RESEARCH ARTICLE

Editorial Process: Submission:08/07/2025 Acceptance:02/03/2026 Published:02/06/2026

Exploring Knowledge, Attitudes, Practices, and Information-Seeking on HPV Infection and Cervical Cancer Prevention in Rural Indonesia

Hariyono Winarto[1]*, Glenardi Glenardi[2,3]*, Muhammad Habiburrahman[2,4], Fitriyadi Kusuma[1], Laila Nuranna[1], Gatot Purwoto[1], Tofan Widya Utami[1], Tricia Dewi Anggraeni[1], Kartiwa Hadi Nuryanto[1]

Abstract

Background: Cervical cancer remains a leading public health problem in Indonesia, with low screening and HPV vaccination coverage, particularly in rural areas where knowledge gaps and limited healthcare access persist. This study aims to assess the knowledge, attitudes, and practices (KAP) regarding HPV infection and cervical cancer, and the role of information-seeking behavior in identifying effective channels for raising awareness on these issues. **Methods:** A cross-sectional study was conducted between 20 March 2023 and 20 January 2024, involving 220 women from two rural districts in North Moluccas, selected via convenience sampling. Data were collected using a validated questionnaire administered through face-to-face interviews. Data were analyzed using SPSS version 25.0 with descriptive statistics, normality testing (Kolmogorov-Smirnov), bivariate analyses (Chi-square, Fisher's Exact, Pearson's or Spearman's tests), and multivariate logistic regression (backward LR, $p < 0.05$), with model performance assessed using ROC curves and AUC values. **Results:** Most participants demonstrated poor KAP, with 18.7% showing good knowledge, 22.7% expressing a positive attitude, and 44.5% engaging in favorable practices. KAP were found to be positively correlated ($p<0.001$). Key predictors of good knowledge included higher education (AOR = 7.07), family history of cancer (AOR = 15.20), private vehicle use (AOR = 4.15), and active health-information seeking behavior (HISB) (AOR = 3.41). Determinants for a positive attitude included higher education (AOR = 3.79), family history of cancer (AOR = 4.42), active HISB (AOR = 3.88), and good knowledge (OR = 10.29). Favorable practices were influenced by private vehicle use (AOR = 2.66) and positive attitude (AOR = 20.62). **Conclusion:** In conclusion, KAP are influenced by HISB, and involving healthcare workers in providing information, particularly through digital platforms, has the potential to improve KAP in rural communities.

Keywords: Knowledge- Attitudes- Practice- Information Seeking Behaviors- HPV infection- Cervical cancer

Asian Pac J Cancer Prev, **27 (2)**, 693-704

Introduction

Despite cervical cancer being nearly fully preventable, Indonesia ranked 3rd globally in incidence and mortality rates in 2022 [1]. One determinant of high mortality rate in Indonesia is the delay in starting treatment due to advanced stage diagnosis [2, 3]. Despite the establishment of a national cervical cancer prevention program by the Indonesian government in 2007, the cervical cancer screening (CCS) coverage rate was only 14.6% during the period from 2021 to 2023. According to WHO and UNICEF, Indonesia's national HPV vaccination coverage remained very low, increasing only from 3% in 2020 to 6% in 2022 [4]. This prompted the Indonesian government to launch a national campaign in 2023 to provide free HPV vaccination for children aged 9–14 [5]. The lack of knowledge of cervical cancer and its prevention contributes to the low screening uptake in Indonesia [6]. According to previous studies conducted in Indonesia, only half of the participants (50 to 53%) were identified as having adequate knowledge about cervical cancer [7, 8]. These findings are disappointing, as knowledge of cervical cancer symptoms, risk factors, and prevention has been proven to increase screening and vaccination rates [9].

*[1]Faculty of Medicine Universitas Indonesia, Division of Gynecologic Oncology, Department of Obstetric and Gynaecology, Dr. Cipto Mangunkusumo Hospital, Greater Jakarta, DKI Jakarta, Indonesia. [2]Faculty of Medicine Universitas Indonesia, Department of Obstetric and Gynaecology, Dr. Cipto Mangunkusumo Hospital, Greater Jakarta, DKI Jakarta, Indonesia. [3]Tobelo General Hospital, North Halmahera, North Moluccas, Jakarta 10430, Indonesia. [4]Faculty of Medicine, Imperial College London, London SW7 2AZ, UK. *For Correspondence: hariyono.winarto@ui.ac.id, Glenardihalim@gmail.com*

Apart from cervical cancer, other HPV-related cancers, including those in men have increased in recent years [10]. Therefore, it is also crucial for men to be aware of HPV and its risks, as this knowledge can help encourage their wives and daughters to participate in cervical cancer prevention programs [11].

Disparities in the incidence and mortality of cervical cancer are prevalent between rural and urban communities [8, 12, 13]. A study conducted in China revealed the incidence of cervical cancer in rural regions was three times greater than in urban areas [12]. Furthermore, the mortality rate in rural areas has increased significantly and has shown little change over the past few decades [12, 13]. The high prevalence, incidence, and mortality rates in rural areas are driven by numerous factors, with a lack of awareness and negative attitudes toward the disease being the most fundamental causes [12, 14]. In fact, a study in rural India shows that only 9% of participant had ever heard of cervical cancer [15], and nearly 96% women in rural Thailand were unaware that CCS should be done regularly [16]. Significant disparities in CCS uptake exist, with lower rates in rural areas, largely due to limited knowledge about cervical cancer, which hinders participation in prevention programs [17, 18]. Rural populations face unique challenges in accessing and utilizing health information, influenced by factors such as limited access to healthcare providers, lower health literacy, and economic constraints. Thus, disseminating information regarding cervical cancer among rural communities is important to overcome this problem [19]. However, information-seeking behavior may vary among different populations. Each population group may have its own preferences for information sources [20, 21]. In fact, studies have proven that health information source preferences significantly impact people's level of knowledge regarding HPV infection and cervical cancer [17, 22]. To our knowledge, no study has explored the relationship between information-seeking behavior and knowledge, attitudes, and practices (KAP) regarding HPV infection, cervical cancer, and its prevention among rural Indonesians. This study aims to assess KAP on these issues, identify factors influencing proper KAP, and examine information-seeking behaviors to determine effective dissemination channels.

Materials and Methods

Study design and study area

We conducted a cross-sectional study of women residing in two rural districts in North Moluccas between 20 March and 20 January 2024. This study obtained ethical approval from the Universitas Indonesia research ethics committee (KET-756/UN2.F1/ETIK/PPM.00.02/2023).

North Moluccas is a province, located 2,483 km from the nation's capital, with 72.9% of its population living in rural areas, making it one of Indonesia's most rural provinces. Health resources are limited, with a doctor density of only 0.373 per 1,000 people [23, 24]. The study was conducted in two rural districts, Tobelo and North Tobelo. North Moluccas was selected due to its low CCS coverage of just 2.2%, one of the lowest in the country [4], and its high rural population.

Eligbility criteria, sampling, and data collection

Participants were eligible if they were aged 15 to 60 years, regardless of gender, and had resided in Tobelo or North Tobelo for at least six months. They also needed to have basic proficiency in the Indonesian language and provide written informed consent to participate in the study.

The minimum sample size was calculated using the formula for wo-proportion group in observational studies [25]. We assumed a statistical power of 80% (Zβ=0.84) and 95% confidence interval (CI), a Zα=1.96. According to a similar study conducted in Indonesia, 59.9% of patients had good knowledge of cervical cancer (PA), while 41.1% had poor knowledge (PB) [26]. Based on calculations using the formula, the required sample size is 97. However, a total of 220 participants were recruited in this study. The flow of participant selection, including the number of individuals screened, those meeting eligibility criteria, and those excluded, is presented in Supplementary Figure 1. The details of the formula are described below:

$$n = \left(\frac{Z\alpha \sqrt{2\left(\frac{PA+PB}{2}\right)} \times \left(1 - \left(\frac{PA+PB}{2}\right)\right) + Z\beta \sqrt{PA\,(1-PA) + PB(1-PB)}}{PA - PB} \right)^2$$

Participants were recruited using a true consecutive sampling approach at all participating facilities (one public hospital and two primary healthcare centers) during the study period (20 March and 20 January 2024). All patients presenting to each site were screened for eligibility; every eligible individual was invited to participate and those consenting were enrolled in the order they presented. A screening log was maintained at each site and recorded the total number screened, numbers eligible, numbers enrolled, and reasons for non-enrollment (ineligible, declined, or other). To avoid time-of-day and day-of-week bias, recruitment shifts were rotated across morning, afternoon, and one weekend session across the study period. Interviewer was trained on a standardized screening checklist and consenting script to ensure uniform application of inclusion/exclusion criteria. We also collected minimal data (age, sex) on individuals who declined participation when possible, and we compared the demographic characteristics of the enrolled sample with available district-level population/facility caseload data to assess representativeness. The sample size was increased beyond the minimum required (n=97) to n=220 to improve precision and allow subgroup analyses; this oversampling also reduces the impact of differential non-participation on study estimates. Data were collected via interviewer-administered questionnaires through face-to-face interviews, conducted in Bahasa Indonesia by a medical doctor. The interviews lasted approximately 20 to 25 minutes.

Study Instrument

The KAP questionnaire used in this study was a modified version of a validated tool from prior research in Indonesia [7, 27]. Content validity was assessed

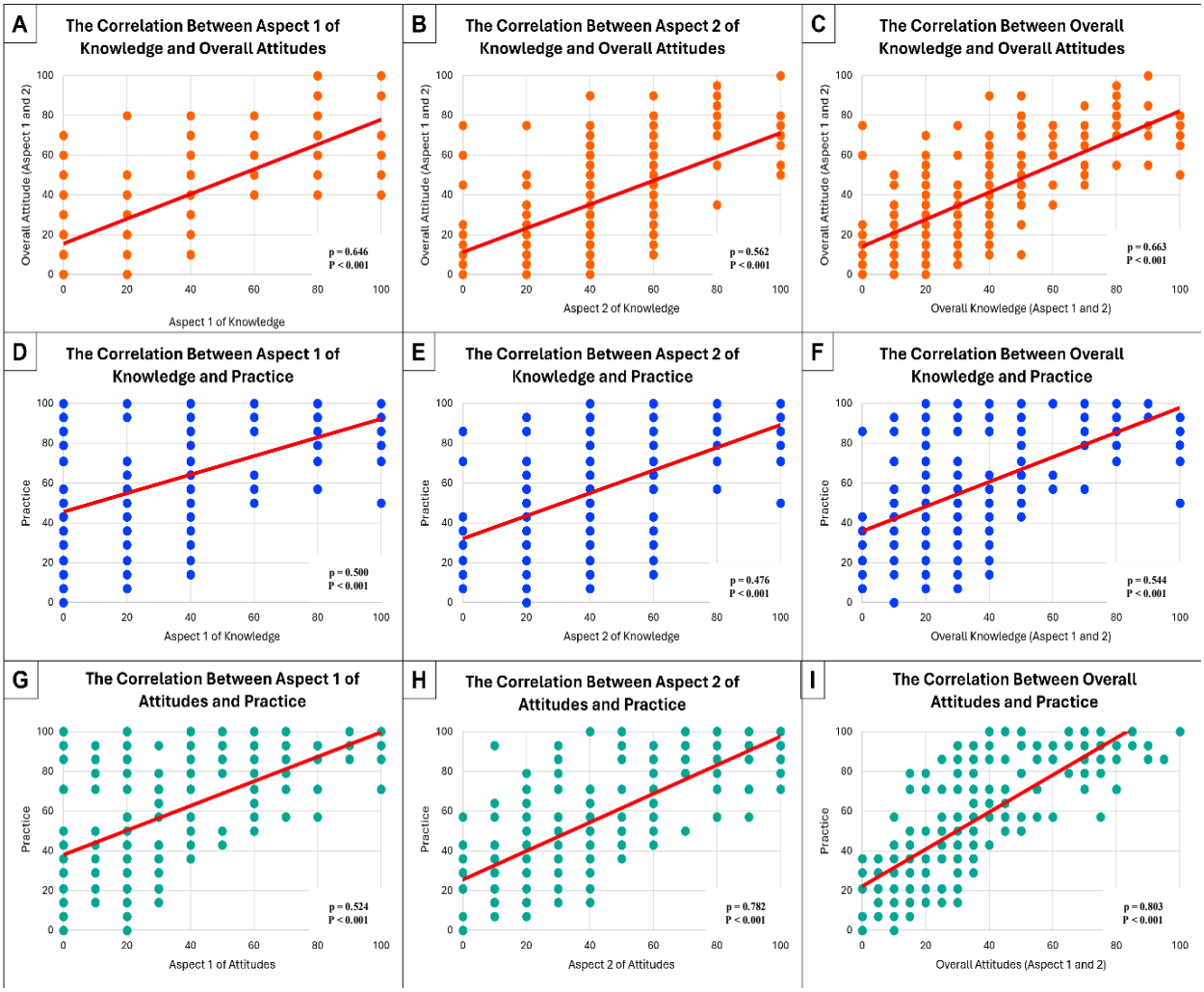

Figure 1. The Correlation between Knowledge, Attitude, and Practice Regarding HPV Infection, Cervical Cancer, and Its Prevention was Assessed. Aspect 1 focuses on HPV infection, cervical cancer, and their association, while aspect 2 addresses HPV infection and cervical cancer prevention. Statistical analysis was performed using Spearman's test due to the abnormal distribution of data, as indicated by the Kolmogorov-Smirnov test for knowledge, attitude, and practice scores. A Rho-value (ρ) of 0.40–0.69 is considered a moderate positive correlation (charts A, B, C, D, E, F, and G), while a value of 0.70–0.89 indicates a strong positive correlation (charts H and I).

by two experts in gynecologic oncology. Following approval, a pilot study with 30 participants evaluated the questionnaire's validity and reliability. Validity results showed r values for the knowledge section ranging from 0.387 to 0.814 ($p < 0.05$), the attitude section from 0.487 to 0.828 ($p < 0.05$), and the practice section from 0.407 to 0.821 ($p < 0.05$), confirming the questionnaire's validity. The item-level content validity index (I-CVI) was determined by dividing the number of experts who rated an item as 3 (quite relevant/clear) or 4 (very relevant/clear) by the total number of experts. An I-CVI value of ≥ 0.70 [33] is generally considered acceptable, indicating that the item appropriately represents the construct being measured. The CVI results are presented in Supplementary Table 1. Reliability testing revealed Cronbach's alpha values of 0.626 for knowledge on HPV and cervical cancer (Domain 1), 0.662 for knowledge on their prevention (Domain 2), 0.790 for overall knowledge, 0.683 for the attitude section, and 0.756 for the practice section, indicating the questionnaire's reliability.

The questionnaire comprised five segments: (1) sociodemographics, (2) information-seeking behavior, (3) knowledge, (4) attitude, and (5) practices related to HPV and cervical cancer. Additionally, we assessed whether participants had a daughter (yes/no), had a family history of cancer or gynecologic cancer (yes/no), were smokers (yes/no), owned a personal mobile phone (yes/no), and had internet access (yes/no).The information-seeking behavior section was adapted from previous studies [21, 28]. We classified health information-seeking behavior (HISB) into two categories: active and passive. Active HISB refers to the intentional pursuit of information to achieve a specific goal, whereas passive HISB occurs when information is acquired incidentally, without any prior intention to seek it. We classified information sources into two categories: indirect contact (media) and direct contact (interpersonal communication). Indirect sources included books, magazines, newspapers, brochures, television, radio, and the internet, while direct sources included health workers, friends, family, local community figures, religious leaders, and non-governmental organizations.

The knowledge and attitude sections consisted of two main domains, each with five questions. The first domain assessed regarding the HPV infection and cervical cancer,

while the second focused on their prevention. The practice section included seven questions on prevention, without subdomains. Scoring was as follows: in the knowledge section, correct answers received a score of 2, and incorrect answers scored 0. For the attitude and practice sections, responses were scored on a 4-point Likert scale, with disagreement scoring 0, moderate agreement scoring 1, and strong agreement scoring 2. Overall scores for each section were calculated by summing individual scores, dividing by the maximum possible score, and multiplying by 100%. A 60% threshold was used to categorize participants' KAP levels on HPV infection and cervical cancer [7].

Study analysis

Data were collected via an online Google Forms questionnaire, with responses recorded in real time by the interviewer. The data were analyzed using SPSS version 25.0. Categorical variables were reported as frequencies and percentages, while continuous variables were reported as means or medians. The normality of the data was assessed using the Kolmogorov-Smirnov test, and correlations between continuous variables were analyzed using Pearson's or Spearman's tests as appropriate. The Chi-square or Fisher's Exact test was used for categorical data analysis. Dependent variables with a p-value ≤0.25 in bivariate analysis were included in the multivariate regression model. Variables with zero cell counts were excluded from further multivariate analysis. The final model was selected using backward LR, with statistical significance set at $p < 0.05$ [29]. The final model's predictive performance was then evaluated using the receiver operating characteristic (ROC) curve and the area under the curve (AUC). An AUC value between 0.9 and 1.0 was regarded as excellent, 0.8 to 0.9 as very good, 0.7 to 0.8 as good, 0.6 to 0.7 as satisfactory, and 0.5 to 0.6 as unsatisfactory [30].

Results

The characteristics of the participants are summarized in Supplementary Table 2. Among the participants, 54.1% were female, with a median age of 34 years. The majority were married (71.4%) and had a low level of education (80.9%). Farming was the most common occupation (28.2%), and more than half had a monthly household income of less than 100 USD (57.7%). Most of the participants owned a personal mobile phone (78.6%) and had internet access (69.5%). Friends and colleagues (50%) were the most common sources of general information, while the internet and social media (34.1%) were the main sources for health information. Participants with active health-information seeking behavior (HISB) had significantly higher education levels ($p < 0.001$), greater monthly income ($p < 0.001$), private vehicle ownership ($p < 0.01$), and more frequent healthcare facility visits ($p < 0.05$) compared to those with passive HISB. They were also more likely to rely on indirect information sources, particularly the internet and social media ($p < 0.05$), while nonetheless showing greater trust in direct contact sources, especially healthcare workers ($p < 0.05$).

As shown in Tables S1, S2, and S3, the majority of participants (> 50%) demonstrated good knowledge in 3 out of 10 items, a positive attitude in 5 out of 10 items, and favorable practices across all 7 items. Furthermore, we also analyzed the response of each item of KAP questions based on the participants' HISB. Our analysis revealed statistically significant differences ($p < 0.05$) in the responses between participants with active versus passive HISB, with significant differences in knowledge for 8 of 10 items, attitudes for 9 of 10 items, and practices for 4 of 7 items.

As presented in Table 1, the median scores for all KAP section were classified as poor (<60) in each domain, as well as the overall score. In the knowledge section, only 18.7% of participants were classified as having good knowledge. Participants with active HISB demonstrated a significantly higher proportion of participants with good knowledge ($p < 0.01$) and higher knowledge scores ($p < 0.01$) across all domains, as well as a higher overall score ($p < 0.01$).Similarly, only 22.7% of participants exhibited a positive overall attitude. Those with active HISB showed a significantly higher proportion of participants with positive attitudes ($p < 0.01$) and achieved higher scores ($p < 0.01$) across all attitude domains, as well as a higher overall attitude score compared to those with passive HISB ($p < 0.01$). In contrast, the proportion of participants with favorable practices was notably higher, at 44.5%. Participants with active HISB also demonstrated a significantly greater proportion of participants with favorable practices ($p < 0.01$) and higher overall practice scores ($p < 0.01$) compared to those with passive HISB.

The correlation between KAP was assessed using Spearman's correlation, due to the abnormality of the data as indicated by the Kolmogorov-Smirnov test. As shown in Figure 1, all correlation tests yielded significant results ($p < 0.01$), with the majority of correlations between variables were classified as moderate positive correlations (ρ= 0.40–0.69) [31]. However, two correlations were identified as strong positive correlations (ρ= 0.70–0.89), specifically the correlation between Aspect 2 of attitudes and practice ($\rho = 0.782$) and the correlation between overall attitudes and practice ($\rho = 0.803$).

Supplementary Table 3 presents the results of the multivariate analysis examining factors associated with good knowledge. Participants with a higher education level (AOR: 7.07; 95% CI: 2.37–21.12; $p < 0.001$), a family history of cancer (AOR: 15.20; 95% CI: 4.37–52.89; $p < 0.001$), primarily using private vehicles for transportation (AOR: 4.15; 95% CI: 1.10–15.63; $p < 0.05$), engaging in active HISB (AOR: 3.41; 95% CI: 1.15–10.15; $p < 0.05$), obtaining general information through indirect contact sources (AOR: 3.16; 95% CI: 1.07–9.29; $p < 0.05$), and preferring indirect contact sources for health information (AOR: 29.85; 95% CI: 3.86–230.89; $p < 0.01$) were all statistically significant predictors of good overall knowledge of HPV infection, cervical cancer, and its prevention. Good knowledge of cervical cancer etiology was significantly associated with higher education level (AOR: 10.22; 95% CI: 3.83–27.24; $p < 0.001$), being single (AOR: 3.56; 95% CI: 1.39–9.10; $p < 0.01$), having a family history of cancer (AOR: 3.44;

Table 1. Knowledge, Attitudes, and Practice towards HPV Infection, Cervical Cancer, and Its Prevention Graded by Their Health-Seeking Information Behavior

Parameters	Total		Health-seeking information behavior				P value
			Passive (n = 109)		Active (n = 111)		
	N	%	n	%	n	%	
Knowledge							
Domain 1: HPV infection and cervical cancer							
Poor	174	79.1%	98	89.90%	76	68.50%	**p<0.001***
Good	46	20.9%	11	10.10%	35	31.50%	
Median (IQR)	0 (0–40)		0 (0–20)		20 (0–80)		**p<0.001†**
Domain 2: HPV infection and cervical cancer prevention							
Poor	137	62.3%	83	76.10%	54	48.60%	**p<0.001***
Good	83	37.7%	26	23.90%	57	51.40%	
Median (IQR)	40 (20–60)		40 (20–40)		60 (40–60)		**p<0.001†**
Overall knowledge							
Poor	179	81.3%	100	91.70%	79	71.20%	**p<0.001***
Good	41	18.7%	9	8.30%	32	28.80%	
Median (IQR)	30 (20–50)		20 (10–40)		40 (20–70)		**p<0.001†**
Attitudes							
Domain 1: HPV infection and cervical cancer							
Negative	177	80.5%	100	91.70%	77	69.40%	**p<0.001***
Positive	43	19.5%	9	8.30%	34	30.60%	
Median (IQR)	20 (10–50)		20 (10–40)		30 (20–60)		**p<0.001†**
Domain 2: HPV infection and cervical cancer prevention							
Negative	141	64.1%	85	78.00%	56	50.50%	**p<0.001***
Positive	79	35.9%	24	22.00%	55	49.50%	
Median (IQR)	40 (15–70)		30 (10–50)		50 (30–80)		**p<0.001†**
Overall attitudes							
Negative	170	77.3%	98	89.90%	72	64.90%	**p<0.001***
Positive	50	22.7%	11	10.10%	39	35.10%	
Median (IQR)	35 (15–55)		25 (15–35)		45 (25–65)		**p<0.001†**
Practice							
Unfavorable	122	55.5%	73	67.00%	49	44.10%	0.001*
Favorable	98	44.5%	36	33.00%	62	55.90%	
Median (IQR)	57 (36–86)		43 (29–71)		71 (43–93)		**p<0.001†**

* Chi-square test or fisher-exact test; † Mann-Whitney U test; Values in bold indicate statistically significant relationships between variables.

95% CI: 1.26–9.39; $p < 0.05$), and not smoking (AOR: 3.28; 95% CI: 1.07–10.09; $p < 0.05$). Female sex (AOR: 4.64; 95% CI: 1.35–15.95; $p < 0.05$), a higher education level (AOR: 30.00; 95% CI: 8.99–100.14; $p < 0.001$), a family history of gynecologic cancer (AOR: 18.69; 95% CI: 1.95–178.79; $p < 0.05$), active HISB (AOR: 6.66; 95% CI: 1.16–26.65; $p < 0.01$), and a preference for indirect contact sources of health information (AOR: 14.78; 95% CI: 2.84–76.81; $p < 0.01$) were significantly associated with good knowledge of CCS methods. Furthermore, we performed ROC analysis to assess the predictive performance of the multivariate models. As shown in Figure 2, the overall knowledge model yielded an AUC of 0.913 (95% CI: 0.861–0.966; $p < 0.001$), the cervical cancer etiology knowledge model produced an AUC of 0.840 (95% CI: 0.779–0.901; $p < 0.001$), and the CCS methods knowledge model showed an AUC of 0.926 (95% CI: 0.868–0.984; $p < 0.001$).

The multivariate analysis of factors associated with a positive attitude is presented in Supplementary Table 4. Participants with a higher education level (AOR: 3.79; 95% CI: 1.31–11.03; $p < 0.05$), a family history of cancer (AOR: 4.42; 95% CI: 1.50–13.04; $p < 0.01$), engaging in active HISB (AOR: 3.88; 95% CI: 1.50–10.01; $p < 0.01$), and good knowledge (AOR: 10.29; 95% CI: 3.49–30.28; $p < 0.001$) were all statistically significant predictors of a positive attitude toward HPV infection, cervical cancer, and its prevention. Acknowledging their own or their partner's susceptibility to cervical cancer was significantly associated with higher monthly household income (AOR: 2.61; 95% CI: 1.34–5.05; $p < 0.01$), a family history of cancer (AOR: 4.40; 95% CI: 1.75–11.09; $p < 0.01$), and excellent knowledge (AOR: 5.47; 95% CI: 2.34–12.79; $p < 0.001$). Participants who expressed concern regarding

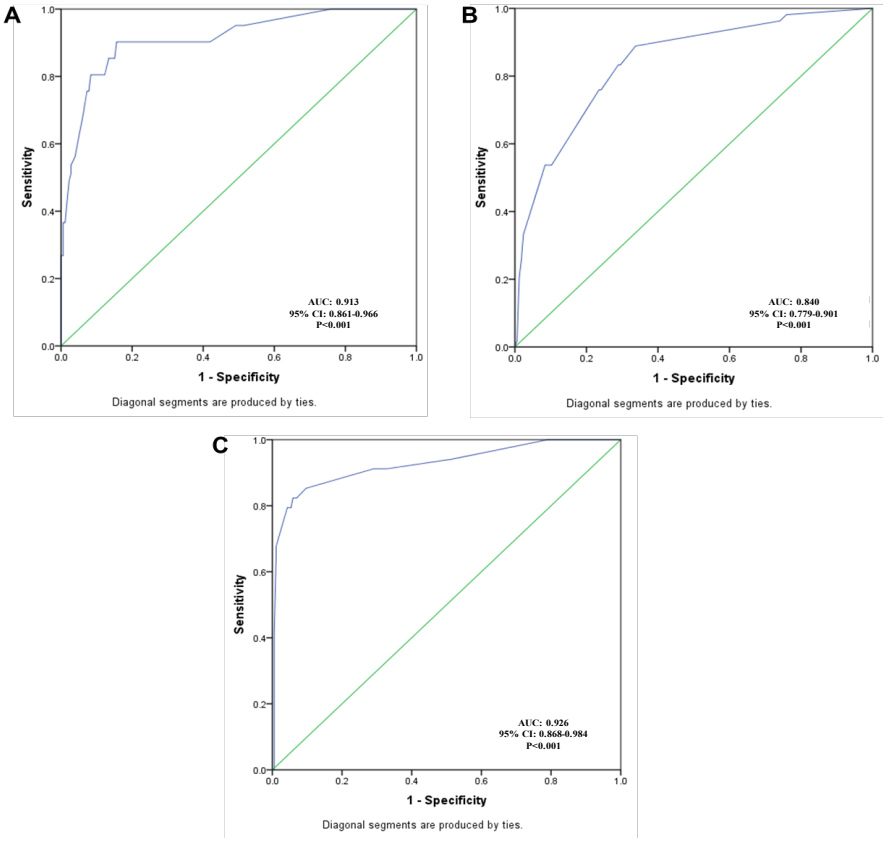

Figure 2. Receiver Operating Characteristic Curve for Predicting Related Factors of (A) overall knowledge with an AUC of 0.913 (95% CI, 0.861 – 0.966; p<0.01), (B) knowledge regarding etiology of cervical cancer with an AUC of 0.840 (95% CI, 0.779 – 0.901; p<0.01), and (C) knowledge regarding cervical cancer screening methods with an AUC of 0.926 (95% CI, 0.868 – 0.984; p<0.01).AUC, area under the curve.

the risk of adverse events following HPV vaccination and/or the CCS procedure were influenced by their monthly household income (AOR: 1.86; 95% CI: 1.03–3.37; p < 0.05), ownership of a personal mobile phone (AOR: 2.34; 95% CI: 1.10–4.99; p < 0.05), and HISB (AOR: 2.67; 95% CI: 1.49–4.79; p < 0.01). Furthermore, we performed ROC analysis to assess the predictive performance of the multivariate models. As shown in Figure 3, the overall attitude model yielded an AUC of 0.863 (95% CI: 0.797–0.929; p < 0.001), the self-susceptibility to cervical cancer model produced an AUC of 0.784 (95% CI: 0.717–0.852; p < 0.001), and the adverse events following HPV vaccination and/or CCS model showed an AUC of 0.702 (95% CI: 0.634–0.771; p < 0.001).

Supplementary Table 5 presents the results of the multivariate analysis examining factors associated with favorable practices related to HPV infection, cervical cancer, and its prevention. Good practices were more likely among participants who primarily used private vehicles for transportation (AOR: 2.66; 95% CI: 1.33–5.32; p < 0.01) and those with a positive attitude toward HPV infection, cervical cancer, and its prevention (AOR: 20.62; 95% CI: 5.70–74.60; p < 0.001). Participants who engaged in active HISB (AOR: 2.33; 95% CI: 1.27–4.26; p < 0.01) and had a positive attitude toward HPV infection, cervical cancer, and its prevention (AOR: 11.41; 95% CI: 3.37–38.66; p < 0.01) were more likely to receive the HPV vaccination compared to their counterparts. Male sex (AOR: 2.72; 95% CI: 1.48–4.99; p < 0.01), age ≥ 25 years (AOR: 2.11; 95% CI: 1.10–4.05; p < 0.05), and excellent knowledge (AOR: 9.98; 95% CI: 2.99–34.15; p < 0.001) were significantly associated with greater willingness or support for their partner to undergo CCS. Furthermore, we performed ROC analysis to assess the predictive performance of the multivariate models. As shown in Figure 4, the overall practice model yielded an AUC of 0.793 (95% CI: 0.732–0.854; p < 0.001), the willingness to receive the HPV vaccination model produced an AUC of 0.722 (95% CI: 0.656–0.788; p < 0.001), and the willingness to undergo CCS model showed an AUC of 0.738 (95% CI: 0.672–0.805; p < 0.001).

Discussion

In this study, the majority of participants were aged ≥ 21 years (83.6%), aligning with current age recommendations for undergoing CCS [32]. Additionally, most participants had children (66.4%), highlighting the importance of evaluating KAP related to HPV infection, cervical cancer, and its prevention. This is particularly crucial as HPV vaccination acceptance, especially among children, is largely influenced by the KAP of parents [33, 34]. Furthermore, internet access was also higher in our study (69.5%) compared to the national figure for rural areas, which stands at 59.33% [35]. However, the utilization of the internet for information-seeking was

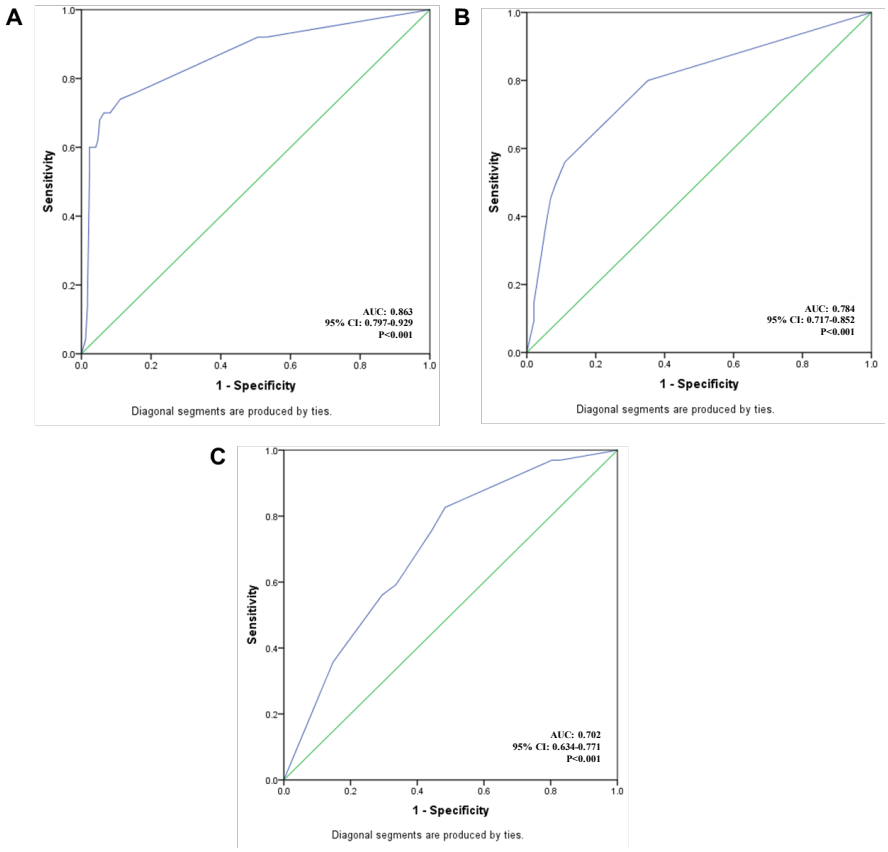

Figure 3. Receiver Operating Characteristic Curve for Predicting Related Factors of (A) overall attitude with an AUC of 0.863 (95% CI, 0.797 – 0.929; P<0.001), (B) attitude towards susceptibility to cervical cancer with an AUC of 0.784 (95% CI, 0.717 – 0.852; P<0.001), and (C) attitude towards the incidence of adverse events after HPV vaccination or cervical cancer screening with an AUC of 0.702 (95% CI, 0.634 – 0.771; P<0.001).AUC, area under the curve.

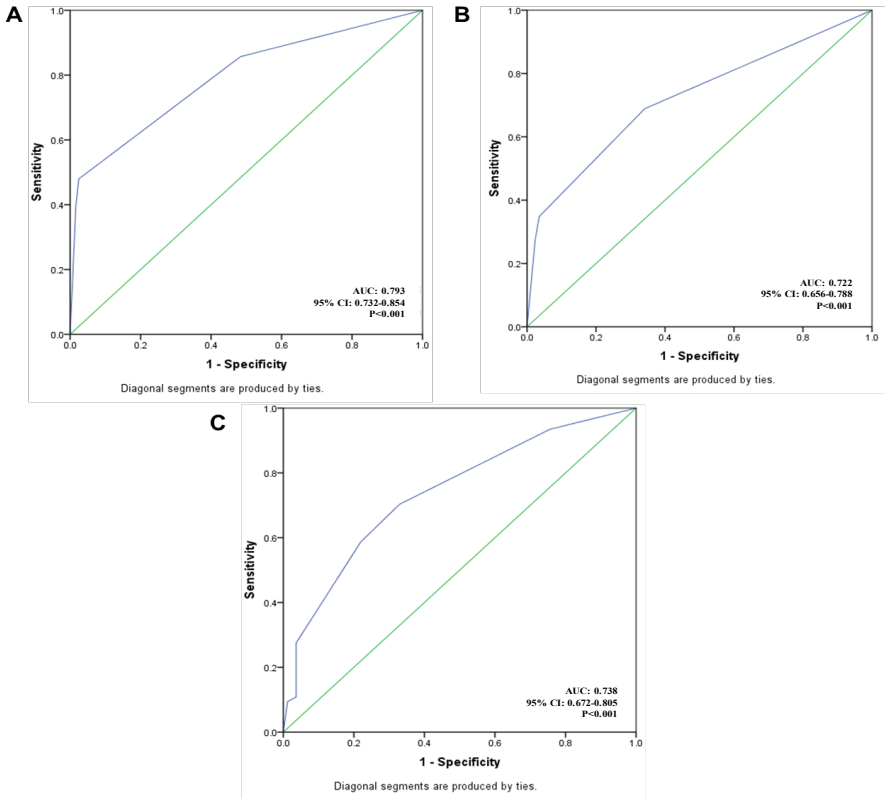

Figure 4. Receiver Operating Characteristic Curve for Predicting Related Factors of (A) overall practice with an AUC of 0.793 (95% CI, 0.732 – 0.854; P<0.001), (B) practice towards willingness for undergoing HPV vaccination with an AUC of 0.722 (95% CI, 0.656 – 0.788; P<0.001), and (C) practice willingness for undergoing cervical cancer screening with an AUC of 0.738 (95% CI, 0.672 – 0.805; P<0.001).AUC, area under the curve.

relatively low among our participants, with only 27.7% reporting the internet as their primary source for general information and 34.1% for health-related information. These figures are notably lower compared to the online HISB reported in other Asian countries [36]. Consistent with previous studies [37, 38], healthcare workers were the most trusted and preferred source of health information, with 75% and 69.5% of participants relying on them, respectively. This finding is significant, as research has shown that individuals who receive education from healthcare workers are more likely to undergo CCS and receive the HPV vaccination compared to those relying on other sources of health information [33, 39]. Therefore, the role of healthcare workers is essential, as their credibility and influence enable their education efforts more effective in improving KAP, especially in rural areas with limited awareness of HPV and cervical cancer prevention.

In our study, the majority of participants exhibited poor KAP. However, significant differences were observed in HISB across all domains of KAP. Consistent with previous research, participants who engaged in active HISB showed better KAP compared to those who did not [40-42]. By acquiring more information regarding the disease through active HISB, participants were likely to experience stronger affective risk responses, motivating them to not only gain more knowledge but also adopt protective behaviors [38, 43]. As a result, their KAP was significantly better than that of those with passive HISB. Additionally, participants who actively sought health information were characterized by higher education levels and socioeconomic status [44, 45], which aligns with the findings of our study. These factors may also explain why they demonstrated better KAP compared to their counterparts. Moreover, we found that participants who engaged in active HISB were more likely to obtain health-related information from indirect contact sources, primarily the internet and social media, which is consistent with previous study [44]. This behavior may result from the lack of health education provided by healthcare providers, a barrier identified by most participants in this study. In Indonesia, healthcare workers particularly physicians are widely regarded by the public as role models in matters related to health. Consequently, health education delivered by healthcare professionals often has a greater impact than that provided by other actors, including trained health cadres. However, the responsibility for preventive and educational activities is largely assigned to primary healthcare facilities, which are required to provide not only preventive but also curative services. In rural areas, the number of physicians is extremely limited, with only one or two doctors available in some districts. As a result, the high outpatient workload often restricts physicians from engaging in promotive activities and community-based health education. This situation represents one of the contributing factors to the insufficient delivery of direct health education by healthcare workers [46]. As a result, individuals with active HISB, who showed greater curiosity about health topics, sought information from alternative sources. While the internet was the primary source of health information for most participants, healthcare workers remained the most trusted source. Thus, in addition to increasing direct education through healthcare workers, the internet can be a transformative solution. Healthcare providers can use online platforms to share health information, reaching rural communities with limited access to healthcare workers.

Consistent with previous studies, our research found positive correlations between knowledge, attitudes, and practices regarding HPV infection, cervical cancer, and its prevention [7, 47]. Further analysis revealed that Domain 1, which focuses on knowledge of HPV infection and cervical cancer, had the strongest correlation with both attitude and practice compared to Domain 2, which focuses on knowledge of their prevention. In contrast, in the attitude section, we observed that Domain 2 showed a stronger correlation with practice than Domain 1. These findings suggest that while understanding the basic knowledge of HPV infection and cervical cancer (Domain 1) is crucial for shaping attitudes, individual's attitude toward prevention of HPV infection and cervical cancer (Domain 2) is the most significant factor in motivating them to engage in preventive behaviors for HPV infection and cervical cancer.

Based on previous findings, knowledge, attitudes, and practices in this study were positively correlated. This explains why the majority of participants exhibited inappropriate attitudes and practices regarding HPV infection, cervical cancer, and its prevention, as most participants (81.3%) also had poor knowledge. Multivariate analysis identified six predictors of good knowledge of HPV infection, cervical cancer, and its prevention: 1) a higher level of education, 2) a family history of cancer, 3) primarily using private transportation, 4) engaging in active HISB, 5) primarily using indirect contact sources for general information, and 6) preferring indirect contact sources for health information.

Consistent with previous studies [48, 49], education level was identified as a strong predictor of knowledge, irrespective of the specific topic. This can be attributed to the fact that individuals with higher levels of education are more likely to actively seek health-related information and possess better cognitive skills to process and retain such information. As a result, they are more capable of improving their knowledge compared to individuals with lower educational level [50 , 51]. Moreover, a family history of cancer was also found to be a significant factor in knowledge, as individuals with this history often perceive themselves as more susceptible and are motivated to seek more [48]. Similarly, participants with a family history of gynecological cancer in our study demonstrated better knowledge of CCS methods and procedures, consistent with previous research findings [51, 52]. Furthermore, the preferred source of health information also had significant impact on the overall knowledge, particularly regarding CCS methods. Similar to previous studies, we found that individuals who preferred indirect sources of contact were more likely to have better knowledge than those who preferred to obtain information through person-to-person interaction [53 , 54]. Individuals who favored indirect contact sources, especially the internet, were also found to seek health-related information more

frequently [38, 55]. This could be because they have easier access to information, as they own personal devices that allow them to search for information at their convenience [36]. In contrast, individuals who rely on person-to-person interaction may face challenges, especially in rural areas. Topics such as HPV infection and cervical cancer are often regarded as sensitive and inappropriate for open discussion, which discourages them from seeking information and result in poor knowledge regarding that topics. A qualitative study on cervical cancer stigma in Indonesia further demonstrated that perceptions related to sexual morality and marital status discouraged women from accessing screening and preventive care [56]. This challenge is further compounded by structural barriers, as our study found that one of the most common difficulties faced by participants was the long distance to healthcare facilities or providers, which makes obtaining trusted information even more difficult.

Similar to knowledge, only 22.7% of participants exhibited a positive attitude toward HPV infection, cervical cancer, and its prevention. Multivariate analysis revealed that participants with a higher educational level, a family history of cancer, active in HISB, and excellent knowledge were more likely to have a positive attitude. Knowledge was the strongest predictor of attitude, consistent with previous studies [41, 42]. This aligns with the Knowledge, Attitudes, and Behavior (KAB) model, which suggests that knowledge shapes beliefs and attitudes, driving behavior change [57]. Interestingly, our study also found that participant who own personal mobile phone to be more likely to had appropriate attitude toward the incidence of adverse events following HPV vaccination and/or CCS. Similarly, our study also found that participants who owned personal mobile phones were more likely to have an appropriate attitude toward adverse events following HPV vaccination and/or CCS. Mobile phone ownership, often linked to higher socioeconomic status in rural areas, provides greater access to information, enabling individuals to address concerns regarding adverse events and develop a more informed and appropriate attitude [58, 59].

Despite the fact that the majority of participants exhibited unfavorable practices, a higher proportion (44.5%) demonstrated favorable practices compared to those with good knowledge and positive attitudes. Multivariate analysis identified two primary predictors of favorable practices related to HPV infection, cervical cancer, and its prevention: the participants' primary mode of transportation and their overall attitude. Consistent with the KAB model described earlier, an individual's practices are often influenced by their attitude toward the issue. Therefore, individuals with a positive attitude are more likely to engage in favorable practices, as corroborated by prior studies [47, 60]. Similar to prior studies [61], our findings indicate that mode of transportation predicts favorable practices related to HPV infection, cervical cancer, and prevention. Individuals using private vehicles were more likely to engage in health-related practices, such as HPV vaccination and CCS, due to the flexibility and convenience they provide, compared to those relying on public transportation. Consequently, this privillege enables them to participate in health-related practices, such as HPV vaccination and CCS [61, 62]. Interestingly, our study found that male participants were more willing to encourage their partners to undergo CCS than females were to participate themselves, potentially due to women's fears or concerns about the procedure or results. Partner support is a critical determinant for CCS participation, particularly in settings requiring partner consent [6, 63].

Strength and limitation of the study

This study has several limitations. Due to the cross-sectional design, recall bias may have affected the results. Furthermore, the interviewer-administered questionnaires conducted through face-to-face interviews may have introduced social desirability bias, potentially leading to underreporting or exaggeration of responses. To minimize these biases, interviews were conducted with local community health volunteers present to validate responses, particularly regarding practices. Lastly, as the study was conducted in a rural province, the findings may not be fully generalizable to all rural communities in Indonesia. However, given North Moluccas' rural status, the study provides valuable insights into KAP and information-seeking behavior in similar communities across the country.

Despite potential limitations, this study offers several strengths. To our knowledge, it is the first to examine the association between KAP regarding HPV infection, cervical cancer, and its prevention, and information-seeking behavior in Indonesia. In addition, the study included heterogeneous participants in terms of sociodemographic and socioeconomic status, enhancing the generalizability of the findings across Indonesia. Furthermore, face-to-face interviews facilitated stronger rapport-building with participants, allowing the collection of more detailed information that they may have been hesitant to share otherwise.

Our study found that KAP regarding HPV infection, cervical cancer, and its prevention remain suboptimal in rural communities. Several determinants, including information-seeking behavior, educational level, family history of cancer, income, frequency of visits to healthcare facilities, and daily modes of transportation, were also identified as key influences on KAP. While information-seeking behavior plays a significant role in shaping good KAP, barriers such as insufficient education from healthcare workers and the physical distance to health facilities hinder access to health information. However, the increasing use of the internet and social media for health information, coupled with the strong credibility of healthcare workers among rural communities, presents an opportunity to overcome these barriers. By leveraging digital platforms, healthcare workers could more effectively disseminate health information, overcoming both the education and distance barriers. From a policymakers perspective, these findings suggest the need for strategies that expand health education outreach in rural settings. Strengthening digital health promotion initiatives through government-supported online platforms could ensure reliable and culturally appropriate information reaches wider audiences. In

parallel, investment in training healthcare workers to use digital tools and engage with communities via social media may increase trust and uptake of preventive services. Policies to integrate HPV infection and cervical cancer prevention campaigns in collaboration with primary health facilities, could further improve accessibility. Additionally, infrastructure improvements such as enhancing transportation access to healthcare facilities and expanding mobile health services may help reduce geographic barriers. In conclusion, our study highlights the importance of understanding rural communities' information-seeking behavior in order to deliver effective health education through suitable platforms.

Author Contribution Statement

Conceptualization: H.W., G.G.; acquisition of data: H.W., G.G., M.H., F.K.; analysis and/or interpretation of data: H.W., G.G., M.H., F.K.; drafting the manuscript: H.W., G.G., M.H., F.K., L.N., G.P., T.W.U., T.D.A., K.H.N; revising the manuscript critically for important intellectual content: H.W., G.G., M.H.; approval of the version of the manuscript to be published: H.W., G.G., M.H., F.K., L.N., G.P., T.W.U., T.D.A., K.H.N

Acknowledgements

The authors would like to express their sincere gratitude to all participants for their involvement in the study and to healthcare workers for their assistance in recruiting them. Special thanks are extended to Dr. Christian Homenta and Dr. Natalia Natalia for their valuable expertise, and constructive feedback in the preparation of this manuscript.

Data Availability Statement

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

Study Registration

This study was not registered in any registration database, as it was not a clinical trial, systematic review, or guideline-based research.

Approval by Scientific Body / Thesis Information

This research was conducted as part of an approved academic project and obtained formal ethical clearance.

Ethical Issue

The study protocol was reviewed and approved by the Universitas Indonesia Research Ethics Committee (KET-756/UN2.F1/ETIK/PPM.00.02/2023). All participants provided informed consent prior to enrollment.

Conflict of Interest

No potential conflict of interest was reported by the author(s).

References

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: Globocan estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2024;74(3):229-63. https://doi.org/10.3322/caac.21834.
2. Kusuma F, Suryoadji KA, Adrian M, Utami TW, Winarto H, Anggraeni TD, et al. Socio-demographic Profiles of Cervical Cancer Patients at Cipto Mangunkusumo and Its Association with Cancer Stages at Diagnosis [Internet]. Vol. 49. 2022. Available from: https://kesmas.kemkes.go.id/assets/upload/
3. Gondhowiardjo S, Hartanto S, Wirawan S, Jayalie VF, Astiti IAP, Panigoro SS, et al. Treatment delay of cancer patients in indonesia: A reflection from a national referral hospital. Med J Indones. 2021;30(2):129–37. https://doi.org/10.13181/mji.Oa.204296.
4. Ministry of health of the republic of Indonesia. Indonesian health profile 2023. 2024 Jun 28.
5. Daniels V, Saxena K, Patterson-Lomba O, Gomez-Lievano A, At Thobari J, Durand N, et al. Modeling the health and economic implications of adopting a 1-dose 9-valent human papillomavirus vaccination program in adolescents in low/middle-income countries: An analysis of indonesia. PLoS One. 2024;19(11):e0310591. https://doi.org/10.1371/journal.pone.0310591.
6. Robbers GML, Bennett LR, Spagnoletti BRM, Wilopo SA. Facilitators and barriers for the delivery and uptake of cervical cancer screening in indonesia: A scoping review. Glob Health Action. 2021;14(1):1979280. https://doi.org/10.1080/16549716.2021.1979280.
7. Winarto H, Habiburrahman M, Dorothea M, Wijaya A, Nuryanto KH, Kusuma F, et al. Knowledge, attitudes, and practices among indonesian urban communities regarding hpv infection, cervical cancer, and hpv vaccination. PLoS One. 2022;17(5):e0266139. https://doi.org/10.1371/journal.pone.0266139.
8. Setiawan D, Miranti I, Partiwi TD, Puspitasari DA, Ramadhan FN. The willingness for cervical cancer screening among sexually active women in indonesia: Lesson learned from two districts. Int J Gynaecol Obstet. 2022;159(1):145-51. https://doi.org/10.1002/ijgo.14113.
9. Debeaudrap P, Sobngwi J, Tebeu PM, Clifford GM. Residual or recurrent precancerous lesions after treatment of cervical lesions in human immunodeficiency virus-infected women: A systematic review and meta-analysis of treatment failure. Clin Infect Dis. 2019;69(9):1555-65. https://doi.org/10.1093/cid/ciy1123.
10. Bruni LB, Barrionuevo-Rosas L, Albero G, Serrano B, Mena M, Gómez D, et al. Human papillomavirus and related diseases in Indonesia [internet]. 2023. Available from: Www.Hpvcentre.Net.
11. Zhang JM, Zhao QM, Zhang LM. Assessment of the knowledge, attitude and practices about human papilloma virus vaccine among the nurses working in a tertiary hospital in china: A cross-sectional descriptive study. J Pak Med Assoc. 2017;67(2):209-13.
12. Wen X, Wen D, Yang Y, Chen Y, Akazawa K, Liu Y, et al. Urban-rural disparity in cervical cancer in china and feasible interventions for tackling the rural excess. Medicine (Baltimore). 2019;98(1):e13907. https://doi.org/10.1097/md.0000000000013907.
13. Sripan P, Chitapanarux I, Tharavichitkul E, Muangwong P, Pongnikorn D, Waisri N, et al. Disparities in the change of cervical cancer mortality rate between urban and rural chiang mai in the era of universal health care and the thai national screening program. Int J Equity Health. 2021;20(1):175.

https://doi.org/10.1186/s12939-021-01515-1.
14. Lesińska-Sawicka M. A cross-sectional study to assess knowledge of women about cervical cancer: An urban and rural comparison. Environ Health Prev Med. 2021;26(1):64. https://doi.org/10.1186/s12199-021-00986-6.
15. Sakrawal K, Meena G, Gupta A, Malav K, Grover S. Knowledge, attitude, and practice about cervical cancer among adult women in rural jaipur: An observational analysis. J Family Med Prim Care. 2023;12(10):2379-84. https://doi.org/10.4103/jfmpc.jfmpc_933_23.
16. Khomphaiboonkij U, Sreamsukcharoenchai N, Pitakkarnkul S, Rittiluechai K, Tangjitgamol S. Knowledge of thai women in cervical cancer etiology and screening. PLoS One. 2023;18(5):e0286011. https://doi.org/10.1371/journal.pone.0286011.
17. Ansari B. Information seeking behaviour differences indicate which us population groups lack information about human papilloma virus and associated cancer risks. Health Info Libr J. 2023;40(1):42-53. https://doi.org/10.1111/hir.12393.
18. Douthit N, Kiv S, Dwolatzky T, Biswas S. Exposing some important barriers to health care access in the rural USA. Public Health. 2015;129(6):611-20. https://doi.org/10.1016/j.puhe.2015.04.001.
19. Chen X, Orom H, Hay JL, Waters EA, Schofield E, Li Y, et al. Differences in rural and urban health information access and use. J Rural Health. 2019;35(3):405-17. https://doi.org/10.1111/jrh.12335.
20. Garcia-cosavalente Hp, wood lE, Obregon R. Health information seeking behavior among rural and urban peruvians: Variations in information resource access and preferences. Inf Dev. 2010;26:37–45. https://doi.org/10.1177/0266666909358640.
21. Hancher-Rauch H, Britt-Spells A, Wojtyna A, Standish M. Health information seeking behavior and perceived source trustworthiness in public health students: A pilot study for improving the curriculum. J health educ teach. 2019;10(1):34–43.
22. Cunningham MS, Skrastins E, Fitzpatrick R, Jindal P, Oneko O, Yeates K, et al. Cervical cancer screening and hpv vaccine acceptability among rural and urban women in kilimanjaro region, tanzania. BMJ Open. 2015;5(3):e005828. https://doi.org/10.1136/bmjopen-2014-005828.
23. Central Statistics Agency of North Maluku Province. Statistics on Village Potential of North Maluku 2021 [Internet]. 2021 [cited 2024 Jan 20]. Available from: Https://malut.Bps.Go.Id/publication/2022/11/02/6ee668318c09e7875e370aa2/statistik-potensi-desa-provinsi-maluku-utara-2021.Html.
24. Putri LP, Russell DJ, O'Sullivan BG, Meliala A, Kippen R. A critical review of definitions of rural areas in indonesia and implications for health workforce policy and research. Health Res Policy Syst. 2022;20(1):46. https://doi.org/10.1186/s12961-022-00847-w.
25. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample size calculation in medical studies. Gastroenterology and Hepatology from bed to bench. 2013;6(1):14.
26. Endarti D, Satibi S, Kristina SA, Farida MA, Rahmawanti Y, Andriani T. Knowledge, perception, and acceptance of hpv vaccination and screening for cervical cancer among women in yogyakarta province, indonesia. Asian Pac J Cancer Prev. 2018;19(4):1105-11. https://doi.org/10.22034/apjcp.2018.19.4.1105.
27. Sumarmi S, Hsu YY, Cheng YM, Lee SH. Factors associated with the intention to undergo pap smear testing in the rural areas of indonesia: A health belief model. Reprod Health. 2021;18(1):138. https://doi.org/10.1186/s12978-021-01188-7.
28. Esmaeilzadeh S, Ashrafi-Rizi H, Shahrzadi L, Mostafavi F. A survey on adolescent health information seeking behavior related to high-risk behaviors in a selected educational district in isfahan. PLoS One. 2018;13(11):e0206647. https://doi.org/10.1371/journal.pone.0206647.
29. Arba A, Zana Z. Knowledge of essential newborn care and associated factors among nurses and midwives: A cross-sectional study at public health facilities in wolaita zone, southern ethiopia, 2019. Int J Pediatr. 2020;2020:3647309. https://doi.org/10.1155/2020/3647309.
30. Trifonova OP, Lokhov PG, Archakov AI. Metabolic profiling of human blood. Biomed Khim. 2014;60(3):281-94. https://doi.org/10.18097/pbmc20146003281.
31. Mukaka MM. A guide to appropriate use of correlation coefficient in medical research. Malawi med j [internet]. 2012 [cited 2024 nov 13];24(3):69. Available from: Https://pmc.Ncbi.Nlm.Nih.Gov/articles/pmc3576830.
32. Perkins RB, Guido RS, Castle PE, Chelmow D, Einstein MH, Garcia F, et al. 2019 asccp risk-based management consensus guidelines for abnormal cervical cancer screening tests and cancer precursors. J Low Genit Tract Dis. 2020;24(2):102-31. https://doi.org/10.1097/lgt.0000000000000525.
33. López N, Salamanca de la Cueva I, Vergés E, Suárez Vicent E, Sánchez A, López AB, et al. Factors influencing hpv knowledge and vaccine acceptability in parents of adolescent children: Results from a survey-based study (kappas study). Hum Vaccin Immunother. 2022;18(1):2024065. https://doi.org/10.1080/21645515.2021.2024065.
34. Xie H, Zhu HY, Jiang NJ, Yin YN. Awareness of hpv and hpv vaccines, acceptance to vaccination and its influence factors among parents of adolescents 9 to 18 years of age in china: A cross-sectional study. J Pediatr Nurs. 2023;71:73-8. https://doi.org/10.1016/j.pedn.2023.03.007.
35. Central Bureau of Statistics of Indonesia. Indonesian telecommunications statistics 2023; 2023.
36. Jia X, Pang Y, Liu LS. Online health information seeking behavior: A systematic review. Healthcare (Basel). 2021;9(12). https://doi.org/10.3390/healthcare9121740.
37. Chepkorir J, Guillaume D, Lee J, Duroseau B, Xia Z, Wyche S, et al. The role of health information sources on cervical cancer literacy, knowledge, attitudes and screening practices in sub-saharan african women: A systematic review. Int J Environ Res Public Health. 2024;21(7). https://doi.org/10.3390/ijerph21070872.
38. Link E, Baumann E, Czerwinski F, Rosset M, Suhr R. Of seekers and nonseekers: Characteristics of Covid-19-related information-seeking behaviors. World Medical & Health Policy. 2022 Jun;14(2):276-94. https://doi.org/10.1002/wmh3.509.
39. Isabirye A, Mbonye MK, Kwagala B. Predictors of cervical cancer screening uptake in two districts of central uganda. PLoS One. 2020;15(12):e0243281. https://doi.org/10.1371/journal.pone.0243281.
40. Kim K, Han HR. Potential links between health literacy and cervical cancer screening behaviors: A systematic review. Psychooncology. 2016;25(2):122-30. https://doi.org/10.1002/pon.3883.
41. Baharum NN, Ariffin F, Isa MR, Tin ST. Health literacy, knowledge on cervical cancer and pap smear and its influence on pre-marital malay muslim women attitude towards pap smear. Asian Pac J Cancer Prev. 2020;21(7):2021-8. https://doi.org/10.31557/apjcp.2020.21.7.2021.
42. Aweke YH, Ayanto SY, Ersado TL. Knowledge, attitude and practice for cervical cancer prevention and control among women of childbearing age in hossana town, hadiya zone, southern ethiopia: Community-based cross-sectional study. PLoS One. 2017;12(7):e0181415. https://doi.org/10.1371/

journal.pone.0181415.
43. Yang ZJ, Kahlor L. What, me worry? The role of affect in information seeking and avoidance. Science communication. 2013 Apr;35(2):189-212.
44. Nikoloudakis IA, Vandelanotte C, Rebar AL, Schoeppe S, Alley S, Duncan MJ, et al. Examining the correlates of online health information-seeking behavior among men compared with women. Am J Mens Health. 2018;12(5):1358-67. https://doi.org/10.1177/1557988316650625.
45. Mehra P. Face to face information seeking behavior of patients and impact on in-clinic satisfaction. Asia Pacific Management Review. 2015 Dec 1;20(4):293-303.
46. Indonesian ministry of health. National cervical cancer elimination plan for Indonesia 2023-2030; 2023.
47. Shao J, Ke H, Jiang C, Sun H, Han H, Zhu J, et al. Knowledge, attitudes, and practices of human papillomavirus and self-sampling among adult women: A cross-sectional study. Front Public Health. 2024;12:1377343. https://doi.org/10.3389/fpubh.2024.1377343.
48. Thapa N, Maharjan M, Petrini MA, Shah R, Shah S, Maharjan N, et al. Knowledge, attitude, practice and barriers of cervical cancer screening among women living in mid-western rural, nepal. J Gynecol Oncol. 2018;29(4):e57. https://doi.org/10.3802/jgo.2018.29.e57.
49. Ruddies F, Gizaw M, Teka B, Thies S, Wienke A, Kaufmann AM, et al. Cervical cancer screening in rural ethiopia: A cross- sectional knowledge, attitude and practice study. BMC Cancer. 2020;20(1):563. https://doi.org/10.1186/s12885-020-07060-4.
50. Taneja N, Chawla B, Awasthi AA, Shrivastav KD, Jaggi VK, Janardhanan R. Knowledge, attitude, and practice on cervical cancer and screening among women in india: A review. Cancer control : journal of the Moffitt Cancer Center. 2021;28:10732748211010799. https://doi.org/10.1177/10732748211010799.
51. Damtie S, Legese B, Berhan A, Kiros T, Eyayu T, Mihrete K, et al. Knowledge, attitude, and practice of cervical cancer screening and its associated risk factors among family planning service users at debre tabor town health facilities, north central ethiopia: A cross-sectional study. SAGE Open Med. 2023;11:20503121231208654. https://doi.org/10.1177/20503121231208654.
52. Gelassa FR, Nagari SL, Jebena DE, Belgafo D, Teso D, Teshome D. Knowledge and practice of cervical cancer screening and its associated factors among women attending maternal health services at public health institutions in assosa zone, benishangul-gumuz, northwest ethiopia, 2022: A cross-sectional study. BMJ Open. 2023;13(5):e068860. https://doi.org/10.1136/bmjopen-2022-068860.
53. Kangmennaang J, Thogarapalli N, Mkandawire P, Luginaah I. Investigating the disparities in cervical cancer screening among namibian women. Gynecol Oncol. 2015;138(2):411-6. https://doi.org/10.1016/j.ygyno.2015.05.036.
54. Banik R, Naher S, Rahman M, Gozal D. Investigating bangladeshi rural women's awareness and knowledge of cervical cancer and attitude towards hpv vaccination: A community-based cross-sectional analysis. J Cancer Educ. 2022;37(2):449-60. https://doi.org/10.1007/s13187-020-01835-w.
55. Demirci Ş, Uğurluoğlu Ö, Konca M, Çakmak C. Socio-demographic characteristics affect health information seeking on the internet in turkey. Health Info Libr J. 2021;38(4):304-12. https://doi.org/10.1111/hir.12358.
56. Bennett LR, Astari P. Unpacking cervical cancer stigma in healthcare: Lessons learnt from indonesian patients and health professionals. Cult Health Sex. 2025:1-16. https://doi.org/10.1080/13691058.2025.2488036.
57. Kallgren CA, Wood W. Access to attitude-relevant information in memory as a determinant of attitude-behavior consistency. J exp soc psychol. 1986;22(4):328–38.
58. LeFevre AE, Shah N, Bashingwa JJH, George AS, Mohan D. Does women's mobile phone ownership matter for health? Evidence from 15 countries. BMJ Glob Health. 2020;5(5). https://doi.org/10.1136/bmjgh-2020-002524.
59. Leahy W, Abomoslim M, Booth A, Gottschlich A, Mwandacha N, Dau H, et al. Women's cellphone access and ownership in rural uganda: Implications for self-care interventions. BMC Glob Public Health. 2024;2(1):8. https://doi.org/10.1186/s44263-024-00038-5.
60. Phaiphichit J, Paboriboune P, Kunnavong S, Chanthavilay P. Factors associated with cervical cancer screening among women aged 25-60 years in lao people's democratic republic. PLoS One. 2022;17(4):e0266592. https://doi.org/10.1371/journal.pone.0266592.
61. Wang C. The impact of car ownership and public transport usage on cancer screening coverage: Empirical evidence using a spatial analysis in england. J Transp Geogr. 2016;56:15-22. https://doi.org/10.1016/j.jtrangeo.2016.08.012.
62. Khan JR, Carroll SJ, Warner-Smith M, Roder D, Daniel M. Residential area and screening venue location features associated with spatial variation in breast cancer screening invitation response rates: An observational study in greater sydney, australia. BMJ Open. 2021;11(4):e043853. https://doi.org/10.1136/bmjopen-2020-043853.
63. Isabirye A. Individual and intimate-partner factors associated with cervical cancer screening in central uganda. PLoS One. 2022;17(9):e0274602. https://doi.org/10.1371/journal.pone.0274602.