

RESEARCH ARTICLE

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Knowledge, Attitude, and Clinical Practice of HPV Vaccination and Cervical Cancer Screening: A National Survey of OB-GYN Practitioners in Thailand

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Abstract

Objective: To evaluate knowledge, attitudes, and practices regarding human papillomavirus (HPV) vaccination and cervical cancer screening among obstetricians and gynecologists (OB-GYNs), residents, and gynecologic oncology fellows in Thailand. **Methods:** A nationwide cross-sectional survey (September 2024-June 2025) was conducted using a content-validated questionnaire. Domains (numbers of items) included knowledge about HPV (7), HPV vaccination (13), and screening (10), attitudes (14), and practices (6). Composite 'good' knowledge thresholds were pre-specified (HPV 5-7/7; screening 7-10/10; vaccination 10-13/13; total 22-30/30). Associations with good total knowledge were examined. **Results:** Of 227 respondents, 74.5% were female, and 83.7% worked in government hospitals. Overall, good knowledge was observed in 55.5%. A wide range of good knowledge was found in each domain: HPV (71.0%), vaccination (41.8%), and screening (87.7%). Frequent misconceptions (incorrect answers) were about the benefits of HPV vaccination in HPV infection clearance (52.8%) and the necessity for HPV testing in men with infected partners (35.7%). The majority agreed or strongly agreed that self-collected and healthcare-collected HPV tests were equally effective (66.5%). In multivariable analysis, years of practice was the only independent factor associated with overall good knowledge (adjusted odds ratio 1.08, 95% CI 1.02–1.14; $p = 0.010$). **Conclusion:** Thai OB-GYN practitioners showed good overall knowledge, especially those with more experience, and positive attitudes toward cervical screening. However, a knowledge gap in HPV vaccination was observed, highlighting the need for continuing education on vaccination.

Keywords: Human Papillomavirus Vaccines, Uterine Cervical Cancer, Knowledge, Thailand, Gynecologist

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Introduction

Cervical cancer remains a major public health concern in Thailand. It is the fourth most common cancer among Thai women, with an age-standardized incidence of 10.3 per 100,000 women [1]. High-risk human papillomavirus (HR-HPV), the primary cause of cervical cancer, is identified in nearly all invasive disease [2-4]. Persistent infection with HR-HPV is the precursor for cervical carcinogenesis, underscoring the role of primary

prevention through HPV vaccination and secondary prevention with effective screening.

Thailand's national covered benefits have included school-based HPV vaccination for grade-5 schoolgirls using a two-dose schedule since 2017 and a 5-yearly cervical cancer screening for women aged 30-60 years since 2005. The current national screening method has also been shifted from cytology-based methods, either conventional Pap smear or liquid-based cytology, to primary HPV testing since 2020. Non-school girls and

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women are also educated and encouraged to receive HPV vaccinations and screenings at appropriate intervals, following the recommendations of societal, educational, and professional organizations based on the best and most up-to-date evidence.

Medical practitioners, including pediatricians, family physicians or general practitioners, and OB-GYNs have an essential role in the achievement of vaccination and screening programs through determination and continued efforts in counseling, education, and clinical practice. The emerging evidence-based information and dynamic national policy may influence the clinicians' knowledge, attitudes, and routine practices, especially OB-GYNs who work across diverse clinical settings.

Previous studies in Thailand have examined knowledge and attitudes towards HPV, HPV vaccination, and cervical screening across diverse groups of general healthcare personnel, students, parents, teachers, and the public [5-13]. With an assumption that OB-GYNs should have a higher level of knowledge, better attitudes, and ideal clinical practice, we conducted a national survey focusing on OB-GYN practitioners as well as residents and gynecologic oncology fellows in Thailand to evaluate their knowledge, attitudes, and practices concerning HPV vaccination and cervical cancer screening. Our objectives were to identify existing strengths and weaknesses including misconceptions and practical barriers, and to optimize cervical cancer prevention strategies in Thailand, aligning with WHO elimination targets.

Materials and Methods

Study design

This nationwide cross-sectional survey study was commenced at the 2024 annual meeting of the Thai Gynecologic Cancer Society (TGCS) by online distribution via email to the TGCS membership list between September 2024 and June 2025. Eligible participants included Thai OB-GYNs who were actively practicing, OB-GYN residents, and gynecologic oncology fellows undergoing training in Thailand. Eligible individuals were informed about the study. The participants granted electronic or written informed consent before the survey. Individuals unable to provide informed consent or with incomplete questionnaires were excluded.

Surveys were completed via a secure web-based form or paper questionnaires administered at conferences. A structured questionnaire was developed based on Thailand and WHO guidelines. The content was assessed for validity by 3 external experts in each knowledge domain. The pilot test showed strong internal consistency (Cronbach's alpha >0.90 for the knowledge scale). The questionnaire assessed knowledge of HPV (7 items), HPV vaccination (13 items), cervical cancer screening (10 items), attitudes toward screening and vaccination, and self-reported clinical practice. Medical scenarios for counseling and practice for vaccination included appropriate age, interrupted series, immunocompromised state, and cervical intraepithelial neoplasia post-excision. Correct responses were summed to produce domain scores; higher scores indicated greater knowledge of that

domain. A total knowledge score was computed as the sum of all knowledge items. The composite "good" knowledge thresholds (HPV 5-7/7; screening 7-10/10; vaccine 10-13/13; total 22-30/30) were arbitrarily determined. Approximately >70% correct was considered 'good' knowledge, consistent with expert consensus and prior knowledge, attitudes, and practices studies.

The main outcomes included scores in domain-specific knowledge (HPV, screening, vaccination) as well as the overall knowledge score. Secondary outcomes included attitudes regarding screening and vaccination, as well as self-reported counseling and practice patterns.

Bias and data quality

Potential selection bias due to voluntary involvement in meetings and online platforms was recognized. Measurement bias was mitigated through the utilization of a structured, content-validated instrument and predetermined score criteria. Social and individuals' attitudes may have affected self-reported behaviors.

Statistical analysis

Participant characteristics and outcomes were summarized using descriptive statistics. Statistical analyses were performed using Stata version 14. Continuous variables were summarized as mean $\pm$ SD. We employed univariable and multivariable logistic regression models to analyze clinically relevant factors associated with high total knowledge. All prespecified covariates (age, gender, hospital type, work hours, practice status, work description, years of practice, and history of self-HPV vaccination) were entered into the multivariable model regardless of univariable p-values because they were considered clinically relevant potential confounders. The analyses report odds ratios (ORs) or adjusted odds ratios (aORs) and 95% confidence intervals (95% CIs) with p-values. A p-value < 0.05 was considered statistically significant.

Ethics statement

All data were anonymized in accordance with the Personal Data Protection Act B.E. 2562 (2019). The protocol received approval from the Ethics Committee of the National Cancer Institute of Thailand (Institutional Review Board No. EC 67024).

Results

A total of 450 participants were invited to join this survey. We analyzed 227 completed questionnaires. Most respondents were aged 31–40 years (57.3%) and were female (74.5%). Most worked in government hospitals (83.7%), were trainees (23.4%), and the majority already had HPV vaccination (79.3%). Slightly more than one-third had more than 40 weekly work hours (38.8%). Basic characteristics of the respondents are shown in Table 1.

The respondents had a high level of knowledge about screening and HPV infection, but their understanding of HPV vaccination-specific content was lower (Table 2). The mean screening knowledge score was $8.1 \pm 1.4/10$,

Table 1. Participant Characteristics (N=227)

Characteristics	N	Percent
Age (years)		
26-30	21	9.2
31-40	130	57.3
41-50	47	20.7
51-60	15	6.6
61-80	14	6.2
Gender		
Female	169	74.5
Male	58	25.5
Religion		
Buddhism	216	95.1
Christianity	7	3.1
Islam or others	4	1.8
Main workplace		
Government	190	83.7
Non-government	37	16.3
Weekly work hours		
≤ 40 hours	139	61.2
> 40 hours	88	38.8
Practice		
Practitioner	174	76.7
In training	53	23.4
Current work description		
General OB/GYN	36	15.9
Subspecialty	191	84.1
Gynecologic Oncology	166	
Laparoscopic gynecology + Gynecologic Oncology	24	
Other	1	
Years of service in OB-GYN (years)		
< 6	95	41.9
6-10	59	26
11-15	25	11
16-20	19	8.4
21-25	10	4.4
> 25	19	8.3
History of self-HPV vaccination		
No	47	20.7
Yes	180	79.3
Bivalent	13	
Quadrivalent	102	
Nonavalent	40	
Multiple	25	

with 87.7% meeting the “good” threshold. HPV infection knowledge averaged $5.1 \pm 1.1/7$, with 71.0% interpreted as “good.” By contrast, the mean vaccination knowledge was $9.1 \pm 2.0/13$, and only 41.8% met the “good” criterion. The composite total knowledge was $20.4 \pm 3.0/30$, with 55.5% classified as “good”.

Table 2. Knowledge Scores and Levels (N=227)

Knowledge	N	Percent
Knowledge about HPV		
Knowledge score, Mean $\pm$ SD		5.1 ± 1.1
Knowledge level		
Good (5 - 7 score)	161	71
Not good (0 - 4 score)	66	29
Knowledge about screening		
Knowledge score, Mean $\pm$ SD		8.1 ± 1.4
Knowledge level		
Good (7 - 10 score)	199	87.7
Not good (0 - 6 score)	28	12.3
Knowledge about HPV vaccination		
Knowledge score, Mean $\pm$ SD		9.1 ± 2.0
Knowledge level		
Good (10 - 13 score)	95	41.8
Not good (0 - 9 score)	132	58.2
Knowledge total score		
Knowledge score, Mean $\pm$ SD		20.4 ± 3.0
Knowledge level		
Good (22 - 30 score)	126	55.5
Not good (0 - 21 score)	101	44.5

For each item assessment (Tables S1-S3), two common misconceptions of respondents were identified: HPV vaccination could accelerate clearance of an existing HPV infection (only 52.8% having a positive response) and men with HPV-infected partners should be tested for HPV (up to 35.7% agreement). Focusing on the screening program, respondents demonstrated a robust conceptual understanding of screening modernization, evidenced by a high recognition of primary HPV testing as the preferred method, as well as an appreciation for risk-stratification principles, including the significance of genotyping for current and future risk assessment.

Focusing on the HPV vaccination program, the respondents showed good knowledge in several specific vaccination topics. Almost all respondents indicated a 2-dose schedule for individuals vaccinated between the ages of 9 and 14 years (97.8%) and a 3-dose schedule for those between 15 and 45 years or for immunocompromised individuals (96.5%). For a special scenario, the majority acknowledged that if the first dose was administered on or after the 15th birthday with a delayed second dose, a 3-dose series was required (89.9%). Regarding the schedule interval, the minimum intervals between each vaccine administration were fairly recognized (78.9% and 59.0% for 2- and 3-dose regimens, respectively). Likewise, more than half misunderstood that the entire series was required after a >1-year interruption (56.8%). A high degree of awareness was found among the respondents about the benefits of HPV vaccination: lower CIN2+ recurrence by adjuvant HPV vaccination after excisional treatment (93.0%), persistent effect of protection against viral infection among women over age 45 (85.5%), and lower benefit compared to younger women (87.2%). Areas of

Table 3. Factors Associated with Good Total Knowledge

	Univariable analysis			Multivariable analysis		
	Odds ratio	95% confidence interval	P-value	Adjusted odds ratio	95% confidence interval	P-value
Age						
≤ 40 years	1					
>40 years	1.54	0.86-2.73	0.146	0.55	0.20-1.51	0.245
Gender						
Female	1					
Male	1.21	0.65-2.30	0.554	1.07	0.52-2.22	0.859
Hospital						
Government	1					
Non-government	0.97	0.46 – 2.05	0.932	0.56	0.23-1.35	0.197
Work hours						
≤ 40 hours	1					
> 40 hours	1.08	0.61-1.90	0.789	1.28	0.72-2.39	0.419
Practice						
Practitioner	1					
In training	0.59	0.29-1.18	0.125	0.75	0.34-1.67	0.488
Current work description						
General OB-GYN	1					
Subspecialty	0.64	0.32-1.33	0.237	0.51	0.24-1.13	0.1
Each year of OB-GYN practice	1.04	1.00-1.07	0.009	1.08	1.02-1.14	0.01
History of self-HPV vaccination						
No	1					
Yes	0.75	0.38-1.45	0.393	1.19	0.52-2.74	0.685

Abbreviations: OR, Odds ratio; aOR, adjusted Odds ratio

misunderstanding or uncertainty remained in other issues: immediate hypersensitivity to yeast as a contraindication to the nonavalent vaccine (50.7% marked true; 18.0% not sure) and deferring doses discovered during pregnancy “until breastfeeding stops” (56.4% marked true; 39.2% marked false; 4.4% not sure).

Tables S4 and S5 show that attitudes toward HPV prevention and programmatic updates were broadly supportive. The majority (85.4%) reported their proactive recommendation of HPV vaccination in routine practice and supported gender-neutral vaccination (84.5%). Approximately two-thirds (66.5%) agreed or strongly agreed that self-collected HPV testing was as effective as clinician-collected sampling. Additionally, 52.8% preferred full genotyping over partial typing.

Routine practice patterns largely tracked positive attitudes (Table S6), with most respondents reporting active counseling and recommendation of HPV vaccination to eligible patients. Consistent with contemporary guidance, about half reported they routinely forgo pre-vaccination cervical screening (49.8% “never”), reflecting that screening is not a prerequisite for vaccination.

By univariable analysis, no factors were associated with good knowledge about HPV or HPV vaccination of the respondents except years of practice in OB-GYN (Table 3). Each additional year was associated with a 4% increase in the odds of good total knowledge (OR 1.04; 95% CI 1.00-1.07). In the multivariable model that

included all prespecified clinically relevant covariates, years of practice remained the only independent factor associated with good knowledge (aOR 1.08, 95% CI 1.02-1.14; $p = 0.010$).

Discussion

Respondents to this nationwide survey among OB-GYNs, residents, and gynecologic oncology fellows in Thailand generally expressed a positive awareness of HPV as the causative agent of cervical carcinogenesis and supported HPV vaccination, cervical cancer screening and management of the patients with abnormal screening tests as the three pillars of prevention. Although the knowledge about screening was high, specific gaps remained. Current recommendations from many organizations support secondary prophylaxis after excisional treatment for CIN; however, only slightly more than half of the respondents accepted this concept. On the contrary, approximately one-third agreed with the statement that a male partner with an HPV-infected partner should have a screening test, which was against the current recommendation and would lead to anxiety and unnecessary costs. Attitudes toward vaccination were generally positive, which is a favorable sign of collaboration with the global and national target to eliminate cervical cancer. Self-reported practice patterns suggested that counseling is common but not yet uniform across settings and training levels.

Previous studies in Thailand reported knowledge and attitudes about HPV and HPV vaccination among health personnel. A hospital-based study in Bangkok revealed that health providers had a moderate level of knowledge and acceptance concerning HPV vaccination; however, a limited percentage accurately responded to detailed inquiries about the vaccine's efficacy and screening eligibility [6]. A comparable survey conducted in a tertiary hospital in Thailand among female healthcare professionals indicated a strong understanding of cervical cancer screening via the Pap test, but revealed markedly lower awareness of HPV and vaccination. A substantial proportion had never undergone a Pap test, highlighting a disconnect between knowledge and preventive behavior [7]. Two other studies in different parts of Thailand assessed the knowledge and attitude of hospital-registered nurses [5, 14]. The participants exhibited a moderate [5] or high level [14] of overall knowledge and willingness for vaccination [5, 14]. However, they encountered misconceptions about the natural history of HPV or the benefits and drawbacks of the vaccine. Nevertheless, most were aware that screening remains essential following vaccination [14].

Even among health professionals, the level of education, specific areas of expertise, and the timing of the study can affect survey results. Physicians who work in cervical cancer prevention and treatment would be expected to have deeper knowledge than general healthcare providers. However, a recent survey of senior medical students in Thailand still showed notable gaps in knowledge regarding screening recommendations and vaccination schedules, with fewer than half answering several essential questions correctly. This finding supports the need for curriculum-level reinforcement, especially regarding the increased sensitivity of HPV testing compared with cytology and the updated screening intervals [8]. In addition, emerging evidence and policy changes must be reflected in continuing professional education. Internationally, adult catch-up vaccination is framed as shared clinical decision-making for ages 27-45 years, yet clinicians often misunderstand the scope and effect of vaccination, particularly its non-therapeutic role, and may benefit from decision aids [15]. These lessons are directly applicable to Thai practice when counseling older adults who have not previously been vaccinated.

We explored clinical features of the respondents who may have good knowledge. We found that respondents older than 40 years, male, and with more years of practice in OB-GYN had better knowledge compared with their counterparts. However, only years of practice had a significant association with good knowledge. This factor remained independently associated with good overall knowledge in multivariable analysis. Each additional year of practice increased the odds of good knowledge by approximately 8%. Our data suggest that professional experience, rather than demographic or workplace characteristics, is the primary determinant of knowledge level [16]. Our results underscore the role of cumulative clinical experience in knowledge acquisition and retention, consistent with previous studies [16, 17]. These findings highlight the need for targeted educational

support and continuing medical education for early-career clinicians to supplement limited clinical experience and promote consistent knowledge across different practice settings [17, 18].

The strength of this study was that it was a national survey that recruited physicians from across Thailand, particularly OB-GYNs, who are directly involved with cervical cancer prevention through screening and vaccination. Secondly, the questionnaire content was developed to capture knowledge, attitudes, and routine practice and validated by the national expert review.

Nevertheless, we were aware of some limitations. Variability in responses may have resulted from potential selection bias due to voluntary recruitment, reliance on self-reporting, the cross-sectional design that prevents causal inference, and transitions in national screening and vaccination protocols. Of note, the December 2022 WHO position paper allows a 1- or 2-dose schedule for those aged 9-20 and 2 doses for women older than 21 years, while immunocompromised individuals should receive at least 2 doses and, where possible, 3 doses [19]. In contrast, the most recent Thai national guideline (August 2024) recommends a 2-dose schedule primarily for younger adolescents, with a lower age cutoff [20]. As the HPV vaccine knowledge questionnaire in this study was developed based on the Thai guideline, respondents who selected the WHO-recommended alternative schedule may have been classified as incorrect. Therefore, our scoring system may have underestimated participants' knowledge for certain vaccination-related items.

The findings provide a practical direction for improvement. Training for OB-GYNs, residents, and related healthcare providers should emphasize a small number of high-yield topics: current age-specific HPV vaccine schedules, the principle that interrupted series do not need restarting, vaccination in immunocompromised individuals, the role of adjuvant vaccination after excisional treatment, and the clear message that HPV vaccination does not treat existing infection. Supportive knowledge tools such as brief guideline summaries, clinic decision aids, and standardized counseling messages could help translate these updates into daily practice. Future research should evaluate whether these interventions improve clinician knowledge, counseling consistency, and management after abnormal screening results, because comprehensive prevention requires vaccination, screening, and timely management of abnormal findings [19-21].

In conclusion, Thai OB-GYN practitioners and trainees exhibit strong knowledge and positive attitudes regarding contemporary cervical screening, especially primary HPV testing and self-collection. However, there are still specific knowledge gaps regarding HPV vaccination, such as misconceptions regarding therapeutic effects and testing of male partners. To fill these gaps, system-wide continuing education should focus on dosing and interval rules without series restarts, indications for different ages and immunocompromised people, adjuvant vaccination after excisional treatment, and clear messaging that routine HPV testing in men is not recommended. In parallel, training should reinforce the full cervical

cancer prevention pathway, including management after abnormal screening results. After adjustment for potential confounders, longer years in practice were significantly associated with good total knowledge. By strengthening vaccination-focused competencies while consolidating favorable screening attitudes and management readiness, Thailand can further accelerate progress toward cervical cancer elimination and optimize the impact of national policies.

Author Contribution Statement

Supakorn Pitakkarnkul, M.D.: (Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Supervision; Validation; Visualization; Writing – original draft; Writing – review & editing). Uraivan Khomphaiboonkij: (Data curation; Formal analysis; Methodology; Software). Siriwan Tangjitgamol: (Conceptualization; Methodology; Writing – review & editing). Jatupol Srisomboon: (Conceptualization; Investigation; Methodology; Writing – review & editing).

Kittipat Charoenkwan: (Conceptualization; Investigation; Methodology; Validation; Writing – review & editing). Chuenkamol Charakorn: (Conceptualization; Investigation; Methodology; Validation; Writing – review & editing). Marut Yanaranop: (Conceptualization; Investigation; Methodology; Validation; Writing – review & editing). Saranya Chanpanitkitchot: (Resources; Writing – review & editing). Natacha Phoolcharoen: (Resources; Writing – review & editing).

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Approval

The protocol was approved by the Ethics Committee of the National Cancer Institute of Thailand.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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