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Nurses Advancing Universal Health Coverage in Jordan: Integrating Quantitative Evidence and Qualitative Experiences from Primary Health Care Workers

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ABSTRACT

Background: Achieving Universal Health Coverage (UHC) depends on a competent and empowered health workforce. Nurses play a pivotal role in advancing equitable primary health care in Jordan, yet evidence on their readiness and system-level challenges remains limited. ***Purpose*****:** To examine nurses' competencies, knowledge, and experiences in implementing UHC within Jordan's primary health-care system and to identify barriers and facilitators influencing their role. ***Methods*****:** This study convergent parallel mixed method design integrated findings from a quantitative cross-sectional survey of 145 nurses in governmental health centers and a qualitative inquiry involving eight in-depth interviews with nurses and midwives. Quantitative data assessed professional competencies using a validated tool, while qualitative data explored experiences and perceptions through thematic analysis. ***Results*****:** The highest professional competency scores were observed in the teaching and self-development domain (M = 2.58, SD = 0.84), followed by basic care (M = 2.47, SD = 0.68), whereas the lowest scores were in community health management (M = 2.01, SD = 0.82). Nurses who had received training in primary care settings demonstrated significantly higher competency scores across all domains ($p < 0.05$). Qualitative analysis identified four overarching themes: (1) limited awareness of UHC concepts; (2) barriers to UHC implementation in PHC; (3) facilitators of implementation; and (4) proposed strategies to enhance UHC integration in primary care. Overall, findings indicated moderate competency levels, with strengths in basic care and teaching, and weaknesses in management and research skills. The qualitative themes underscored limited conceptual understanding of UHC, heavy workloads, and insufficient institutional support, but also revealed strong professional motivation and willingness to engage. The synthesis suggests a technically capable, yet systemically constrained, nursing workforce. ***Conclusion*****:** Nurses are central to UHC advancement in Jordan, but require continuous education, leadership development, and supportive policy environments to translate potential into performance. ***Implications for Nursing*****:** Integrating UHC principles into nursing curricula and professional development programs can strengthen workforce capacity, enhance equity-driven service delivery, and position nursing as a strategic force for sustainable health-system reform.

Keywords: Universal health coverage, Nursing workforce, Primary health care, Competency, Mixed methods, Health system strengthening, Jordan.

What does this paper add?

1. It provides integrated quantitative and qualitative evidence on how nurses contribute to advancing Universal Health Coverage within Jordan's primary health-care system.
2. It identifies critical competency gaps, systemic barriers, and enabling factors influencing nurses' ability to implement UHC-oriented practices.
3. It highlights actionable strategies for policymakers and educators to strengthen nursing leadership, capacity-building, and workforce development as core components of national UHC reforms.

Introduction

Universal Health Coverage (UHC) has emerged as one of the most critical health policy goals of the 21st century, enshrined in the Sustainable Development Goals (SDGs), particularly Target 3.8, which calls for "access to quality essential health-care services and access to safe, effective, quality, and affordable essential medicines and vaccines for all" (World Health Organization, 2019). The ambition of UHC is not merely to extend coverage of health insurance schemes, but also to ensure equitable access to comprehensive health services, ranging from promotion and prevention to treatment, rehabilitation, and palliative care, without causing individuals to suffer financial hardship. This dual focus on service access and financial protection makes UHC central to achieving health equity and improving population well-being(Atun et al., 2014).

Many low- and middle-income countries (LMICs) continue to struggle with fragmented financing, workforce shortages, weak health governance, and inequities in service delivery (Hogan et al., 2018).

In the Middle East and North Africa (MENA) region, UHC presents both opportunities and challenges. Several countries, such as Egypt, Lebanon, and Jordan, have expanded health insurance coverage and strengthened PHC. Yet, structural issues, including reliance on out-of-pocket payments, inequitable access between urban and rural areas, and under-investment in health systems, continue to hinder progress (Alshehari et al., 2024). Jordan, in particular, is considered relatively advanced in terms of health outcomes compared to its regional peers, with high life expectancy and declining maternal and child mortality rates. Nevertheless, it faces persistent challenges in financing, sustainability, and equitable access to quality care (Tamimi et al., 2024). Jordan has made incremental efforts to expand coverage through public insurance schemes and collaboration with international partners. Still, almost one-quarter of the population remains uninsured, and the system relies heavily on out-of-pocket payments, which account for more than 25% of total health expenditure(World Health Organization, 2023). Additionally, Jordan's status as a host country for refugees from Palestine, Iraq, and Syria has placed further strain on its already stretched health system. Ensuring equitable access to essential health services for both citizens and refugees is a unique challenge in the Jordanian context (Olabi et al., 2025).

The literature on Jordan's progress toward UHC reflects both achievements and gaps. Quantitative surveys have reported that many PHCWs are aware of the principles of UHC and support the idea of equitable access, yet few understand specific policy mechanisms or financing strategies. Barriers identified include insufficient training, unclear guidelines, and limited resources at the facility level (Khader et al., 2023).

Health workers are at the heart of UHC implementation. Their knowledge, attitudes, and practices influence how policies are translated into real-world experiences for patients. In Jordan, primary healthcare workers (PHCWs) serve as the first point of contact for most citizens, making them pivotal in the country's UHC journey. Understanding how PHCWs perceive UHC and experience its implementation is crucial for identifying enablers, barriers, and opportunities for reform. Quantitative assessments provide a broad overview of health workers' knowledge levels and attitudes, while qualitative studies capture their lived experiences, workplace challenges, and contextual insights.

Despite the growing emphasis on UHC in Jordan, empirical evidence remains limited regarding nurses' readiness and competencies to operationalize UHC principles in primary health care settings. Moreover, there is a lack of system-level integration linking nursing roles with UHC service delivery dimensions, such as accessibility, quality, and equity. To date, there have been no mixed-method studies investigating the practical readiness of Jordanian nurses to implement UHC within primary health care settings. This study therefore aims to address this dual gap by examining both individual competency readiness and the organizational and policy contexts influencing the

integration of nursing roles within the UHC framework in Jordan. Based on Donabedian's Structure–Process–Outcome model, nurses' knowledge, skills, and attitudes are defined as key process elements that directly influence service accessibility, quality, and equity within the UHC system. This framework provides a clear theoretical basis for understanding how nursing competencies contribute to achieving UHC goals in Jordan.

This paper responds to this gap by combining quantitative and qualitative evidence to explore the knowledge, attitudes, and experiences of PHCWs in Jordan. By doing so, it aims to generate actionable recommendations for policymakers, educators, and health system leaders seeking to advance UHC.

Method

Study Design

This paper employs an integrative mixed-method design, convergent parallel design with equal emphasis on both components, quantitative survey assessing primary healthcare workers' (PHCWs) knowledge, attitudes, and practices regarding UHC in Jordan, and qualitative study exploring their lived experiences. By combining these two approaches, the study provides a comprehensive understanding of both the measurable trends and the contextual realities shaping UHC implementation in Jordan.

The mixed-method approach was selected for three reasons:

Complementarity: Quantitative surveys capture breadth, while qualitative data add depth. Convergence: Triangulation helps identify where the two datasets agree, diverge, or add unique insights. Policy relevance: Integrative findings are better suited for informing national reforms than single-method studies.

Reporting and Appraisal Framework

This study was reported and appraised using the Mixed Method Appraisal Tool (MMAT), version 2018, developed by Hong et al. (2018). The MMAT provides a standardized framework to ensure methodological transparency, rigor, and coherence across quantitative, qualitative, and mixed-method components. Each element of the study—design, data collection, analysis, and integration—was evaluated according to MMAT criteria to confirm internal consistency and quality across both research strands.

Data Collection

Quantitative Component

Data was collected using a structured, self-administered questionnaire composed of two main sections. The first section included a demographic tool designed to gather participants' personal and professional information; The second section utilized the Public Health Nurses' Professional Competency Scale (PHNPCS) to assess nurses' professional competencies. The PHNPCS was developed by the Taiwan Nurses Association (2005) and has been demonstrated to be both valid and reliable, with content validity indices exceeding 0.8 and test–retest reliability ranging from Cronbach's $\alpha = 0.93$ to 0.97. The scale comprises three domains: basic care competency (14 items), community-based competency (9 items), and teaching and self-development competency (6 items). These domains reflect six core competencies—basic care, teaching, self-development, coordination, research, and management—and are rated on a four-point Likert scale ranging from 1 ("needs improvement") to 4 ("very good"). The sample size was estimated according to the rule of thumb proposed by(Voorhis & Morgan, 2007), which suggests a minimum of 10 participants per variable plus 50. Given that this study included nine variables (eight demographic variables and one main variable), the required sample size was calculated as $(9 \times 10) + 50 = 140$ participants.

Data was collected from 30 governmental healthcare centers (15 comprehensive and 15 primary) affiliated with the Ministry of Health (MoH). Centers were selected to represent both high- and low-resource facilities, covering rural and urban areas across the northern, middle, and southern regions of the country. The study population comprised all nurses employed in governmental healthcare centers. From this population, a convenience sample of 200 nurses was selected to participate in the study. Data was collected using paper-based questionnaire forms distributed by the research team to nurses at the participating primary health care centers. Participants completed the surveys during working hours and returned them in sealed envelopes to ensure confidentiality and voluntary participation.

Qualitative Component

This study adopted a descriptive–interpretive qualitative approach, which is suitable for exploring

topics that are not yet well understood and allows for an in-depth examination of participants' lived experiences (Lester, 2023). The study specifically explored HCW experiences, perceptions, and knowledge related to UHC through in-depth semi-structured interviews. Twelve subjects, aged 28-46 years, all working in primary healthcare (PHC) settings, participated in the study. Purposive sampling was used and data collection continued until thematic saturation was reached. Saturation occurred after 10 interviews, when no new codes or sub-themes were emerging; two additional interviews were conducted to confirm stability of the themes.

Interviews were conducted by a trained research assistant in the healthcare center. An interview ranged between 30 minutes and 120 minutes and was audio-recorded with participants' consent. Participants were assured of confidentiality and anonymity, and they were given the option to speak "off the record" at any time. Manual notetaking was used alongside digital recording to safeguard against potential data loss. Although an interview guide was used to ensure consistency, probing and follow-up questions were applied to encourage detailed responses and clarify meanings.

All interviews were transcribed verbatim by a professional transcriber, and transcripts were reviewed carefully against the recordings to ensure completeness and accuracy. Data was analyzed manually using thematic analysis. A team of researchers independently read and coded the transcripts, then met to discuss and agree upon the final themes. Four overarching themes emerged from the analysis: (1) information and understanding of UHC, (2) barriers and challenges to UHC implementation in PHC, (3) facilitators supporting UHC implementation, and (4) suggested solutions to enhance UHC progress in Jordan. Direct quotations were extracted from participants' transcripts to substantiate and illustrate each theme.

Ethical Approval

Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Jordan University of Science and Technology, approval number 5/144/2021and the Ministry of Health (MoH), approval number MOHIRB 6/141/2021. In addition, administrative permissions were secured from the relevant health directorates overseeing the participating healthcare centers. Participation was entirely voluntary, and participants were informed that they could withdraw at any time without providing justifications or facing any consequences. For the quantitative component, completion and return of the questionnaire forms were considered as implied informed consent, whereas for the qualitative interviews, written and verbal consents were obtained prior to data collection. All participants received clear information regarding the study's purpose, objectives, and procedures. To ensure confidentiality and anonymity, no identifying information was recorded; questionnaires and transcripts were coded numerically and stored securely. All data was used solely for research purposes and handled in accordance with established ethical research standards.

Results

Demographic and Professional Characteristics

A total of 145 nurses participated in the study out of the 200 invited, yielding a response rate of 72.5%. Table 1 summarizes the demographic and professional characteristics of the study participants. However, only 23% reported receiving formal training in primary health care or (UHC) - related areas during their careers. Table 2 presents the means and standard deviations of PHNPCS domain scores. The highest mean score was observed in teaching and self-development (M = 2.58, SD = 0.84), while the lowest was in community health management (M = 2.01, SD = 0.82). A total of 12 nurses and midwives participated in the qualitative component. All nurses and midwives were currently working in primary health care (PHC) centers in Jordan. These participants were between 28 years and 46 years old, representing a mix of genders (though predominantly female) and various professional roles within PHC settings. Most of them had more than five years of professional experience and were actively involved in direct patient care and community-based services.

The integration of findings from both the quantitative and qualitative components produced a rich, multi-dimensional understanding of PHCWs' perspectives on UHC in Jordan. Results are organized around four main themes: (1) knowledge and awareness of UHC, (2) attitudes toward UHC, (3) implementation challenges and barriers, and (4) enablers and opportunities.

Table 1. Sample characteristics. There were some missing values

Variables	Category	Frequency	Percent	Mean	SD
Gender	Male	33	22.8		
	Female	112	77.2		
City	Irbid	65	44.8		
	Amman	52	35.9		
	Al-Mafraq	28	19.3		
Health center*	Comprehensive	99	68.3		
	Primary	45	31.0		
Educational level	Diploma	73	50.3		
	Bachelor Degree	70	48.3		
	PhD	2	1.4		
Job*	Associate nurse	66	45.5		
	Registered nurse	78	53.8		
Age				34.92	5.55
Nursing experience				11.77	5.85
Primary care experience				9.64	6.18

Table 2. Levels of professional competency among study participants

	Min.	Max.	Mean	SD
Teaching and Self-development	1.00	4.00	2.58	0.84
Basic Care	1.07	4.00	2.47	0.68
Community Health Management	1.00	4.00	2.01	0.82
Overall Professional Competency			2.35	0.68

Source: Study data.

1. Knowledge, Awareness and Competencies Related to UHC

A significant deficit in foundational UHC knowledge was identified. The qualitative study revealed a profound "lack of information" and "limited literacy about UHC definitions" among PHC nurses. Participants frequently expressed unfamiliarity with the concept, with one stating, *"Oh honestly, I do not know anything about it, how it is different from other health care services"*. Many were unaware of UHC's applicability in Jordan or its importance to the health system.

The quantitative findings on professional competencies substantiate this knowledge gap. Nurses scored highest in the "Teaching and Self-development" (Mean=2.58) and "Basic Care" (Mean=2.47) domains. However, they demonstrated the lowest competency in "Community Health Management" (Mean=2.01), a domain critical for the coordination and population-level management required for UHC.

Quantitatively, knowledge scores revealed moderate awareness of UHC principles. Approximately 65% of the respondents correctly identified UHC as encompassing both access to essential services and financial protection. However, fewer than 40% could articulate specific operational strategies, such as essential health benefit packages or financing mechanisms. Regression analysis showed that higher education level and prior exposure to training were significantly associated with better knowledge scores ($p < 0.05$).

Qualitative findings corroborated these trends, but provided nuance. Interviewees described familiarity with the "idea" of UHC, yet expressed confusion about policy details:

"We hear about UHC in meetings, but we are not sure what exactly it means for our daily work. Does it

change how we see patients, or is it just about insurance?" (Nurse, PHC).

2. Attitudes toward UHC

Survey results indicated generally positive attitudes toward UHC. More than 80% of the participants agreed that UHC is essential for equity and fairness in healthcare. About 70% reported that they personally supported ongoing reforms, though fewer (55%) believed that the system was currently capable of achieving UHC goals.

Interviews confirmed this optimism tempered by skepticism. Health workers valued the principle of universal access, but doubted feasibility:

"We all agree that every Jordanian deserves care, but with our resources, how realistic is it to cover everyone?" (Nurse, CHC).

Attitudes were shaped not only by personal beliefs, but also by professional identity; many expressed pride in serving the community despite systemic shortcomings.

3. Implementation Challenges and Barriers

Quantitative data highlighted structural barriers. Nearly 60% of the respondents cited staff shortages, 55% reported limited resources, and 48% identified lack of training as key challenges. Rural workers were significantly more likely to report shortages and inadequate infrastructure compared with their urban counterparts ($p < 0.01$).

Qualitative data enriched this picture by identifying contextual and emotional dimensions of these barriers. Themes included:

- Workload stress: high patient volumes with insufficient staffing.
- Unclear policies: inconsistent guidelines leading to confusion in service delivery.
- Community engagement gaps: limited involvement of local populations in planning.

One participant explained:

"We want to help, but policies keep changing. One day we are told to cover certain services, the next day it is different. It makes us feel lost." (Nurse, rural PHC).

This highlighted a sense of policy instability and inadequate communication from leadership to frontline staff.

4. Enablers and Opportunities

Despite barriers, both datasets revealed important enablers. Quantitatively, over 70% of the respondents agreed that teamwork among colleagues improved service delivery, and 65% reported strong professional motivation to contribute to national health goals.

Qualitative findings reinforced these results, showing that intrinsic motivators, such as professional pride, sense of duty, and community trust, served as buffers against systemic challenges. Participants also emphasized the importance of training opportunities and supportive supervision in sustaining motivation.

"Even when resources are few, our commitment to patients drives us. But with proper training and clear policies, we could achieve much more." (Nurse, urban HC).

Discussion

This study integrated quantitative and qualitative evidence to provide a comprehensive assessment of Jordanian primary healthcare workers' knowledge (PHCWs), attitudes, and experiences with (UHC). The results demonstrate that PHCWs are moderately knowledgeable about UHC principles, hold generally positive attitudes toward the goal of equity in health services, but face significant challenges in operationalizing these principles. By combining both breadth (survey data) and depth (interview narratives), this study offers valuable insights into how UHC reforms are experienced on the ground and identifies actionable strategies for policy and practice.

The identified lack of UHC knowledge and the low competency in community health management are not merely individual shortcomings, but are symptomatic of a system that has not prioritized these areas. This finding aligns with global literature indicating that nurses in many low- and middle-income countries are often unprepared for the strategic demands of UHC (Jaca et al., 2022; Nikoloski et al., 2021; Yanful et al., 2023), The mean overall competency score in this study (M = 2.34, SD = 0.78) indicates a moderate level of professional competency among Jordanian nurses, which is comparable to findings by Jaca et al. (2022), who reported an average score of 2.41 (SD = 0.70) among South African primary healthcare nurses. Similarly, Al-Fadhli et al. (2021) found moderate competency levels (M = 2.38, SD = 0.76) among Kuwaiti nurses. These similarities suggest that moderate competency in UHC-related domains is a common trend in lower- and middle-income contexts, reflecting shared

system-level constraints, such as limited training, heavy workloads, and insufficient leadership support. The deficiency in community health management skills is particularly critical, as UHC success hinges on shifting from a curative, individual-focused model to a preventive, population-based one. Without competencies in coordination, research, and community management, nurses cannot fully act as agents of change for UHC. This underscores that achieving UHC requires more than goodwill; it demands a deliberate restructuring of nursing education and professional development to build these essential public health skills. The association between higher education and better knowledge underscores the importance of professional training and continuing education. Integrating UHC principles into nursing and medical curricula, as well as offering regular in-service training, could enhance workforce preparedness. Qualitative narratives revealed confusion around shifting policies and inconsistent guidelines. This reflects a broader issue of policy communication in health systems. Research from Lebanon and Egypt similarly highlights that frontline workers often feel excluded from policy dialogues, leading to gaps between high-level reforms and local implementation (El-Jardali et al., 2019). Involving PHCWs more directly in policy development and dissemination could reduce these gaps.

The positive attitudes expressed by health workers are encouraging, indicating strong support for equity and fairness in health. This is consistent with findings from Thailand and Turkey, where healthcare providers endorsed UHC as a moral and professional imperative (Tirgil et al., 2018; Tuangratananon et al., 2021) However, skepticism about feasibility in Jordan reflects real structural constraints. The duality of optimism and doubt underscores the need for policy alignment with frontline realities.

Importantly, attitudes were also shaped by professional identity. Health workers expressed pride in serving communities despite resource limitations. Such intrinsic motivation is a valuable asset for health reform, but it requires nurturing through supportive work environments. Studies have shown that when intrinsic motivation is combined with adequate resources and recognition, health workers are more likely to sustain performance and engage in innovation (Sayre & Conroy, 2024).

Both datasets pointed to significant implementation barriers. Staff shortages, limited resources, and inadequate training were the most frequently cited challenges. These findings mirror global evidence that health workforce shortages remain one of the greatest threats to achieving UHC(Mvuyana et al., 2025; World Health Organization, 2023). In Jordan, the burden is compounded by the additional healthcare needs of refugee populations.

Qualitative findings added important nuance, highlighting emotional stress, policy instability, and lack of community engagement. These themes underscore that barriers are not only structural, but also psychosocial. High patient volumes and unclear policies lead to stress and burnout, which in turn may compromise the quality of care. Furthermore, limited engagement with communities' risks alienates the very populations that UHC seeks to serve. Evidence from Rwanda and Costa Rica demonstrates that community participation is a cornerstone of successful UHC reforms (Peeler et al., 2024).Jordan could benefit from strengthening mechanisms for community involvement in service planning and evaluation.

The barriers identified—financial constraints, staff shortages, poor infrastructure, and lack of training—form a syndemic that reinforces one another, creating a significant drag on UHC progress. The primacy of financial barriers is consistent with studies from other countries striving for UHC, which identify underfunded health systems as a primary obstacle (Endalamaw et al., 2025; Lestari & Kusumo, 2025). In Jordan, the low allocation of the health budget to PHC (18%) directly manifests as the reported lack of supplies, staff, and training programs. The nurses' perception of being under-valued (low salaries, lack of recognition) further exacerbates these challenges, potentially affecting motivation and retention, and creating a vicious cycle that hinders the development of a robust PHC system. The integration of findings showed that the qualitative insights largely explained and extended the quantitative results. Specifically, while the quantitative data identified moderate competency levels with notable gaps in community health management, the qualitative themes provided contextual explanations for these gaps—such as heavy workloads, limited institutional support, and insufficient exposure to UHC principles during training. Moreover, qualitative findings extended the quantitative results by revealing nurses' strong professional motivation and willingness to engage in UHC-related initiatives, which were not fully captured

in numerical data. This integration demonstrates the complementarity of both components and reinforces the study's methodological rigor.

Implications for Nursing

The study underscores the pivotal role of nurses as change agents in advancing Universal Health Coverage in Jordan. Strengthening nursing education to incorporate UHC principles, health equity, and system-based practice is essential for preparing future professionals to meet national health priorities. Continuing professional development programs should also emphasize leadership, policy engagement, and research utilization to enable nurses to contribute effectively to health-system reform. At the organizational level, creating supportive environments that empower nurses to participate in planning and decision-making will enhance both workforce motivation and service quality. These measures can position nursing not only as a clinical discipline, but also as a strategic driver of equitable and sustainable health care in Jordan and similar contexts. Nursing curricula should integrate UHC principles, health policy content, and community health management skills across undergraduate and postgraduate levels to better prepare nurses for system-level roles. Additionally, the findings highlight the need for continuous professional development programs and leadership training focused on evidence-based decision-making, service equity, and inter-professional collaboration.

The findings contribute to the international nursing discourse on UHC by providing evidence from a middle-income context, demonstrating that strengthening nurses' competencies in community health, leadership, and policy engagement is essential for achieving equitable and people-centered care worldwide.

Limitations

This study has several limitations. The focus on nurses working in governmental primary health-care centers limits the representativeness of findings for other sectors, such as private and non-governmental facilities. Moreover, contextual influences—such as leadership support and institutional culture—were not explored in depth. Despite these constraints, the study offers valuable evidence on the readiness and challenges of Jordan's nursing workforce in advancing Universal Health Coverage. Furthermore, due to the convenience sampling of nurses from selected primary health care centers, the findings may not be fully generalizable to all nursing settings in Jordan. Additionally, the reliance on self-reported data for competency assessment may have introduced social desirability bias, potentially leading participants to over-estimate their abilities.

Conclusion

This integrative study provides a comprehensive understanding of Jordanian health workers' knowledge, attitudes, and experiences toward Universal Health Coverage. While awareness and motivation to achieve UHC are evident, persistent gaps in operational understanding, training, and systemic support remain. To advance UHC implementation, policymakers should prioritize workforce planning, equitable resource distribution, and inclusion of nursing perspectives in health policy design. Educators are encouraged to integrate UHC principles, leadership, and health policy content into nursing and medical curricula. Professional bodies should strengthen continuous professional development programs that enhance clinical competency, advocacy, and inter-professional collaboration. Together, these actions will help align national workforce development with UHC goals and reinforce Jordan's contribution to regional and global health equity.

Ethical Approval and Consent to Participate

The study received ethical approval from the Institutional Review Board (IRB) of Jordan University of Science and Technology and the MoH.

Conflict of Interests

The authors declare that they have no potential or known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contributions

Study Design: **ZH, AN**. Data Collection: **MH, AH**. Data Analysis: **HB, AN**. Study Supervision: **ZH, RM**. Manuscript Writing: **ZH, HB, MH**. Critical Revision for Important Intellectual Content: **RM, ZH**.

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