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Validating an Instrument for Measuring the awareness and challenges of nursing services accreditation from the healthcare providers in Yemen

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Abstract:

Introduction: Enhancing healthcare quality and patient safety is a global priority. Unsafe healthcare practices increase patient morbidity, mortality, and suffering while undermining public trust in healthcare systems. This study aims to validate an instrument assessing awareness and challenges related to nursing services accreditation among healthcare providers (HCPs) in Yemen, supporting broader efforts to improve healthcare quality and patient safety.

Materials and Methods: Using stratified random sampling, 358 healthcare providers (nurses and doctors) were selected from various hospitals in Hadhramaut, Yemen. Structural Equation Modeling with Confirmatory Factor Analysis (CFA) was employed to validate the measurement model. Key metrics for validity and reliability, including convergent validity (average variance extracted [AVE] and composite reliability [CR]), discriminant validity, internal consistency (Cronbach's Alpha), and goodness-of-fit (GOF) indices, were rigorously assessed to confirm model robustness.

Results: The validated instrument included nine constructs and 39 items. The CFA demonstrated excellent model fit, with all factor loadings exceeding 0.50, affirming strong convergent validity. Discriminant validity was achieved as each factor's AVE exceeded the squared correlations with other factors. Reliability measures were met, with Cronbach's Alpha values above 0.70, CR above 0.60, and AVE above 0.50 for all constructs.

Conclusion: This study successfully validated an instrument for assessing nursing services accreditation awareness among healthcare providers in Hadhramaut hospitals, Yemen. This reliable and valid tool provides a framework for evaluating accreditation awareness and can be adapted to similar healthcare settings. The findings offer practical insights for healthcare professionals, researchers, and policymakers to guide quality and safety improvements in healthcare.

Keywords: Healthcare Providers, Awareness, Measurement Model, Confirmatory Factor Analysis, Hadhramaut, Yemen

Introduction

Accreditation is a widely recognized mechanism for managing and evaluating healthcare quality globally. It not only enhances overall healthcare services but also strengthens nursing practice, promoting autonomy in patient care, professional communication within multidisciplinary teams, collaboration, professional development, and decentralized decision-making [1,2]. Nursing plays a crucial role in healthcare systems, directly influencing healthcare outcomes [3]. Nurses significantly contribute to patient outcomes and care quality, ensuring patient safety [1, 4].

However, the successful adoption of accreditation in healthcare settings is often hindered by a lack of awareness and understanding among healthcare professionals, as well as insufficient commitment from management and physicians [5,6]. Limited knowledge about accreditation processes can severely impact effectiveness, leading to suboptimal outcomes [7]. Furthermore, studies have reported inconsistent findings regarding the impact of accreditation on healthcare organizational performance and patient satisfaction [8]. It is vital for hospital staff to grasp the comprehensive nature and importance of accreditation, as this understanding can lead to improved care quality when implemented correctly [9].

In Yemen, the healthcare system faces significant challenges, including low staff morale, inadequate service quality, and a fragile healthcare infrastructure [10-12]. This is particularly evident in Hadramaut, characterized by diverse geography, including coastal areas, mountains, and valleys [13]. With a population of approximately 1.5 million, Hadramaut has a mix of urban and rural communities, affecting access to healthcare services. Urban centers like Mukalla have better facilities, while rural areas often suffer from a shortage of

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essential services, leading to disparities in health outcomes [13,14].

Healthcare services in Hadramaut are strained by various factors, including a lack of trained professionals, inadequate facilities, and limited access to essential medications [15,16]. The region has also been adversely affected by ongoing political instability and economic challenges, exacerbating health issues such as maternal and child morbidity and communicable and non-communicable diseases [11,14,16]. The absence of standardized accreditation and adherence to international best practices has hindered Yemen's progress in healthcare standards compared to other developing countries.

Despite global efforts to enhance healthcare quality through accreditation, a significant gap remains in understanding how healthcare providers, especially in resource-limited and politically unstable regions like Yemen, perceive and engage with accreditation processes [17,18]. Addressing this gap is crucial, as accreditation can catalyze improvements in healthcare quality, patient safety, and overall system performance, even in challenging environments. Moreover, there is limited understanding of the awareness of nursing service accreditation standards among healthcare providers, including decision-makers, in Yemen [8,18,19].

Purpose of study

The aim of this study is to validate an instrument designed to assess awareness and challenges related to nursing services accreditation among healthcare providers in Yemen, contributing to broader efforts to enhance healthcare quality and patient safety.

Materials and Methods

Design

A descriptive cross-sectional correlational design was employed.

Sample and setting

The research focused on healthcare professionals (HCPs) working in hospitals in Hadramaut, including physicians, nurses, and administrators. A total of 394 individuals were sampled from eight hospitals—four public hospitals (two governorates and two district) and four private hospitals (two for-profit and two non-profit). The selection ensured representation from both public and private sectors.

To select hospitals, we employed simple probability sampling from a comprehensive list of eligible hospitals in Hadramaut. Hospitals were categorized based on type and operational characteristics, with two hospitals chosen from each category to reflect the diversity of healthcare services available in the region.

Using OpenEpi software, the initial sample size for healthcare professionals was calculated at 358 based on the study's descriptive nature (Table 1). To mitigate potential information collection bias, the sample size was increased by 10%, resulting in a final sample size of 394 participants. This sample was allocated to selected hospitals according to the percentage of healthcare professionals present in each category (nurses, doctors, and administrators). Random sampling within each hospital was conducted, allowing participants to respond to surveys at their convenience.

Table 1: Distribution of Sample Size among the Selected Hospitals

No.	Hospital	Percentage	Sample size distribution
1	Ibn Sina Teaching hospital	23%	82
2	Seiyun General hospital	22%	79
3	Alsheher hospital	19%	68
4	Al-Qatn General Hospital	10%	36
5	Al Bourj hospital Advisory	9%	32
6	Bin Zeela Modern Hospital	8%	29
7	Dawan Hospital-khailatBugshan	6%	21
8	Saleh Babeker Charity Hospital	3%	11
	Total	100%	358

Instruments

The quantitative data collection instrument for this study was a self-reporting questionnaire, which underwent pre-testing to ensure reliability and validity. Approval for the questionnaire was granted by two lecturers at Hadhramaut University. To establish its validity and reliability, a review by an experts and conducting a pilot study were implemented. The instrument underwent review by two experts, and a pilot test was conducted with 36 healthcare providers (HCPs), including nurses, doctors, and managers, as a pre-test sample. Subsequently, the instrument's reliability was assessed and validated using SPSS software.

Once approved, the questionnaire was distributed to the available HCPs. Detailed instructions for completing the questionnaire were provided on the first page. The questionnaires were personally given to the respondents at the beginning of their morning shift and collected at the end of their shift. This process was continuous until the essential sample for each hospital was obtained without any data duplication

The questionnaire comprised three parts. Part 1: HCPs' personal sociodemographic, occupational, and organizational data, designed based on the literature review.

Part 2: The Awareness Regarding Accreditation (ARA) tool is a structured questionnaire comprising 13 items designed to assess healthcare professionals' awareness and understanding of accreditation processes and standards. It evaluates several domains, including general awareness, knowledge of accreditation standards, perceived benefits, challenges to implementation, and attitudes toward accreditation. Each item typically uses a Likert scale for responses, ranging from

"Strongly Agree" to "Strongly Disagree," allowing for a nuanced understanding of participants' perceptions. The scoring system involves assigning numerical values to responses (e.g., 1 for "Strongly Disagree" to 5 for "Strongly Agree"), with higher total scores indicating greater awareness and understanding of accreditation. This quantitative data can be analyzed to identify knowledge gaps and inform targeted educational interventions to enhance accreditation engagement among healthcare professionals.

Part 3: The Awareness of Nursing Services Accreditation Standards tool is a comprehensive assessment instrument that evaluates healthcare professionals' knowledge across five key domains derived from the Malaysian Society for Quality in Health (MSQH) standards: Organization and Management (OM), Human Resource Development and Management (HRD), Policies and Procedures (PP), Facilities and Equipment (FE), and Safety and Performance Improvement Activities (SPI). Each domain includes specific items that gauge awareness of the standards and their implications for nursing practice. The scoring system typically employs a Likert scale format, where respondents rate their level of awareness from "Not at All Aware" to "Very Aware." Each response is assigned a numerical value (e.g., 1 for "Not at All Aware" to 5 for "Very Aware"), allowing for a cumulative score that reflects the overall level of awareness regarding nursing services accreditation standards. Higher scores indicate a greater familiarity with the standards, providing valuable insights for identifying areas needing further education and support.

Data Analysis

Normality assumption

A normal data distribution is indicated by Z-value skewness and Z-value kurtosis falling within ±3 and ±7, respectively. The study followed Hair et al. (2011) criteria, using a critical cut-off value of ±2.58 [20]. The kurtosis and skewness values for each construct were observed to be within this range (Table 2). The descriptive analysis revealed an almost normal distribution, with mean skewness from -0.005 to 0.441 and kurtosis values between -0.864 and 0.058. Detailed skewness and kurtosis values can be found in Table 2.

Table 2: Skewness and Kurtosis for Variables.

Variables	Code	Skewness	Kurtosis
Awareness Regarding Accreditation	ARA	-.056	-.718
Organisation and Management	OM	.026	-.620
Human Resource Development	HRD	.438	.058
Policies and Procedures	PP	.441	-.507
Facilities and Equipment	FE	.302	-.624
Safety and Performance Improvement	SPI	-.005	-.864

Results and Discussion

Assessment of confirmatory factor analysis (CFA) results (measurement model)

This study aimed to evaluate HCPs' awareness regarding accreditation through a structured analysis. An exploratory factor analysis (EFA) initially identified nine distinct factors related to accreditation awareness.

Following the EFA, a CFA integrated these factors into a cohesive model, including the ARA factor and five constructs based on MSQH standards: OM, HRD, PP, FE, and SPI. The integration allowed a thorough assessment of convergent and discriminant validity. To evaluate the model's fit, various fit indices were analyzed. The results indicated strong validity and reliability, evidenced by acceptable fit indices such as chi-squared over degrees of freedom (Chi-square/df), Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI). Specifically, Chi-square/df was found to be 1.982, CFI was 0.915, and RMSEA was 0.050, demonstrating a good fit according to established criteria.

The Fitness of a measurement model

Brown (2015) recommends reporting fit indices such as chi-squared goodness of fit (χ^2), standardized root mean square residual (SRMR) for absolute fit, RMSEA for parsimony-corrected fit, and Tucker–Lewis fit index (TLI) and comparative fit index (CFI) for comparative fit. Mohamad, Awang, and Salim (2017) advised using at least one index from each of the three fitness categories: absolute fit, incremental fit, and parsimonious fit [21].

The present study employed commonly used fitness indices in scholarly research: chi-squared over degree of freedom (Chi-square/df), Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI) [22]. The model fit was determined based on specific cut-off values: RMSEA values between 0.05 and 1.00, CFI ≥ 0.90, and Chi-square/df ≤ 5.00, indicating a reasonable fit as per the criteria set by Hair et al. (2014) [22]. The results indicated that Chi-square/df = 1.982 (≤ 5.00), CFI = .915, IFI = .916, TLI = .905 (≥ 0.90), GFI = 0.859 (≤ 0.85), RMSEA = .050 (≤ .080), and RMR = .026 (≤ 0.10), which is considered a good fit, as shown in Figure 1 and Table 3.

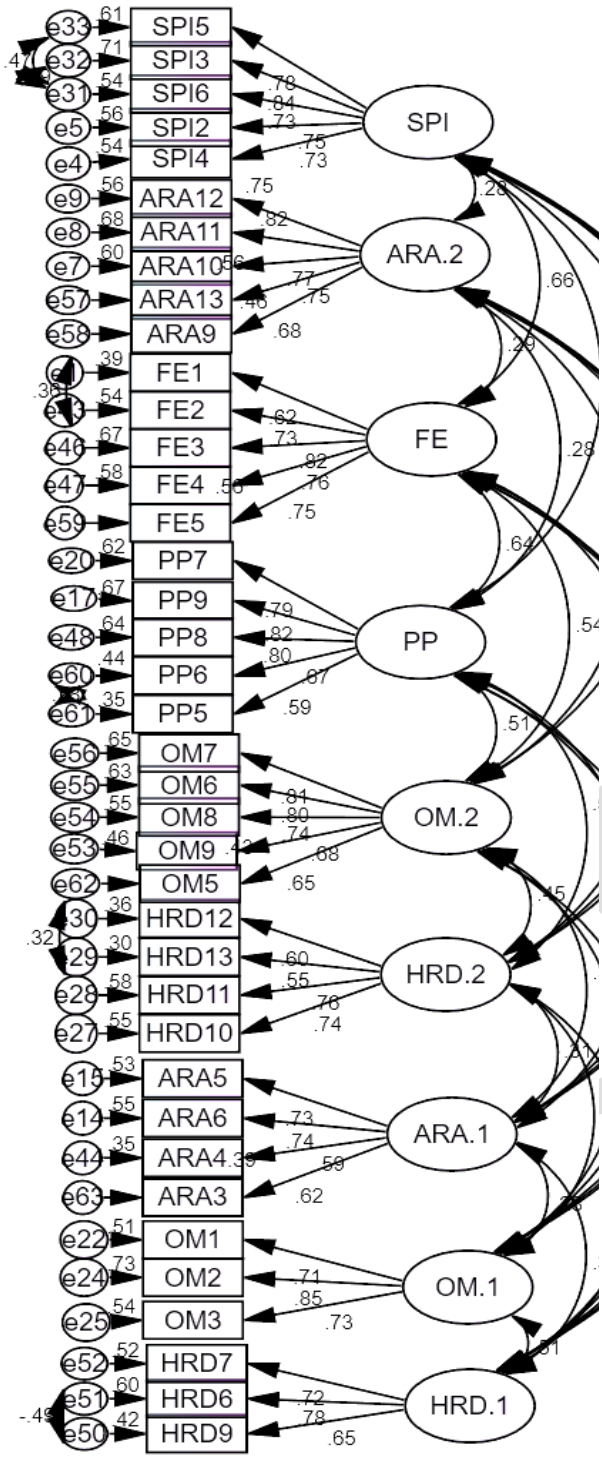

Figure. 1: Confirmatory Factor Analysis (CFA) Results for All Variables

Table 3: Results of fit indices for CFA- Final Measurment Model

Measure	Estimate	Threshold*	Interpretation
CMIN	1308.436	--	--
DF	660	--	--
CMIN/DF	1.982	<3	Excellent
CFI	0.915	>0.95	Acceptable
GFI	0.865	>0.85	Acceptable
IFI	0.916	>0.95	Acceptable
TLI	0.905	>0.95	Acceptable
RMSEA	0.050	<0.05	Excellent
RMR	0.026	<0.10	Excellent
P-value	0.000	>0.05	Acceptable

Source: Computed Data Analysis, *(Awang, 2014; Hair et al. 2010)

Reliability (Cronbach's Alpha) and composite reliability (CR)

The assessment of reliability ensures internal consistency when evaluating variables (Kim & Cha, 2002). A reliability score above 0.60 is considered acceptable for the instrument [22,23]. This study conducted two types of reliability tests: Cronbach's alpha using SPSS 25.0 and CR. Specifically, the study found Cronbach's alpha values ranging from 0.751 for ARA.1 to 0.881 for SPI, while CR values ranged between 0.768 and 0.878 for the same variables as presented in Table 4. All the reliability and composite reliability values for the constructs reached a higher than the recommended threshold of 0.60.

1.1.1. Constructs validity

Convergent validity, the first type, was assessed through structural equation modelling (SEM) analysis in the measurement model to ascertain whether the indicators in a scale load together on a single construct. Discriminant validity, the second type, was used to confirm whether the items designed to measure different constructs are indeed evaluating different constructs

1.1.2. Convergent validity

Convergent validity assesses the degree to which measures of a specific construct align, indicating a high proportion of shared variance [22]. Convergent validity can be evaluated through CFA. According to Table 4, all items exhibited loadings above 0.50 on their respective constructs. A factor loading exceeding 0.50 is considered acceptable for a study sample of more than 300 respondents and provides strong evidence of convergent validity [20]. With factor loadings ranging from (0.552) for HRD13 to (0.852) for OM2, all indicators in the study were clearly associated with their respective constructs, providing solid support for the model's convergent validity.

Furthermore, Table 4 shows the Average Variance Extracted (AVE) test results for two constructs [human resource development1 (HRD.1) and awareness regarding accreditation2 (ARA.2)], which were below the recommended threshold of 0.5 (0.451 and 0.455, respectively). Consistent with previous

research [24], while an AVE exceeding 0.5 is preferred, values as low as 0.4 are acceptable. Following the criteria set by Fornell and Larcker (1981), an AVE below 0.5, but with a composite reliability (CR) greater than 0.6, indicates adequate convergent validity of the construct [25]. Table 4.19 presents the findings of item loadings, AVE, Cronbach's alpha, and CR.

Table 4: Items loading, Cronbach's alpha, Composite Reliability (CR) and (AVE)

Constructs	Items	Factor Loading	Cronbach's alpha	CR	AVE
ARA.1	ARA3	0.622	0.751	0.768	0.455
	ARA4	0.592			
	ARA5	0.731			
	ARA6	0.641			
	ARA9	0.675			
ARA.2	ARA10	0.772	0.858	0.868	0.570
	ARA11	0.823			
	ARA12	0.751			
	ARA13	0.746			
OM.1	OM1	0.713	0.807	0.811	0.591
	OM2	0.852			
	OM3	0.733			
OM.2	OM5	0.653	0.851	0.856	0.545
	OM6	0.796			
	OM7	0.806			
	OM8	0.742			
	OM9	0.681			
HRD.1	HRD6	0.777	0.769	0.760	0.516
	HRD7	0.724			
	HRD9	0.647			
HRD.2	HRD10	0.743	0.786	0.758	0.451
	HRD11	0.746			
	HRD12	0.603			
	HRD13	0.552			
PP	PP5	0.653	0.858	0.854	0.543
	PP6	0.667			
	PP7	0.789			
	PP8	0.798			
	PP9	0.817			
FE	FE1	0.622	0.861	0.857	0.548
	FE2	0.732			
	FE3	0.821			
	FE4	0.762			
	FE5	0.749			
SPI	SPI2	0.751	0.881	0.878	0.591
	SPI3	0.842			
	SPI4	0.734			
	SPI5	0.780			
	SPI6	0.732			

Source: Prepared by researcher using output of Amos-SEM (Measurement Model)

Discriminant validity

Discriminant validity refers to the extent to which a particular construct is distinct from other constructs [20]. It is assessed by comparing the average variance extracted (AVE) for each construct with the squared correlations between that construct and others [25]. In our analysis, the AVE values for each construct exceeded the squared correlations with other constructs, demonstrating discriminant validity. Specifically, the square root of the AVE for each construct was greater than the absolute value of the correlation squared with any other factor (AVE > correlation square). This was further supported by Table 5, which shows that the AVE and the square root of the AVE for all constructs exceeded the correlations with other constructs in the model.

Table 5: Discriminant Validity for Latent Variables for Fronell & Larcker, (1981)

	HRD.1	FE	OM.1	HRD.2	OM.2	SPI	ARA.2	ARA.1	PP
	0.718								
	0.527	0.740							
	0.515	0.456	0.768						
	0.712	0.458	0.462	0.672					
	0.493	0.537	0.571	0.447	0.738				
	0.588	0.663	0.507	0.525	0.616	0.769			
	0.248	0.286	0.210	0.174	0.378	0.276	0.755		
	0.295	0.353	0.283	0.308	0.365	0.393	0.462	0.675	
	0.498	0.640	0.388	0.532	0.513	0.602	0.276	0.309	0.737

Source: Prepared by researcher using output of Amos-SEM (Measurement Model)
Note: HRD.2=Human Resource Development2 HRD.1= Human Resource Development1; FE= Facilities and Equipment; OM.2= Organization and Management2; OM.1= Organization and Management1; SPI= Safety and Performance Improvement; ARA.2= Awareness Regarding Accreditation; ARA.1= Awareness Regarding Accreditation1; PP= Policies and Procedure

Discussion

This study successfully developed and validated a measurement model to assess the awareness and challenges surrounding nursing services accreditation among healthcare providers (HCPs) in Yemen. By employing rigorous statistical methods, including Confirmatory Factor Analysis (CFA), the research established the construct validity, reliability, and overall robustness of nine distinct constructs: Awareness Regarding Accreditation (ARA), Organization and Management (OM), Human Resource Development (HRD), Policies and Procedures (PP), Facilities and Equipment (FE), and Safety and Performance Improvement (SPI). The use of well-established fit indices confirmed that the model demonstrated adequate fitness, thereby validating the effectiveness of the measurement instrument.

The identified constructs are essential for understanding the current landscape of nursing services accreditation in Yemen. For instance, the strong emphasis on organizational management and human resource development suggests that healthcare institutions need to enhance their administrative frameworks and invest in ongoing training for staff [3, 26, 27]. These factors are crucial for fostering an environment conducive to high-quality patient care, especially in resource-limited settings where healthcare infrastructure may be underdeveloped [28,29].

Notably, the results revealed that while the measurement model was robust, some constructs exhibited Average Variance Extracted (AVE) values slightly below the preferred threshold of 0.5. Specifically, constructs related to Human Resource Development (HRD) and Awareness Regarding Accreditation (ARA) had AVE values of 0.451 and 0.455, respectively. While these values suggest room for improvement, they still meet the criteria for adequate convergent validity when accompanied by satisfactory composite reliability scores. This indicates that the instruments can still effectively capture the constructs they are intended to measure, although further refinement may enhance their validity [31,32].

The practical implications of these findings are significant. The validated instrument serves as a critical tool for identifying specific areas requiring attention in the accreditation process, such as the development of comprehensive training programs. It emphasizes the importance of continuous education not only for HCPs but also for healthcare managers and policymakers [33, 34]. Cultivating a culture of quality and accreditation is essential, particularly in regions like Hadhramaut, where gaps in knowledge and resistance to change can impede progress. Engaging HCPs in regular training initiatives can significantly enhance their understanding of the accreditation process and its role in improving patient outcomes and healthcare performance [3, 35].

Moreover, this study highlighted the need for future research to address the limitations of the current sample, which was restricted to doctors, nurses, and managers. Incorporating a broader range of healthcare professionals, such as laboratory technicians, pharmacists, and support staff, would provide a more comprehensive perspective on the challenges and opportunities associated with nursing services accreditation. By expanding the scope of future studies, researchers can capture a fuller understanding of the accreditation landscape and develop strategies that encompass the insights of all relevant stakeholders.

Conclusion

This study explored the relationships among Gacha game use, sleep quality, and aggression among university students. The findings indicate that Gacha game players experience poorer sleep quality and moderate levels of aggression. However, no significant correlations were found between game duration, sleep quality, and aggression, possibly due to cultural factors or the catharsis theory. These results highlight the need for increased awareness of the potential negative consequences of excessive Gacha game use and the importance of monitoring and self-regulation to minimize adverse effects.

Ethics approval and consent to participate

The Institutional Review Board Hadhramaut University approved this study on 20/6/2023 (Ref no. H.U.1/16/2023-2024). The current study followed the Declaration of Helsinki provisions, and all participants provided informed consent. The permission to use the measurement instruments was received from the original author.

Consent for publication

The authors grant the Publisher permission to publish this work. All the data generated for this study are included within the article.

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Availability of data and materials

All data generated during this study are included in this published article.

Author's contribution

study conception and design: Talal Mansoor, Sharifa Ezat Bint Wan Puteh, Azimatun Noor Aizuddin, Nawal Saeed Banafa; data analysis and validation, Talal Mansoor, Malakeh.Z. Malak, Sharifa Ezat Bint Wan Puteh: draft manuscript preparation: Talal Mansoor, Malakeh.Z. Malak, Sharifa Ezat Bint Wan Puteh, Azimatun Noor Aizuddin, Nawal Saeed Banafan. All authors reviewed the results and approved the final version of the manuscript.

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Conflicts of interest

The authors report no conflict of interest.

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