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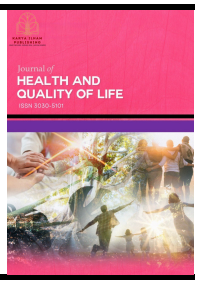

Development and Validation of A Basic First Aid Questionnaire for School Children

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ABSTRACT

Basic first aid knowledge is a critical life-saving skill that can reduce injury severity and prevent complications during emergencies. Refugee school children are particularly vulnerable due to unsafe environments and limited access to healthcare. However, there is a lack of age-appropriate, psychometrically sound instruments to assess first aid knowledge in this population. This study aimed to develop and validate a Basic First Aid Questionnaire for refugee children aged 7–15 years. The questionnaire was adapted from a previous study and underwent forward–backward translation and cultural adaptation. Content validity was assessed by an expert panel of eight specialists, with Item-level Content Validity Index (I-CVI) values ranging from 0.75 to 1.00 and a Scale-level Content Validity Index (S-CVI/Ave) of 1.00 after refinement. A pilot study involving 30 children demonstrated good internal consistency, with Cronbach's alpha values of 0.87 and 0.85. The findings indicate that the questionnaire is a valid and reliable tool for assessing first aid knowledge, attitudes, and awareness among refugee school children, supporting the evaluation of first aid education programmes in vulnerable communities.

1. Introduction

Basic first aid refers to the immediate care provided to individuals experiencing injury or sudden illness before professional medical assistance becomes available. Early and appropriate first aid interventions can significantly reduce injury severity, prevent complications, and improve survival outcomes. For example, World Health Organization emphasizes that timely first aid and basic emergency care are essential components of community health systems, particularly in settings where access to formal healthcare is delayed [1]. Similarly, International Federation of Red Cross and

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Red Crescent Societies highlights that first aid education improves community preparedness and empowers laypersons to respond effectively during emergencies [2].

Prompt and appropriate first aid responses have been shown to reduce the severity of injuries, prevent complications, and ultimately save lives [3]. As injuries frequently occur in everyday environments such as homes, schools, and communities, school children represent an important target group for first aid education. Children are often present during emergencies involving peers or family members and may act as first responders when adults or healthcare professionals are not immediately available [4]. Refugee children constitute a particularly vulnerable subgroup due to their living conditions and limited access to formal healthcare services. Overcrowding, unsafe environments, poor infrastructure, and restricted access to emergency care place refugee children at increased risk of injuries and delayed treatment [5]. Consequently, empowering refugee school children with essential first aid knowledge is not only an educational priority but also a critical public health and humanitarian intervention. Providing these children with basic life-saving skills has the potential to improve immediate emergency responses and enhance community resilience in resource-limited settings.

Despite increasing global emphasis on first aid education in school and community settings, the availability of age-appropriate, culturally relevant, and psychometrically sound instruments for assessing first aid knowledge among children remains limited. Many existing first aid assessment tools have been developed for adults, healthcare professionals, or university students and may not be suitable for younger populations due to differences in cognitive development, comprehension, and learning contexts [6]. This limitation is even more pronounced in refugee settings, where language, educational background, and cultural factors must be carefully considered.

To address this gap, the present study aimed to develop and validate a Basic First Aid Questionnaire tailored for refugee school children aged 7–15 years. The instrument was adapted from an existing validated questionnaire and underwent rigorous translation, cultural adaptation, and psychometric evaluation. The significance of this study lies in providing a valid and reliable tool that can be used to assess first aid knowledge, awareness, and attitudes among vulnerable child populations. This tool is expected to support the evaluation and improvement of school- and community-based first aid education programmes, ultimately contributing to enhanced emergency preparedness and resilience in resource-limited and humanitarian settings.

2. Method

This study employed a research design focusing on instrument adaptation, content validation, and reliability testing.

2.1 Instrument Development

The Basic First Aid Questionnaire was adapted from the instrument developed by a previous study, which assessed knowledge, awareness, and attitudes related to first aid among university students [7]. The original questionnaire items were systematically reviewed and modified to ensure age appropriateness, clarity, and relevance for use among school children. Medical terminology was simplified, and examples were contextualised to reflect situations commonly encountered in children's daily school and home environments. The adapted instrument focused primarily on assessing basic first aid knowledge appropriate for the developmental level of the target population.

2.2 Translation and Cultural Adaptation

The adapted questionnaire was translated into the Malay language using a forward–backward translation procedure in accordance with established guidelines for cross-cultural instrument adaptation [8]. Forward translation was conducted by bilingual experts proficient in both English and Malay. The translated version was then reviewed to ensure conceptual equivalence and clarity. Subsequently, backward translation into English was performed by independent bilingual translators who were blinded to the original version. Discrepancies between the original and back-translated versions were discussed and resolved through consensus among the research team to ensure semantic and conceptual accuracy.

2.3 Content Validity

Content validity of the Basic First Aid Questionnaire was established through a two-stage expert review process. This approach aligns with established methods for instrument development, where Lynn [9] introduced the Content Validity Index (CVI) for quantifying expert agreement, Polit *et al*., [10] further refined its application and interpretation, and Taherdoost [11] emphasized systematic validation procedures in questionnaire design. This process ensured that all questionnaire items were relevant, representative, and appropriate for assessing basic first aid knowledge among school children aged 7–15 years within a refugee education context.

In the first stage, content validation was conducted by a panel of eight experts drawn from nursing, emergency care, public health, education, and community health disciplines. The multidisciplinary composition of the panel was intended to ensure both clinical accuracy and educational suitability of the instrument. Each expert independently evaluated all questionnaire items using two separate four-point rating scales: degree of relevancy and degree of representativeness. For degree of relevancy, items were rated as 1 = very irrelevant, 2 = irrelevant, 3 = relevant, and 4 = very relevant. For degree of representativeness, items were rated as 1 = totally does not represent the domain, 2 = minimally representing the domain, 3 = properly representing the domain, and 4 = accurately representing the domain. The use of four-point scales without a neutral midpoint was intended to encourage definitive expert judgments, consistent with recommendations by a previous study [9].

Item-level Content Validity Index (I-CVI) values were calculated separately for relevancy and representativeness by dividing the number of experts assigning a rating of 3 or 4 by the total number of experts. Scale-level Content Validity Index (S-CVI) was then computed to assess the overall content validity of the questionnaire, following the methods proposed by a previous study [9]. Experts were provided with a period of four to six weeks to complete the evaluation and to provide qualitative comments and recommendations for item refinement.

At the first stage of validation, the questionnaire consisted of two parts. Part A included ten items capturing sociodemographic information, such as participants' characteristics, reasons for learning first aid, previous attendance at first aid courses, and self-reported confidence in performing first aid. Part B comprised fifteen items assessing knowledge, attitude, and awareness related to basic first aid. Expert feedback from both quantitative CVI analysis and qualitative comments indicated that while most items were relevant and representative, some required simplification of wording, improved clarity, or removal due to redundancy or limited applicability to the target age group.

Based on the findings from the first-stage review, revisions were made to the questionnaire to enhance content clarity and relevance. Items that did not meet acceptable I-CVI thresholds for either relevancy or representativeness were revised or eliminated. The revised questionnaire was then

subjected to a second-stage content validation by three experts with relevant expertise. This second-stage review served to confirm the adequacy of revisions and ensure that the refined instrument maintained conceptual coherence and alignment with the intended measurement domain.

Following the second-stage validation, the final version of the questionnaire consisted of eight items in Part A and thirteen items in Part B. The reduction in item numbers reflected a more focused and age-appropriate instrument with strong content relevance and representativeness. Overall, the two-stage content validation process provided robust evidence supporting the content validity of the Basic First Aid Questionnaire for use among school children.

2.4 Pilot Testing and Reliability

A pilot study was conducted to evaluate the internal consistency reliability of the Basic First Aid Questionnaire prior to its use in the main study. The pilot testing involved 30 refugee school children aged 7–15 years recruited from the Rohingya Education Centre, Kuantan. The sample size for the pilot study was considered adequate for preliminary reliability assessment of a newly developed or adapted instrument, as commonly recommended in methodological research.

The primary objective of the pilot study was to assess the extent to which the questionnaire items consistently measured the construct of basic first aid knowledge among the target population. Internal consistency reliability was examined using Cronbach's alpha coefficient, which is widely used to evaluate the reliability of multi-item instruments in health and educational research. Cronbach's alpha assesses the degree of interrelatedness among items within a scale, providing an indication of whether the items collectively measure the same underlying construct.

In accordance with established methodological guidelines, a Cronbach's alpha value of 0.70 or higher was considered indicative of acceptable internal consistency for newly developed instruments [10]. Item-total correlations were also examined to identify any items that demonstrated poor consistency with the overall scale. The results of the reliability analysis indicated satisfactory internal consistency of the questionnaire, supporting its reliability for assessing basic first aid knowledge among refugee school children.

Overall, the pilot testing and reliability findings provided empirical support for the stability and consistency of the Basic First Aid Questionnaire, justifying its use in subsequent phases of the study and in future first aid education programmes targeting school-aged children.

2.5 Ethical Considerations

Ethical approval for this study was obtained from the International Islamic University Malaysia Research Ethics Committee (IIUM IREC; Approval ID: IREC 2024-212), the Persatuan Jaringan Islam Global Masa Depan Research Ethics Committee (JREC), and the administrative committee of the Rohingya Education Centre, Kuantan. All ethical requirements were strictly adhered to throughout the study.

Participation in the study was entirely voluntary. Informed consent was obtained from parents or legal guardians, and agreement was obtained from the participating children prior to data collection. Confidentiality and anonymity were maintained at all stages of the research, with no personally identifiable information collected or recorded. All data were handled securely and used solely for research purposes.

Participants were informed of their right to decline participation or withdraw from the study at any time without penalty or adverse consequences. Special consideration was given to the

vulnerability of the refugee population to ensure respect, protection, and ethical integrity in line with established research ethics principles.

3. Results

3.1 Content Validity

Content validity of the Basic First Aid Tool for school children was established through a systematic expert review process using the Item-Level Content Validity Index (I-CVI) and the Scale-Level Content Validity Index (S-CVI). A total of eight experts with backgrounds in nursing, public health, education, and first aid training participated in the first stage of validation. Each item was rated using a four-point Likert scale, where higher scores indicated greater relevance and clarity of the item. Ratings of 3 (quite relevant) and 4 (highly relevant) were considered acceptable and counted as agreement among experts.

Table 1
First stage of content validation for the basic first aid tool for school children with 8 experts

Questions	No.	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert 8	Expert in Agreement (n)	Proportion relevant (I-CVI)
Part A	1	4	4	4	4	4	4	4	4	8	1
	2	4	4	4	4	4	4	4	4	8	1
	3	4	4	4	4	4	4	4	4	8	1
	4	4	4	4	4	4	4	4	4	8	1
	5	3	4	3	3	3	2	4	3	7	0.88
	6	3	3	4	4	3	2	3	3	7	0.88
	7	4	3	3	4	2	3	2	3	6	0.75
	8	3	3	3	4	3	4	4	3	7	0.88
	9	4	3	3	3	2	3	2	3	6	0.75
	10	4	4	3	3	4	4	3	4	7	0.88
Part B	1	3	4	2	3	4	4	3	4	7	0.88
	2	3	4	3	3	4	3	3	4	8	1
	3	3	4	4	3	4	3	3	4	8	1
	4	3	3	4	3	3	3	3	3	8	1
	5	3	3	4	3	3	4	3	3	8	1
	6	4	3	4	4	3	3	4	3	8	1
	7	4	3	4	4	3	3	4	3	8	1
	8	4	3	3	4	3	4	4	3	8	1
	9	4	4	3	4	4	4	4	4	8	1
	10	3	4	2	3	4	4	3	4	7	0.88
	11	3	4	4	3	4	3	3	4	8	1
	12	4	4	3	4	4	4	4	4	8	1
	13	4	3	3	4	3	3	4	3	8	1
	14	4	4	4	4	4	3	4	4	8	1
	15	3	4	4	3	4	4	3	4	8	1

As shown in table 1, during the 1st stage of content validation, most items demonstrated excellent content validity, with I-CVI values ranging from 0.75 to 1.00 in Part A questions. Items A7 and A9 showed the lowest agreement (0.75), indicating that minor revisions may be required based on expert feedback, while the remaining items met or exceeded recommended thresholds for content validity.

For part B, all items demonstrated strong content validity, with I-CVI values between 0.88 and 1.00, indicating a high level of expert consensus that the items were relevant and representative of the basic first aid knowledge domain for school children.

Table 2
Second stage of content validation for the basic first aid tool for school children with 3 experts

Questions	No.	Expert 1	Expert 2	Expert 3	I-CVI and S-CVI
Part A	1	4	4	4	1
	2	4	4	4	1
	3	4	4	4	1
	4	4	4	4	1
	5	4	4	4	1
	6	4	4	4	1
	7	4	4	4	1
	8	4	4	4	1
Part B	1	4	4	4	1
	2	4	4	4	1
	3	4	4	4	1
	4	4	4	4	1
	5	4	4	4	1
	6	4	4	4	1
	7	4	4	4	1
	8	4	4	4	1
	9	4	4	4	1
	10	4	4	4	1
	11	4	4	4	1
	12	4	4	4	1
	13	4	4	4	1

As shown in table 2, second-stage content validation demonstrated excellent agreement among the expert panel. All items in both Part A (sociodemographic characteristics) and Part B (knowledge, attitude, and awareness related to basic first aid) were rated as either “relevant” or “very relevant” by all three experts. Consequently, the item-level content validity index (I-CVI) for every item was 1.00, indicating complete expert agreement.

The scale-level content validity index calculated using the average method (S-CVI/Ave) was also 1.00 for both sections of the questionnaire, reflecting outstanding overall content validity. These findings confirm that the refined instrument is highly relevant, representative, and appropriate for assessing basic first aid knowledge among school children aged 7–15 years. No further item modification was required following the second-stage validation.

3.2 Reliability Analysis

A pilot study was conducted to evaluate the internal consistency reliability of the Basic First Aid Questionnaire among 31 refugee school children aged 7–15 years from the Rohingya Education Centre, Kuantan. The sample included 15 males (48.4%) and 16 females (51.6%), with the majority aged 10–12 years (41.9%) and enrolled in Primary 4–6 (64.5%), ensuring a representative distribution of school-aged children for the pilot study. Table 3 shows the participants’ demographic characteristics.

Table 3
Participants demographics characteristic for pilot study (N= 31)

Demographic	Description	Frequency	Percentage
Gender	Male	15	48.4%
	Female	16	51.6%
Age Group	7-9 years	6	19.4%
	10-12 years	13	41.9%
	13-15 years	12	38.7%
Education Level	Primary 1-3	11	35.5%
	Primary 4-6	20	64.5%

The questionnaire consisted of two sections: Part A, which assessed sociodemographic characteristics and prior exposure to first aid, and Part B, which evaluated knowledge, attitudes, and awareness related to basic first aid. Each section was analyzed separately to determine its internal consistency. Reliability was assessed using Cronbach's alpha coefficient, where a value of ≥0.70 was considered acceptable for newly developed instruments [10].

As shown in table 4, the reliability results indicated that Part A demonstrated good internal consistency, with a Cronbach's alpha of 0.87, suggesting that the items reliably captured the sociodemographic and prior first aid experience of the participants. Part B also showed strong reliability, with a Cronbach's alpha of 0.85, confirming that the knowledge, attitude, and awareness items consistently measured the intended constructs. These findings indicate that the Basic First Aid Questionnaire is a reliable tool for assessing first aid knowledge and related attitudes among school-aged children, supporting its use in the main study and in future educational interventions.

Table 4
Reliability test for basic first aid tool

Variables	Number of items	Cronbach's alpha α)
Part A	8	.87
Part B	13	.85

4. Discussion

The present study successfully developed and validated a Basic First Aid Questionnaire tailored to school children aged 7–15 years, with a particular focus on usability within refugee education settings. The rigorous two-stage content validation process and pilot reliability assessment provide compelling support for the instrument's psychometric soundness.

4.1 Content Validity

Content validity refers to the degree to which items in an instrument are representative and relevant to the construct being measured, requiring systematic evaluation by subject matter experts. It is widely recognized that quantifying content validity using indices such as the item-level content validity index (I-CVI) and scale-level content validity index (S-CVI) provides empirical evidence that supports item relevance and domain coverage in newly developed tools [11]. The use of expert ratings to calculate I-CVI and S-CVI is recommended practice in health and educational research instrument development [12]. In the current study, initial I-CVI values ranged from acceptable to excellent across most items, and after refinement, all items achieved an I-CVI of 1.00 with an

S-CVI/Ave of 1.00, indicating unanimous expert agreement on item relevancy and representativeness. These results exceed commonly recommended thresholds (I-CVI ≥ 0.78 and S-CVI/Ave ≥ 0.90) cited in the literature for excellent content validity in validated instruments [13].
Iterative expert review ensured that items were age-appropriate, culturally relevant, and aligned with the construct of basic first aid knowledge suitable for school children. The multidisciplinary composition of the expert panel, including professionals from nursing, public health, emergency care, education, and community health, strengthened content validity by ensuring both clinical accuracy and educational appropriateness.

4.2 Internal Consistency and Reliability

Internal consistency reliability reflects the degree to which items within a scale measure the same underlying construct [14]. Cronbach's alpha is the most widely used statistical indicator of internal consistency, with values above 0.70 generally considered acceptable for newly developed instruments [12]. In this study, Part A (sociodemographic/first aid experience) demonstrated a Cronbach's alpha of 0.87, and Part B (knowledge, attitude, awareness) showed an alpha of 0.85. Both values indicate satisfactory internal consistency, supporting the reliability of the instrument in measuring these constructs among school-aged children.
These reliability findings are consistent with previous research demonstrating that well-constructed questionnaire items can yield robust internal consistency in both educational and health domains when subjected to pilot testing [15]. Such reliability indices provide confidence that the instrument yields stable, consistent responses across items intended to measure basic first aid knowledge components.

5. Implications for Future Study

The validated Basic First Aid Questionnaire fills a critical gap in assessment tools for first aid knowledge among children, especially within humanitarian or resource-limited contexts such as refugee education centers. By providing a culturally adapted, age-appropriate, and psychometrically sound instrument, this study advances the capacity of educators and health practitioners to evaluate first aid educational outcomes systematically. Reliable assessment tools can inform evidence-based curricula, track programme effectiveness, and shape policy recommendations for first aid education in school settings.

6. Limitations and Future Directions

A notable limitation of this study is the relatively small pilot sample drawn from a single education center, which may constrain generalizability. Future research should examine the instrument's psychometric properties across diverse populations and educational contexts, including confirmatory factor analysis and criterion-related validation. Additionally, while the present questionnaire effectively measures knowledge and attitudes, future work could integrate performance-based assessments to capture actual first aid skills.

7. Conclusion

The Basic First Aid Questionnaire developed in this study demonstrates excellent content validity and strong internal consistency reliability for assessing basic first aid knowledge and related attitudes

among school children aged 7–15 years. Through a systematic two-stage content validation process conducted with multidisciplinary experts and pilot reliability testing, the instrument proved conceptually sound and statistically robust.

This questionnaire provides a valuable tool for evaluating first aid educational interventions, especially in vulnerable and resource-limited settings such as refugee school populations. Its use can support targeted instruction, impact assessment, and data-driven improvements in first aid education curricula. Future research should expand the validation process to additional populations and incorporate practical skills assessment to enhance the instrument's comprehensiveness.

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Conflict of Interest
The authors declare that there are no conflicts of interest associated with this publication.

Author Contributions
TS@SJ: Conceptualisation, drafting, and finalisation of the manuscript.
MSN: Concept development, study design, and approval of the final version.
ZAS: Literature review and theoretical support.
MKCH: Evaluation of instrument suitability and validation.
MKZHF: Data management and statistical analysis.
CACA: Data interpretation and synthesis.
KKW: Contribution to discussion and critical review of the manuscript.
RYS: Literature search and reference compilation.
HS: Literature contribution to discussion

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