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Development and psychometric evaluation of Nurses and Midwives' Perceptions of their Roles in Primary Healthcare

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ABSTRACT

Objective: This study aimed to develop Nurses and Midwives' Perceptions of their Roles in Primary Healthcare (NMPR-PHC) and evaluate its psychometric properties.

Methods: A cross-sectional survey was performed to recruit a convenient sample of 150 registered nurses and midwives from various primary healthcare settings in Jordan. Reliability was evaluated by examining the internal consistency and split-half reliability of the item. A exploratory factor analysis was performed to assess the factor structure of the NMPR-PHC.

Results: The final version of NMPR-PHC contained 18 items. Exploratory factor analysis revealed six factors (care coordination and interprofessional collaboration, workplace facilitators of the primary healthcare, management of care, research, workplace constraints of primary healthcare, and advanced education) for the questionnaire which explained 66.49% of the total variance. The Cronbach's α of the total scale was 0.834, the subscales Cronbach's α were ranging between 0.662 and 0.770, and the split-half reliability of the total scale was 0.734.

Conclusion: The overall performance of the questionnaire showed promising sound psychometric properties. The NMPR-PHC can be recommended for use as a tool for the assessment of nurses and midwives' perceptions of their roles in primary healthcare.

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What is known?

- To assume a primary healthcare role, nurses and midwives should perceive the necessity of the following: post-graduate (advanced) education, care coordination, management of care, and interprofessional collaboration.

What is new?

- A psychometrically sound instrument was developed to measure nurses and midwives' perceptions of their roles in primary healthcare.

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1. Introduction

Primary healthcare (PHC) is an essential component of public healthcare. Services of PHC cover health promotion, disease prevention and protection, treatment, rehabilitation, and palliative care and are delivered at an individual or population level [1]. The Alma-Ata Declaration, which is an international conference that was conducted in 1978, focused mainly on PHC to achieve health for all. PHC was defined as "the health care that is based on practical, scientifically sound and socially acceptable methods and technologies made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination" [2].

Many countries have successfully adopted a PHC system and achieved substantial health benefits as a result. One example is Cuba, its success lies in the focus on early intervention, in addition to patient education and health promotion that was offered to its population. The average life expectancy was 78 years. Furthermore,

Cuba spent only 7% of its GDP on health care compared to 10% by the UK, and 13% by the USA [3].

There is an evolution of primary care services worldwide, where nurses comprise the largest percentage of primary care providers. Primary care nursing was defined as the nursing services provided by nurses outside acute settings [4]. This role has been developed in response to policies aimed at meeting the consumers' changing health needs, the sustainability of healthcare funding, shortage of general practitioner (GP) workforce, as well as increasing GP workload. These factors are consistent among the US, UK, Australia, and Canada [4]. For example, an increased number of Americans are accessing primary care, however, clinics face the challenge of increasing demands for services with no enhanced capacity to meet these demands [5]. One way to address these challenges is to initiate nurse-led visits that require less time and leads to increase access to health services [5].

Among the other strategies that should be considered to overcome difficulties in primary care, is to involve nurses with postgraduate education to provide primary care services for communities [6]. Hallinan and Hegarty [4] argued that nurses with postgraduate degrees have the capabilities to improve practice, possess a better teaching role, and provide more preventive and therapeutic services in primary care. Thus, Hallinan and Hegarty [4] recommended increasing nurses' access to scholarships that enable them to undertake postgraduate degrees in primary care nursing, enhance alternative means of delivering courses in primary care nursing education, and improve primary care policies.

One of the central components that nurses play is care coordination [7]. Camicia and colleagues emphasized that the best-coordinated care is the one that is delivered by a multidisciplinary team and coordinated by at least one-member staff. Camicia et al. argued that nurses' role in patient care coordination has many benefits including, but not limited to; reducing costs, reducing errors, improving care effectiveness, and improving patient outcomes. Coordinating care requires the skills of care management, comprehensive assessment, interpersonal communication, education, and integration of community resources, research, and evaluation [8].

The roles of nurses and midwives in PHC settings extend to coordinating services across the multi-sector service providers such as governmental and non-governmental professional associations, and educational institutions [9]. Acknowledging the role of nurses and midwives in PHC must be ensured in a way that their collaborative action adheres to the guiding principles of the PHC and the WHO global health agenda that emphasizes the ethical practice based on equity, integrity, and justice [10].

Nurses are the key health professionals of the interdisciplinary teams whose responsibilities are extended to include coordinating and facilitating patient care in primary care [11]. Nurses' role contributes to disease prevention, health promotion, reduction of newborns and infants' mortality, and crisis management [10]. However, quality patient care requires all health professionals to collaborate efficiently. Research suggests that interprofessional education (IPE) is one of the methods to improve collaborative practice between healthcare professionals [12]. The components and strategies of the nurses' role in primary care nursing could be summarized as following: post-graduate (advanced) education, care coordination, management of care, and interprofessional collaboration.

Jordan is a low-middle income country, in which human resources are considered the most valuable resources for the development of the country. Jordan's performance is among the best countries in the Arab region because Jordan is achieving a progressive milestone in many health indicators including life expectancy, health literacy, and reduced mortality rates among infants [13]. The significant challenges facing the Jordanian healthcare systems include accessibility, equity, duplication of services problems, in addition to poor coordination and communication among major providers which consequently affect the quality of care [13]. Other challenges are; lack of regulated private institutions, lack of utilizing the full potential of private sector services, lack of quality improvement programs, unproductive use of the resources, and weak health information systems [14].

The role of the primary care nurse needs to be thoroughly explored and identified, and more information is needed to capture the core characteristics and perceptions of the roles of primary care nurses and midwives. Initially, assessing the perception and awareness of Jordanian primary care nurses and midwives is essential to gather basic information, then strategies can be developed to empower nurses in the field of PHC. These strategies will enable policymakers and stakeholders of the Jordanian healthcare system to concur with the sustainable development goals.

The main challenge here is the lack of research tools that assess nurses and midwives' roles in PHC, and therefore, there is a clear deficiency in research in this area. According to the scoping review of Swanson and colleagues (2020), there is no previous research that entirely studies the roles of nurses in PHC. Previous research focused only on specific aspects of nurses' practice in PHC such as collaborative practice, or specific health-related issues in PHC, but did not capture the full picture of nurses' roles in PHC [15]. Therefore, this study aimed to evaluate the psychometric properties and the dimensionality of a newly developed measure specifically designed to assess nurses and midwives' perceptions of their roles in primary healthcare.

2. Methods

2.1. Study design and setting

A cross-sectional, correlational design was used. The participants were nurses and midwives who are involved in primary care settings in the northeastern and middle parts of Jordan. Participants were recruited between August 2018 and February 2019. The primary care settings cover urban, suburban, and rural areas of the country, and included public, private, university-affiliated, and non-governmental PHC centers.

2.2. Study population and sample

The accessible population was nurses and midwives in the selected primary care settings in the northeastern and middle parts of the country. The total eligible nurses and midwives were estimated to be 900 nurses and midwives. A total of 160 nurses and midwives working in these primary care settings were invited to the study. A convenience sample of 150 nurses and midwives was recruited, with a response rate of 94%, to allow for psychometric and dimensionality assessment of the newly developed scale [16]. The sample size just fulfilled the most lenient requirement of the subject to a variable ratio of 5 [17,18] but not for more conservative sample size requirements of more than 150 [16] or 300 subjects [19].

2.3. Ethical considerations

Before data collection, the ethical approval by the Institutional Review Board at Jordan University of Science and Technology (JUST) was obtained (IRB#: 42/114/2018). The cover page of the questionnaire was consistent with the code of ethics. The purpose of the study was explained to each participant and informed consent was signed if agreed to participate. Participants were informed that

their participation is voluntary, and no identifiers will be collected. Participants were assured that the collected data will remain confidential and will be used for study purposes only. Participants were informed that they have the right to decide whether to participate, refuse, or withdraw anytime from the study. Only the study investigators had access to the data.

2.4. Data collection

This study used a survey as a data collection technique. The paper survey was administered by research assistants who traveled to the primary care settings in Northeastern and Middle areas of Jordan. Participants were informed that there are no right, or wrong answers, and the survey is intended to measure their perceptions rather than their knowledge. The recruitment process and the survey filling took around 30 min for each participant. To standardize the data collection procedure, the research assistants were trained by the primary investigators on the data collection procedure.

2.5. Instruments

2.5.1. Sociodemographics

Sociodemographics were measured using a profile of sample characteristics that include age, gender, education level, place of work, postgraduate education, and years of experience.

2.5.2. Nurses and midwives' perception of their role in PHC

The perceptions of nurses and midwives regarding PHC were measured using a new questionnaire (Nurses and Midwives' Perceptions of their Roles in Primary Healthcare, NMPR-PHC) that was developed by the investigators. The questions were formulated based on the definition of the role of the primary healthcare, the competencies that nurses and midwives should accomplish to practice in PHC, and the findings of previous research. A pool of 30 items was created by the authors to capture the concept of PHC; the initial items were reviewed by experts in the field of PHC to evaluate their clarity, conciseness, and relevance to the concept intended to be measured. Ten items were eliminated because the panel of experts thought that were either redundant, lengthy items, difficult to read, or double-barreled items. The questionnaire was piloted to determine its face validity and feasibility before conducting the actual study, some modifications were made that added to the clarity and suitability of the questionnaire. The resulting 20 items cover the concepts of care coordination and interprofessional collaboration, workplace facilitators, and constraints of the primary healthcare, management of care, research, and advanced education. The responses to the 20 items were of a 7-point Likert scale that ranges from "strongly agree" to "strongly disagree" (Appendix A). The total score of the survey was created to quantify participants' agreement with the statements about their perception of their role in PHC. The total score ranges from 20 to 140, with a higher score indicating more agreement with the PHC role. Additionally, the mean of each subscale was calculated and the mean of responses for each item was evaluated to determine if participants were favoring the socially desirable response.

2.6. Data analysis

The filled-out surveys were manually entered into SPSS version 25 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY), and then a second research assistant rechecked the data entry for accuracy and missingness. The statistical analysis started with describing sociodemographics and scores on the NMPR-PHC of the participants.

The psychometric statistics focused on internal consistency for reliability, construct validity, and principal components analysis. Internal consistency reliability coefficients (Cronbach's α) were calculated for the total scale and subscales. Spearman-Brown coefficients were calculated to assess for split-half reliability. For any item to be retained in the instrument it has to have a commonality of at least 0.4 [20]. A scree plot was also examined to determine the actual number of factors that fit the data [21]. Sampling adequacy was assessed using the Kaiser-Meyer-Olkin (KMO) statistic and Bartlett's sphericity test. For further analysis, the KMO should be at least 0.6 and Bartlett's test should be significant [16].

3. Results

3.1. Descriptive results

Table 1 shows the sociodemographics of the participants ($n = 150$). The majority of the participants were recruited from public PHC settings (82.0%). The participants included nurses (92.0%) and midwives (8.0%). The majority of participants were females (80.7%), most of them are bachelor's degree holders (44.7%). The mean age of the participants was 36.00 ± 6.85 years with an average experience in their current position of 8.60 ± 10.39 years. The results showed that nurses and midwives had high perceptions regarding their role in PHC. The mean of the total score was 107.00 ±16.25.

3.2. Psychometrics of the NMPR-PHC

Since the role of primary care nurses could simply be a unidimensional concept, an exploratory factor analysis (EFA) was conducted to explore the dimensionality of our data. Principal components analysis (PCA) was used with oblimin rotation, to maximize the independence of the factors. First, the Kaiser-Meyer-Olkin (KMO) statistic was 0.80, and Bartlett's sphericity test was significant ($P < 0.001$) indicating adequate sampling.

The EFA results revealed the existence of multiple factors and provided evidence that most items fall into distinct categories and supported the construct validity. The analysis results revealed six factors with eigenvalues greater than or equal to 1.0. This also was confirmed by the shape of the scree plots (Fig. 1). However, some items double-loaded on more than one factor, and other items did not load on their expected factors. These results could be explained

Table 1
Characteristics of the participants ($n = 150$).

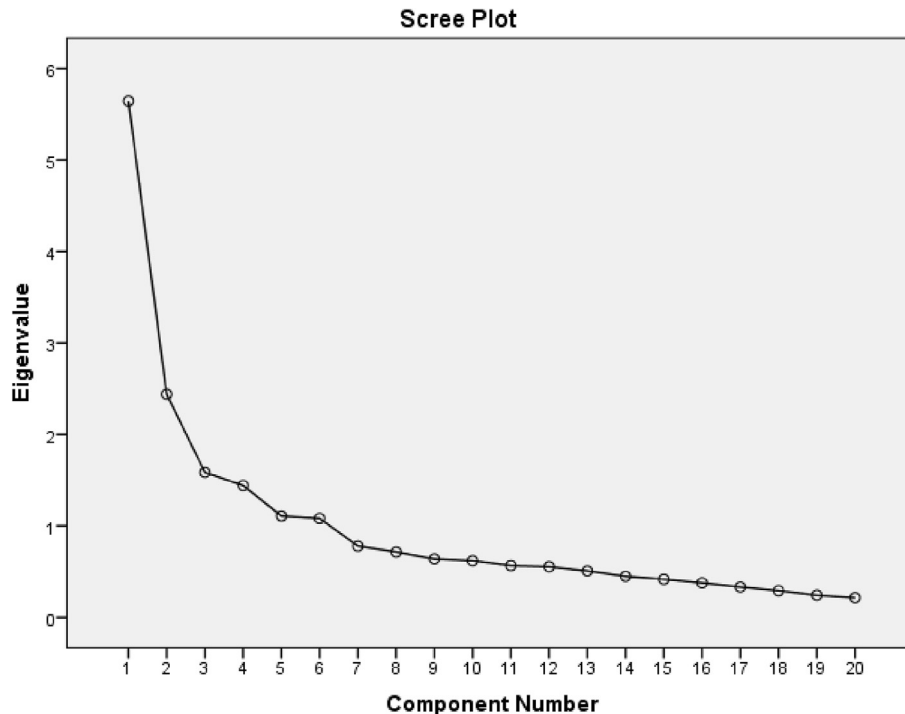| Characteristics	n	%
Gender		
Female	121	80.7
Male	29	19.3
Working place		
Public	123	82.0
Private	11	7.3
University affiliated	8	5.3
Nongovernmental organization	5	3.3
Profession		
Nursing	138	92.0
Midwifery	12	8.0
Education		
High school	9	6.0
Associate degree	65	44.5
Bachelor	67	45.9
Master	5	3.4
Postgraduate education		
Yes	80	53.3
No	70	47.7

Scree Plot

Fig. 1. A scree plot illustrating the factor loading of Nurses and Midwives' Perceptions of their Roles in Primary Healthcare.

by the fact that there are overlaps between some roles of primary care nurses. The total variance explained by the six components was 66.49%, with all items were highly loaded on at least one factor (Table 2).

The reliability of the NMPR-PHC was measured by testing and inter-item correlation matrix. According to the correlation matrix, most of the items of each dimension were strongly associated with each other; On the other hand, most of the items in different dimensions were weakly associated with each other. However, few items from different dimensions were strongly associated with each other due to their interrelated nature. Overall, the inter-item correlations were good which allowed conducting the EFA.

Internal consistency reliabilities were examined for each of the five suggested subscales. Since all items were worded only in positive directions, no items were reverse coded. Some of the five subscales that structure the survey were found to have an acceptable reliability level (defined as a Cronbach's α greater than or equal to 0.70), the total scale Cronbach's α was 0.834, the subscales Cronbach's α ranged between 0.662 and 0.770 (Table 3). The Spearman-Brown coefficients were found to be acceptable too (Table 3).

4. Discussion

The overall performance of the instrument NMPR-PHC showed promising sound psychometric properties. The total scale reliability was high (Cronbach's α = 0.834), however, the subscales' reliabilities were satisfactory. One of the possible sources of this problem is the initial grouping of the items together. The instrument was created using a priori five major concepts that form the construct of primary care nurses' roles which are the *Management of Care*, *Advanced Education*, *Care Coordination*, *Primary Healthcare*, and *Inter-Professional Collaboration*. The grouping of the items should be reconsidered in light of the results of the EFA.

The EFA results showed that the first four items (items 1–4) were successfully loaded to the first domain (*Management of Care*)

that was initially suggested. However, two items (5, 6) of the suggested three were loaded successfully to the second domain (*Advanced education*), whereas, item number 7 loaded into a different domain. Items 8,9,15,16, and 19 were successfully loaded into one domain; initially, these items were suggested to be into two different domains (*Care coordination and inter-professional collaboration*). It appears that these two domains are closely related which may explain the successful loading of their items together. Items 13, 17, and 18 were successfully loaded to one domain, and this domain is suggested to be named (*Workplace facilitators of the primary healthcare*). Item 11 only loaded to one domain; this domain was named *Research*. Items 7, 14, and 20 loaded successfully to one domain which suggested to be named (*Workplace constraints of primary healthcare*). Due to double loading into two different domains items, 10 and 12 are suggested to be removed so the total number of the items would be 18.

The total remaining items that were loaded in 5 distinct domains, in addition to the single item that was loaded to a single domain, should be further investigated; it is suggested that some items should be negatively reworded to avoid agreement bias that could be resulted from using positively worded items solely. Furthermore, social desirability items could be added to the questionnaire to control for this common problem.

The results of this study showed that Jordanian nurses and midwives had a high perception of the role of primary healthcare nurses. This could be due to a high percentage of nurses who hold a bachelor's or master's degree . Also, involvement in postgraduate programs might have contributed to this result; 53.3% of nurses and midwives had postgraduate and professional training during their work. The number of years the nurses and midwives spent in their current positions could be another factor that may contribute to their high perception of their role as primary care nurses.

Further investigation of the psychometric properties of the newly developed instrument is recommended using a larger sample size. It is also recommended to use this instrument in other countries to assess the cultural appropriateness of the instrument.

Table 2
The items of the extracted factors and their factor loading values.

Factors and items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Care coordination and interprofessional collaboration						
Q8 - Patient care coordination	0.495					
Q9 - Care coordinator and communicate with other healthcare professionals	0.652					
Q15 - The primary care nurse role entails working with all ages	0.588					
Q16 -The interdisciplinary collaboration is necessary for an effective primary healthcare.	0.684					
Q19 - Interprofessional education will enhance the overall quality of care delivered to patients	0.664					
Workplace facilitators of the primary healthcare						
Q13 - There is a sufficient number of experienced primary care nurses where I work.		0.659				
Q17 - In the setting where I work, there is a well-defined interdisciplinary collaboration to plan and implement primary healthcare.		0.740				
Q18 - In the setting where I work, I think there is a sufficient number of healthcare professionals to effectively provide patients with the appropriate primary healthcare.		0.820				
Management of care						
Q1 - Record past and present medical history, and perform a physical exam			0.860			
Q2 - Implement when needed, and document nursing notes			0.612			
Q3 - Present history to clinicians and document the physical examination, assessment, and plan of care.			0.695			
Q4 - Review plan of care for the patient and provide the patient with appropriate education			0.451			
Research						
Q11 - Research and evaluation knowledge is required to improve patient care coordination.				0.650		
Workplace constraints of primary healthcare						
Q7 - The institution encourages nurses post-graduate/professional education					0.597	
Q14 - There is no financial barrier that prevents me from performing my role as a primary care nurse					0.522	
Q20 - I received an inter-professional education in the institution where I got my degree.					0.827	
Advanced Education						
Q5 - Enroll in post-graduate or professional program						0.839
Q6 - Post-graduate/professional education will improve nurses practice autonomy, enhance clinical practice, increase the scope of practice, and improve job satisfaction.						0.825

Table 3
Descriptive statistics of the four subscales and reliability of the NMPR-PHC ($n = 150$).

Subscales	Mean ± SD	Cronbach's α	Split-half reliability
Care coordination and inter-professional collaboration	5.80 ± 0.91	0.770	0.727
Workplace facilitators of the primary healthcare	4.60 ± 1.53	0.758	0.778
Management of care	5.80 ± 0.96	0.701	0.736
Workplace constraints of primary healthcare	4.40 ± 1.51	0.662	0.642
Advanced education	5.60 ± 1.50	0.687	0.697
Total scale	5.40 ± 0.81	0.834	0.734

Note: NMPR-PHC = Nurses and Midwives' Perceptions of their Roles in Primary Healthcare.

The newly developed instrument is designed to assess nurses' and midwives' perceptions of the primary healthcare nurse role; however, it would be more comprehensible if we have information about nurses' and midwives' knowledge of their role in PHC. Schveitzer et al. [9] identified several challenges that prevent nurses from presuming their role in primary healthcare that includes, but is not limited to, education and training. Although this study showed that nurses in this sample were exposed to professional postgraduate education, it is not well known if this education is closely related to primary healthcare. Further investigation of the postgraduate education workshops' contents is warranted.

5. Limitations

The current study has some limitations. Firstly, the convenient sampling procedure could limit the generalizability of the study findings. Secondly, the use of solely positive items to assess for nurses' and midwives' perceptions of their role in PHC; which may increase the chance for social desirability bias. This questionnaire needs to be further tested and refined.

6. Conclusion

In this study, NMPR-PHC was designed to assess the perceptions of nurses and midwives on their roles in PHC. The tool has promising internal consistency reliability and construct validity. However, we recommend further examination of these psychometric properties to capture the concept of PHC which allows for evaluating the enactment of core competencies that are related to the nurses' and midwives' role in PHC settings.

CRediT authorship contribution statement

Tariq N. Al-Dwaikat: Conceptualization, Methodology, Writing-original draft preparation, Supervision, Project administration. **Wafa'a Ta'an**: Conceptualization ,Writing-review and Editing, Investigation, Formal analysis, Original draft preparation. **Mohammad Alrawashdeh**: Formal analysis and methodology. **Nesrin Abu Baker**: Writing-review and editing. **Nahla M. Al Ali**: Writing-review and editing.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author [Tariq N. Al-Dwaikat]. The data are not publicly available due to [restrictions e.g. they're containing information that could compromise the privacy of research participants].

Declaration of competing interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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Appendices. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijnss.2020.09.009.

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