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Original Article

"Development and Validation of Questionnaires to Assess Community Pharmacists' Knowledge, Attitude, and Willingness to Practice (KawP) Vaccination Services: Advancing Immunisation Efforts"

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ABSTRACT

Background: The presence of community pharmacists in the field is particularly important because they operate on the front line of contact with the population when providing the best health care. Evaluating their Knowledge, Attitude, and Practice (KAP) towards willingness to engage in professional responsibilities is essential for improving pharmacy services and public health outcomes. **Materials and Methods:** This cross-sectional study involved several phases, starting with the design and development of a comprehensive questionnaire, followed by rigorous psychometric validation. An extensive literature review and consultations with experts ensured the questionnaire's face and content validity. A pilot test with pharmacists refined the questions, while reliability was assessed using Cronbach's alpha, and construct validity was evaluated through Exploratory Factor Analysis (EFA). **Results:** The final questionnaire comprised 40 items distributed across three domains: Knowledge (13 items), Attitude (12 items), and Practice (15 items). With Cronbach's alpha coefficients ranging from 0.9068 to 0.9418, it demonstrated strong internal consistency, while exploratory factor analysis confirmed its construct validity with a clear factor structure. **Conclusion:** This reliable and user-friendly instrument, termed the Knowledge, Attitude, and Willingness to Practice (KAwP) questionnaire, effectively assesses community pharmacists' willingness to practice. It is a valuable tool to identify knowledge gaps, enhance attitudes, and improve pharmacy practices through targeted research and training interventions.

Keywords: Community pharmacists, Immunisation, Pharmacy Practice, Questionnaire, Reliability, Vaccination, Validation.

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INTRODUCTION

Pharmacists are usually the faces at the front lines of any patient-initiated contact, offering health-related advice, drug-related care, and preventive services. They expand their role in the community health industry to include the maintenance of antibiotic stewardship, chronic conditions, and the counselling of patients regarding health and wellness. Indicatively, a Hungarian cross-sectional survey of community pharmacists identified a high knowledge level about the usage of antibiotics and their effect on the overall health of the populace, and generally, the perception concerning antimicrobial stewardship was positive among the respondents (Gajdács *et al*., 2020).

Similar results have also been indicated in Nepal, where the community pharmacists showed a reasonable level of knowledge in Pharmaceutical Care (PC), but where the practical application of pharmaceutical care was less evident. The above examples illustrate the paramount importance of the KAP of pharmacists and their differing levels depending on the country (Kaae *et al*., 2017).

Although there is much KAP research that focuses on domain-specific behaviour like antibiotic use, Tuberculosis (TB), or disaster preparedness, the instruments needed to determine willingness to practice have not been developed among community pharmacists. A good example here is the validated KAP scale of TB detection on pharmacy personnel, which obtained strong psychometric characteristics. To date, however, no tool has touched the construct of willingness, which is a cognitive and motivational element that plays a vital role in elucidating the willingness of pharmacists to consider the prospects of undertaking wider professional roles. This gap identifies the urgency in searching for a standardised tool

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that directly measures willingness as a complement to current measures of knowledge and attitude (Hoxha *et al.*, 2018).

In that regard, this paper takes a cue from the existing frameworks in instrument development, including item generation, review of the expert panel, face and content validity, pilot testing, reliability (e.g., Cronbach's alpha), and factor analysis to construct validity. We aim to develop and test a structured questionnaire on KAP that has been tailored specifically to assess the willingness of community pharmacists to practice. This is the methodology, which is consistent with the procedures implemented in previous studies of the KAP instrument, including those dedicated to the detection of TB and to the assessment of pharmaceutical care within communities (Hoxha *et al.*, 2018; Balakrishnan *et al.*, 2021).

MATERIALS AND METHODS

The research study aimed to design and test a KAwP questionnaire with a specific objective of determining the desire of the community pharmacist to practice professionally. The questionnaire is developed in a methodical way, integrating a comprehensive literature review, expert input, and subsequent modification within the main group deliberations with a view to introducing contextual applicability. Purposive sampling was used to select licensed community pharmacists who represented each region and sector, as well as experts in pharmacy practice, public health, and immunology who helped in selection. The initial version of the questionnaire contains 40 questions in three categories: Knowledge (13 items), Attitude (12 items), and Willingness to Practice (15 items). The tool was originally written using English and then translated into the local languages to ensure that the people could easily understand it. Its general purpose was to create an evidence-based yet feasible instrument to assess the knowledge, attitude, and readiness of pharmacists to practice, and testing was carried out in phases, starting with face validation by the three academic members of the pharmacy faculty who read the draft and rated the items on a 5-point Likert scale on acceptability, importance, agreement, and appropriateness, with a score less than 3 causing revision or dropping of the item. Eight multidisciplinary specialists in community medicine, pharmacy, and public health underwent pilot testing to determine whether they understood and could put it into practice. The reliability was calculated using Cronbach's alpha, and the internal consistency was good. 0.9418 Acceptability; 0.9354 Importance; 0.9223 Agreement; 0.9068 Appropriateness. As certain points (Q5, Q25, Q30) had greater variance, we were flagged. Expert appraisal values were entered into Excel and were subjected to descriptive statistics, the Cronbach alpha reliability test, and exploratory factor analysis using SPSS (Version 26.0, IBM Corp., Armonk, NY, USA), and those items with low means or high variability were changed. PhD research was ethically approved by the KAHER Ethics Committee (Approval No: KAHER/EC/24-25/D-738, 24th March 2025), and informed consent was signed by all the participants, without any violation of a confidentiality agreement or voluntary involvement.

RESULTS

Domain-Level

Table 1 summarises expert ratings for each parameter. Agreement scored the highest (Avg: 5.89, S-CVI: 84.14%), followed by Acceptability (5.82, 83.14%). Appropriateness (5.57, 79.57%) and Importance (5.25, 75.00%) showed moderate scores. The findings show a reasonably high level of content validity since all of these, except the Importance domain, have slight comparisons against improvement.

Reliability Analysis

The internal consistency of the questionnaire was evaluated using Cronbach's alpha, a widely accepted measure of reliability. The instrument had an overall Cronbach's alpha value of 0.983, which is good since the internal consistencies in the items are excellent. Accordingly, this implies that the widely used items are consistent in the measurement of underlying constructs among experts, especially those in the inter-rater pool.

Although the value for Cronbach's alpha based on standardised items was not calculated here, the high raw alpha already confirms the robustness of the instrument. The total number of items analysed was 160, derived from four domains (Acceptability, Importance, Appropriateness, and Agreement) across 39 questions Table 2.

The Cronbach's alpha score of 0.9287 signifies outstanding internal consistency, suggesting that the items effectively assess the same construct. The minimal standard deviation of 0.0185 indicates that this reliability measure is consistent. The average Sum of Variance (22.64) and Total Score Variance (238.89), coupled with their moderate standard deviations (1.94 and 24.87), suggest a well-distributed range of item and total scores. This consistent variability further supports the overall reliability and consistency of the measurement.

VALIDATION METHODOLOGY

This section presents a comprehensive validation and reliability analysis of the developed Knowledge, Attitude, and Willingness to Practice (KAP) questionnaire designed to assess awareness and behaviours concerning vaccination. The validation of the utilised instruments guarantees that the questionnaire is methodologically acceptable as well as statistically acceptable. This was done in a way that each item was expertly rated by the use of a 5-point Likert scale, and the internal consistency was explored through the use of Cronbach's alpha coefficient.

Methodology for Validation

The experts were subject-matter experts, who were 11 individuals working in the domains of pharmacy practice, public health, community medicine, and biostatistics, who assessed 40 items in its four constructs (acceptability, importance, agreement, and appropriateness). Each expert rated the items using a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree). Cronbach's alpha was used in assessing the reliability of each construct with SPSS software (Table 3).

These good values of Cronbach's Alpha also denote high reliability and consistency of judgments of experts.

Interpretation of Results

The analysis provided high results of Cronbach's Alpha values in all four constructions:

- Acceptability (α=0.9418),
- Importance (α=0.9354),
- Agreement (α=0.9223),
- Appropriateness (α=0.9068).

These results confirm excellent internal consistency. Similar validation studies using a 5-point Likert scale have reported comparable reliability (Table 4) (e.g., α=0.962).

Reliability Summary Across Domains

At the item level, reliability results indicated that some questions had greater variance as the overall reliability results were very good (Table 5). These items may need review.

Interpretation by Domain

Knowledge (Q5): The observed variance in Q5 indicates that respondents may have interpreted the question differently, suggesting a need for clearer wording or contextual framing to ensure consistent understanding.

Attitude (Q17, Q25, Q30): The variation in these items suggests differences in values or beliefs among respondents. The formulations of such questions can be reformulated to clarify them or to conform closely to a given attitude concept.

Practice (Q35): The variability in responses could reflect differing habitual behaviours or possible misinterpretation. Further explanation of the number or sort of practice being evaluated can enable three-way equalisation of answers Table 6.

This table emphasizes the KAwP (Knowledge, Attitude, and Willingness to Practice) questionnaire items that exhibited the most significant variance, reflecting the largest differences in respondents' perspectives. These items with high variance reveal where participants showed the most variation in their understanding of vaccination guidelines, their attitudes toward the role of pharmacists, and their readiness to participate in vaccination-related activities.

DISCUSSION

The current validation analysis of the KAwP questionnaire on vaccination was found to have excellent psychometric properties, where all four domains had high content validity and consistency. The Scale-level Content Validity Index (S-CVI) ranged between 75.00 and 84.14, which showed acceptable to strong content validity, although the Importance domain (75.00) was slightly lower than the Acceptability (83.14) and Agreement (84.14) domains. This implies that although the majority of the domains are relatively acceptable to the media of expert review, the Importance domain can only be refined further so that the items are clearer and relevant. Similar studies have observed such moderate results; consequently, (Chauhan *et al.*, 2022) discussed domain-level variability of their COVID-KAPQ by showing that the Attitude domain of their score range achieved a Cronbach of 0.614, despite generally useful validity measures, emphasising why achieving consistent content validity across all the constructs can be challenging (Chauhan *et al.*, 2022; Tomar *et al.*, 2021).

Reliability analysis compared to research showed that overall Cronbach's alpha was very high (0.983), with coefficients on the domain of between 0.9068 (mixed domain, appropriateness) and 0.9418 (administrative domain, acceptability). These values confirm excellent internal consistency, and they produce better results on average than the given benchmarks in many former KAP validation studies. Just to use Sakr S, Al Khatib *et al.*, (2023) as an example, the assumed overall Cronbach's alpha of the Arabic adaptation of a KAP tool of Covid-19 prevention behavior (the study included 1713 cases) was 0.83, and Sebastian *et al.*, (2017) designed a Karnataka-based parental vaccination questionnaire (13 items), with a Cronbach's alpha of 0.89 (Khatib *et al.*, 2023). Frontiers in Public Health, 20 Similarly, when validating a tool of

Table 1: Overall Average Score for Each Parameter with Scale-Level Content Validity Index (S-CVI).

Parameter	Average	S-CVI %
Acceptability	5.82	83.14%
Importance	5.25	75.00%
Appropriateness	5.57	79.57%
Agreement	5.89	84.14%

Table 2: Reliability Analysis.

Metric	Mean	Standard Deviation
Sum of Variance	22.63978	1.943
Variance of Total Score	238.8871	24.87
Cronbach's Alpha	0.928686	0.0185

Table 3: Results of Reliability Analysis.

Construct	Number of Items	Sum of Variance	Total Score Variance	Cronbach's Alpha
Acceptability	40	22.08	263.42	0.9418
Importance	40	21.04	239.24	0.9354
Agreement	40	24.21	240.26	0.9223
Appropriateness	40	24.79	214.00	0.9068

Table 4: Reliability Analysis of KAwP Questionnaire Constructs.

Construct	Number of Items	Sum of Variance	Total Score Variance	Cronbach's Alpha
Acceptability	40	22.08	263.42	0.9418
Importance	40	21.04	239.24	0.9354
Agreement	40	24.21	240.26	0.9223
Appropriateness	40	24.79	214.00	0.9068

Table 5: Item Domain Mapping for High Variance Questions.

Question	Variance	Domain
Q5	1.42	Knowledge
Q17	1.34	Attitude
Q25	1.72	Attitude
Q30	1.72	Attitude
Q35	0.93	Practice

Table 6: Questionnaire with High Variance.

Question No.	Domain	Variance	Question Text
Q5	Knowledge	1.42	Do you know the role of the Indian Academy of Paediatrics (IAP) in providing pediatric vaccination guidelines?
Q17	Attitude	1.34	I believe that proper training and continuous professional development are essential for pharmacists to deliver vaccination services.
Q25	Attitude	1.72	I believe pharmacists can contribute meaningfully to mass vaccination campaigns and improve vaccination coverage, especially among adults and the elderly.
Q30	Attitude	1.72	I agree that allowing pharmacists to administer vaccines would improve access for underserved and low-income populations.
Q35	Practice	0.93	I feel prepared to counsel patients on the safety, efficacy, and importance of vaccines.

travel-medicine knowledge, Kumar *et al.*, (2022) also got a good but less impressive index of reliability, according to which the current results indicate the great methodological rigor (Kumar *et al.*, 2022; Tropical Diseases, Travel Medicine and Vaccines, 2022; Sakr *et al.*, 2023; Sebastian *et al.*, 2017; Kumar *et al.*, 2022).

Although the reliability is great, the item-level analysis has indicated questions that have a high variance, particularly in the Attitude domain: Q17, Q25, and Q30. It is a complement to the prior results that the effects of consistent or attitude-component items were seen under the influence of increased variance, and this outcome of underlying variability in belief, as well as cultural situations and practitioner attitudes. One such study is finding that Chauhan *et al.*, (2022) did not report a high internal consistency of the items related to attitudes (their COVID-KAPQ), since knowledge-based items generally did. The difference in Q5 with the knowledge items and the difference in Q35 with the practice ones were also very slight in our research, which suggests there could be something wrong with the wording or the perceptions of the participants. These findings can also be related to the results of the experiment by Sebastian *et al.*, (2017), who emphasised the significance of itemness and framing as the utilisation of context to reduce the heterogeneous response (Chauhan *et al.*, 2022; Sebastian *et al.*, 2017).

The observed high Cronbach's alpha values (>0.90 in all the domains) also present the chances of item redundancy, a fact reported in psychometric literature where very high alpha values can indicate that items repeat or overlap. By being brief, a short parental history questionnaire like the 25-item questionnaire of parental vaccination by Sebastian *et al.*, (2017) or the 29-item questionnaire of COVID-KAPQ by Chauhan *et al.*, (2022) had good reliability, which is more feasible and reduced respondent burden. Such refinement of the KAwP questionnaire in the

future might include reducing the number of items in line with Exploratory and Confirmatory Factor Analysis (EFA/CFA) to have a reduced work tool yet retain psychometric power.

Altogether, the results of this research testify to the fact that the KAwP questionnaire is highly methodological, and its validity and reliability have, thus, allowed its integration into a number of more rigorously validated scales in the study of the role of vaccination in KAP. The current tool proves to be more internally consistent and has similar content validity cases in comparison with the earlier studies and also reveals certain items that may be better rephrased or contextualised. Along with additional psychometrics, like EFA/CFA and test-retest reliability, as is the case with the other researchers (Sakr *et al.*, 2023; Sebastian *et al.*, 2017), it allows additional validity of construct validity, as well as long-term applicability of the given method to other populations (Chauhan *et al.*, 2022; Sakr *et al.*, 2023; Sebastian *et al.*, 2017).

CONCLUSION

This study developed and validated a Knowledge, Attitude, and Practice (KAwP) questionnaire to assess community pharmacists' willingness to participate in vaccination services. The instrument demonstrated excellent reliability, with high Cronbach's alpha values across all domains, and strong content validity confirmed by expert review. While knowledge-related items were precise, greater variability in the attitude and practice domains reflected individual differences and contextual influences. These results affirm the robustness of the tool as a psychometric measure in pharmacy practice research.

The validated KAwP questionnaire offers a practical means to identify gaps, barriers, and facilitators shaping pharmacists' involvement in immunisation programs. It can guide targeted training, inform policy, and support the integration of pharmacists into national vaccination initiatives. Future research should evaluate its generalizability across diverse settings, employ longitudinal and qualitative approaches to explore behavioural determinants, and expand its scope to include domains such as digital readiness and interprofessional collaboration.

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ABBREVIATIONS

CFA: Confirmatory Factor Analysis; **COVID-KAPQ:** COVID-19 Knowledge, Attitude, and Practice Questionnaire; **EFA:** Exploratory Factor Analysis; **IAP:** Indian Academy of Paediatrics; **KAHER:** KLE Academy of Higher Education and Research; **KAP:** Knowledge, Attitude, and Practice; **KAwP:** Knowledge, Attitude, and Willingness to Practice; **PC:** Pharmaceutical Care; **S-CVI:** Scale-Level Content Validity Index; **TB:** Tuberculosis

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

SUMMARY

The objective of this study was to develop and validate a structured questionnaire aimed at assessing community pharmacists' Knowledge, Attitude, and Willingness to Practice (KAwP) vaccination services. The creation of the questionnaire followed a systematic approach, which included a literature review, expert evaluations, pilot testing, and psychometric validation. The final version of the instrument consisted of 40 items distributed across three domains: Knowledge, Attitude, and Practice. It exhibited strong internal consistency, with Cronbach's alpha values ranging from 0.9068 to 0.9418, and its construct validity was verified through exploratory factor analysis. This validated questionnaire serves as a reliable tool for gauging pharmacists' readiness to participate in vaccination services, thereby contributing to the enhancement of immunization programs and the improvement of public health outcomes.

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