3	4	3	4	3	4	3	4	3	15	1	Valid
17	4	3	4	3	4	3	4	3	4	3	15	1	Valid
18	4	3	4	3	4	3	4	3	4	3	15	1	Valid
19	4	3	4	3	4	3	4	3	4	3	15	1	Valid
20	4	3	4	3	4	3	4	3	4	3	15	1	Valid
21	4	3	4	3	4	3	4	3	4	3	15	1	Valid
22	4	3	4	3	4	3	4	3	4	3	15	1	Valid
23	4	3	4	3	4	3	4	3	4	3	15	1	Valid
24	4	4	4	3	4	3	4	3	3	2	15	1	Valid

behaviors varied between 0.80 and 1.00, as depicted in [Supplementary Tables 1, 2, and 3](#).

Construct validity

We assessed the construct validity using a cross-sectional approach, involving a consistent sample of 250 volunteers. The validation process for the measurement tool included exploring the factor structure of its 65 items through exploratory factor analysis (EFA). The results of the EFA showed that all items were valid. In terms of knowledge, the EFA revealed two significant factors with eigenvalues greater than 1.0, together explaining 71.4% of the total variability. The loading factor for 25 items ranged from 0.34 to 0.65, meeting the valid threshold of 0.3, as specified by van de Velde et al. in 2011. For attitude, the EFA findings indicated one factor with eigenvalues exceeding 1.0, accounting for a total variance explanation of 86.2%. The loading factor for 18 items varied between 0.30 and 0.50. In the context of behaviors, the EFA results revealed the presence of two factors with eigenvalues above 1.0, collectively accounting for 79.7% of the

total variance. The loading factor for 22 items was observed within the range of 0.30 to 0.60.

The findings from the confirmatory factor analysis (CFA) revealed that the knowledge factor had a value of $I^2 = 65.04$, with degrees of freedom (df) at 45, and a p-value of 0.021. Despite the chi-square test showing significant results, suggesting a mismatch between the model and the data, the Root Mean Square Error of Approximation (RMSEA) was 0.058, indicating a reasonably good fit within a probability range of 0.05 to 0.089. The same pattern was observed for attitude, where the CFA outcomes showed $I^2 = 66.23$, df = 47, p-value of 0.027. Despite significant results in the chi-square test, the RMSEA value was 0.061, signifying a well-fitting model within a probability range of 0.05 to 0.090. Similarly, for behaviors, the CFA findings indicated $I^2 = 65.44$, df = 49, p-value of 0.031. Again, the chi-square test demonstrated significance, implying a model-data mismatch, but the RMSEA value of 0.061 indicated a suitable fit with a probability from 0.05 to 0.085. These results are illustrated in [Figures 1, 2, and 3](#).

Supplementary Table 2. CVI for Attitude of Earthquake and Tsunami Preparedness

Item	Examiner 1		Examiner 2		Examiner 3		Examiner 4		Examiner 5		Σs	V	
	score (R)	S=R-Lo	score (R)	S=R-Lo	score (R)	S=R-Lo	score (R)	S=R-Lo	score (R)	S=R-Lo			
Attitude													
1	4	3	4	3	4	3	4	3	4	3	15	1	Valid
2	4	3	4	3	4	3	4	3	4	3	15	1	Valid
3	4	3	4	3	4	3	4	3	4	3	15	1	Valid
4	4	3	4	3	4	3	4	3	4	3	15	1	Valid
5	4	3	4	3	4	3	4	3	4	3	15	1	Valid
6	4	3	4	3	4	3	4	3	4	3	15	1	Valid
7	4	3	4	3	4	3	4	3	4	3	15	1	Valid
8	4	3	4	3	4	3	4	3	4	3	15	1	Valid
9	3	2	4	3	4	3	3	2	3	2	12	0,8	Valid
10	4	3	4	3	4	3	3	2	4	4	15	1	Valid
11	4	3	4	3	4	3	4	3	4	3	15	1	Valid
12	4	3	4	3	4	3	4	3	4	3	15	1	Valid
13	4	3	4	3	3	2	3	2	3	2	12	0,8	Valid
14	4	3	4	3	4	3	4	3	4	3	15	1	Valid
15	4	3	4	3	4	3	4	3	4	3	15	1	Valid
16	4	3	4	3	4	3	4	3	4	3	15	1	Valid
17	4	3	4	3	4	3	4	3	4	3	15	1	Valid
18	4	3	4	3	4	3	4	3	4	3	15	1	Valid

Reliability

The reliability of the three instruments was found to be satisfactory, as demonstrated in Table 1. Specifically, the Cronbach's alpha coefficient for earthquake and tsunami preparedness knowledge was 0.763, for attitude it was 0.736, and for behaviors it was 0.760.

Discussion

The initial step towards earthquake and tsunami preparedness involved discerning the community's actual understanding and recognition of the subject. To effectively design and execute educational curricula and ongoing programs for disaster preparedness, a measuring scale that encompasses knowledge, attitude, and behavior is indispensable. Such endeavors hold potential for enlightening the general public about appropriate responses during challenging circumstances. This study stands out as one of the pioneering efforts to employ a validated questionnaire in appraising community knowledge, attitudes, and behaviors related to disaster preparedness.

The utilization of confirmatory factor analysis serves as a rigorous approach for scale validation. This validation investigation underscored the questionnaire's commendable internal consistency. Exploratory factor analysis brought to light distinct factors, each encapsulating a shared conceptual

essence, even though the items within these factors gauged diverse concepts. Furthermore, the significant correlations between items within each factor validated their cohesion. Typically, a good test has an internal consistency of 0.7 or higher. In our research, Cronbach's alpha reached a level considered satisfactory. Furthermore, our exploratory analysis identified variables that explain more than 70% of the variability. It's suggested to keep extracting items until at least 60% of the variance is achieved, as recommended by [Cecchetto & Pellanda \(2014\)](#) and [Kheirollahpour & Shohaimi \(2014\)](#). As a result, the variance explained by these factors in our study is considered acceptable.

The survey employed in this research involved self-reporting regarding community readiness concerning knowledge, attitudes, and behaviors related to disaster preparedness. Consequently, it holds potential to serve as a standardized tool in upcoming investigations for assessing earthquake and tsunami responsiveness. Furthermore, health administrators and policymakers could utilize this instrument to gain insights into community dynamics. Insufficient preparedness within the community could hinder effective disaster response, potentially resulting in adverse outcomes. Enhanced readiness correlates with reduced mortality rates and mitigated severity of challenges. Notably, this questionnaire boasted comprehensiveness, as it encompassed a broad spectrum of aspects pertaining to knowledge, attitude, and behavior of disaster preparedness.

Supplementary Table 3. CVI for Behavior of Earthquake and Tsunami Preparedness

Item	Examiner 1		Examiner 2		Examiner 3		Examiner 4		Examiner 5		$\sum s$	V	
	score (R)	S=R-Lo	score (R)	S=R-Lo	score (R)	S=R-Lo	score (R)	S=R-Lo	score (R)	S=R-Lo			
Behavior													
1	4	3	4	3	4	3	4	3	4	3	15	1	Valid
2	3	2	4	3	4	3	3	2	3	2	12	0.8	Valid
3	4	3	4	3	4	3	3	2	4	4	15	1	Valid
4	3	2	4	3	4	3	3	2	3	2	12	0.8	Valid
5	4	3	4	3	4	3	4	3	4	3	15	1	Valid
6	4	3	4	3	4	3	4	3	4	3	15	1	Valid
7	4	3	4	3	4	3	4	3	4	3	15	1	Valid
8	4	3	4	3	4	3	4	3	4	3	15	1	Valid
9	3	2	4	3	4	3	3	2	3	2	12	0.8	Valid
10	4	3	4	3	4	3	3	2	4	4	15	1	Valid
11	4	3	4	3	4	3	4	3	4	3	15	1	Valid
12	4	3	4	3	4	3	4	3	4	3	15	1	Valid
13	4	3	4	3	3	2	3	2	3	2	12	0.8	Valid
14	4	3	4	3	4	3	4	3	4	3	15	1	Valid
15	4	3	4	3	4	3	4	3	4	3	15	1	Valid
16	4	3	4	3	4	3	4	3	4	3	15	1	Valid
17	4	3	4	3	4	3	4	3	4	3	15	1	Valid
18	4	3	4	3	3	2	3	2	3	2	12	0.8	Valid
19	4	3	4	3	4	3	4	3	4	3	15	1	Valid
20	4	3	4	3	4	3	4	3	4	3	15	1	Valid
21	3	2	4	3	4	3	3	2	3	2	12	0.8	Valid
22	4	3	4	3	4	3	4	3	4	3	15	1	Valid

Although this study possesses notable strengths, it also presents certain limitations. To begin with, the utilization of a convenience sample drawn from communities within three public health institutions in Banten might not offer a comprehensive representation of the entire nation. For forthcoming investigations, it would be advisable to employ the scale with larger sample sizes derived from public health facilities across various Indonesian provinces. Another limitation stems from the potential ambiguity surrounding the roles of the community and volunteers in disaster preparedness, which could potentially impact participants' responses to the questionnaire items.

Conclusion

To sum up, our recently introduced measuring tool for assessing community knowledge, attitudes, and behaviors in disaster preparedness has demonstrated satisfactory validity and reliability for survey application in Indonesia. Establishing foundational insights into community preparedness

levels could assist health policymakers in formulating nurse training programs and integrating them into program and curriculum development.

Authors' contribution

All authors conceptualized and analyzed data and drafted the paper and critical revised the paper.

Declaration of competing of interest

The authors declare that they have no conflict of interests.

Funding

None.

Acknowledgement

We thanks to all participant to joined in this study.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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