Section: Obstetrics and Gynaecology

Original Research Article

DETERMINANTS OF CERVICAL CANCER PREVENTION UPTAKE: PAP SMEAR AND HPV VACCINE ACCEPTANCE IN WOMEN ATTENDING A GYNAECOLOGY OPD OF TERTIARY CARE CENTRE

Soumya Siramshetty[1], Gade Rama[2]

[1]Assistant Professor, Department of Obstetrics and Gynaecology, Pratima Relief Institute of Medical Sciences, Hanamkonda, Telangana, India.
[2]Associate Professor, Department of Obstetrics and Gynaecology, Pratima Relief Institute of Medical Sciences, Hanamkonda, Telangana, India.

Received *: 01/07/2025*
Received in revised form *: 17/08/2025*
Accepted *: 05/09/2025*

Corresponding Author:
Dr. Gade Rama,
Associate Professor, Pratima Institute of Medical Sciences and Research, Nagunoor, Telangana, India.
Email: drramagade@gmail.com

DOI: 10.70034/ijmedph.2025.3.488

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (3); 2660-2664

ABSTRACT

Background: Cervical cancer is a leading cause of cancer morbidity and mortality among women in India, despite being largely preventable through screening and HPV vaccination. Understanding acceptance and barriers among women in real-world outpatient settings is crucial to improving uptake. This study was designed to determine the acceptance rates of Pap smear screening and HPV vaccination and to identify barriers among women attending a tertiary care gynaecology outpatient department (OPD).

Materials and Methods: This hospital-based cross-sectional study was conducted between January and June 2025 among 220 women aged 18–65 years at a tertiary care centre in South India. Data were collected using a pretested interviewer-administered questionnaire covering demographics, reproductive history, knowledge, attitudes, practices, and perceived barriers. Acceptance was defined as ever undergoing Pap smear/HPV vaccination or willingness to do so within six months. Descriptive statistics, χ^2 tests, and multivariable logistic regression were performed.

Results: The mean age of participants was 32.6 ± 7.8 years; 68.6% resided in urban areas and 44.5% had college education. Only 28.2% had ever undergone a Pap smear, but 55.4% expressed willingness following counselling. HPV vaccination uptake was 12.7%, with 48.6% willing to vaccinate themselves or their daughters. Major barriers included lack of awareness (64.1%), fear of pain or diagnosis (41.8%), embarrassment (38.6%), perceived cost (34.5%), and safety concerns (29.1%). Multivariable analysis showed higher education, adequate knowledge, and provider recommendation significantly increased acceptance, while perceived cost reduced it.

Conclusion: Acceptance of Pap smear and HPV vaccination is modest but improves after counselling. Addressing awareness gaps, affordability, and provider-driven interventions can substantially enhance cervical cancer prevention uptake.

Keywords: Cervical cancer, Pap smear, HPV vaccine, acceptance.

INTRODUCTION

Cervical cancer remains a significant global public health challenge, ranking as the fourth most common cancer among women worldwide, with an estimated 604,000 new cases and 342,000 deaths in 2020.[1] Nearly 90% of these deaths occur in low- and middle-income countries (LMICs), where screening and vaccination programmes are less accessible.[2] India bears a disproportionate burden, contributing to one-fifth of global cervical cancer cases and recording approximately 77,000 deaths annually.[3,4]

Persistent infection with high-risk human papillomavirus (HPV) types, particularly HPV 16

and 18, is the primary cause of cervical cancer.[5] Effective preventive strategies include cytology-based screening using the Papanicolaou (Pap) smear and primary prevention through HPV vaccination.[6,7] Organised screening programmes in high-income countries have markedly reduced cervical cancer incidence and mortality.[8] However, in India, screening is mostly opportunistic and coverage remains low, with the National Family Health Survey-5 reporting <25% uptake among eligible women.[9]

HPV vaccination, recommended for adolescent girls before sexual debut, has shown high efficacy in preventing HPV infection and precancerous lesions.[7] Despite the availability of quadrivalent and bivalent vaccines and the recent introduction of a cost-effective indigenous HPV vaccine under the Universal Immunisation Programme, uptake remains poor.[10,11] Barriers include lack of awareness, cultural beliefs, safety concerns, high costs, and absence of provider recommendation.[12]

Hospital outpatient departments (OPDs) offer an opportunity to assess real-world acceptance of cervical cancer prevention strategies. Women attending gynaecology OPDs come from varied sociodemographic backgrounds and are well-positioned to benefit from provider counselling. Prior Indian studies have documented wide heterogeneity in awareness and acceptance, but data specific to tertiary care OPD populations remain limited. This study was conducted to determine the acceptance rates of Pap smear screening and HPV vaccination and to identify barriers among women attending a tertiary care gynaecology OPD.

MATERIALS AND METHODS

Study Design and Setting: This cross-sectional study was conducted at the Outpatient Department (OPD) of obstetrics and gynaecology, Pratima Institute of Medical Sciences and Research, Nagunoor, Telangana, India from July 2024 to June 2025.A total of 220 women attending OPD consented for assessing acceptance and barriers to cervical cancer prevention services were recruited.

Inclusion Criteria: Women aged 18-65 years attending the gynaecology OPD, and willing to provide informed written consent were included.

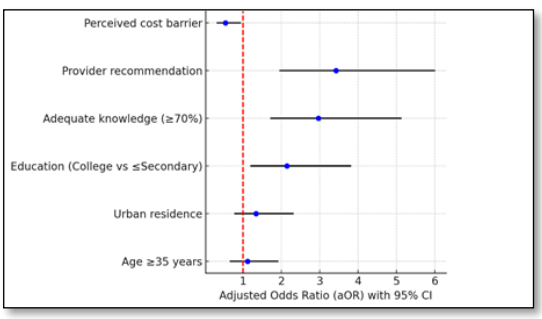
Exclusion Criteria: Pregnant women beyond 28 weeks of gestation, History of total hysterectomy or prior diagnosis of cervical cancer, women who were severely ill and unable to complete the interview and who declined participation were excluded.

Written informed consent was obtained from all the participants and study protocol was reviewed and approved by the institutional ethics committee. Around 250 eligible women attend daily; based on feasibility, 8-10 participants were considered each day using Systematic random sampling. A sampling interval was calculated by dividing the expected daily attendees by required daily recruitment. Every third eligible woman was invited to participate after triage. If a woman declined, the next eligible woman was approached.

A pretested, interviewer-administered, semi-structured questionnaire was used and prepared in English, Telugu and Hindi. A pilot test was conducted among 20 women for validation and to refine clarity and flow. The questionnaire consists of sociodemographic details, reproductive and obstetric history. It also has sections assessing knowledge levels consists of ten multiple choice questions scored with 1 = correct, 0 = incorrect/don't know; Adequate knowledge was defined as ≥7/10 (≥70% correct), attitude levels were assessed by seven items on a 5-point Likert scale (strongly agree to strongly disagree) covering perceived susceptibility, severity, benefits, barriers, spousal support, and trust in healthcare providers. Details of ever has pap smear, ever vaccinated against HPV, intension to undergo pap smear and details of barrier with multi-response options including lack of awareness, fear of pain/diagnosis, embarrassment, high cost, distance to facility, lack of female provider, spousal permission, vaccine safety/infertility concerns, religious/cultural reasons, and open-ended response. The above-mentioned data was collected by trained OBG specialist in a private room adjacent to the OPD to maintain confidentiality and comfort. Interviews lasted 15-20 minutes.

Statistical analysis: The above data was collected into Microsoft Excel sheet and analysed using SPSS v.26.0. Continuous variables were represented in mean and SD, categorical variables in frequency and percentages by using descriptive statistics. Bivariate analysis was conducted by chi-square test for categorical variables and independent t-test or continuous variables. Multivariable logistic regression was conducted separately for Pap smear acceptance and HPV vaccination acceptance. Variables with $p<0.20$ in bivariate analysis were included in the model. Adjusted odds ratios (aOR) with 95% confidence intervals (CI) were reported. Model fit was assessed using Hosmer-Lemeshow test and predictive ability with area under ROC curve. $P<0.05$ was considered as statistically significant outcome.

RESULTS



Graph 1: Forest plot of adjusted odds ratios for determinants of acceptance.

Table 1: Sociodemographic and obstetric characteristics of study participants (n=220).

Characteristic	Frequency (%)
Age (In years)	
18–29 years	92 (41.8%)
30–39 years	76 (34.5%)
40–49 years	36 (16.4%)
50–65 years	16 (7.3%)
Residence	
Urban	151 (68.6%)
Rural	69 (31.4%)
Education	
Illiterate	47 (21.4%)
Higher secondary	75 (34.1%)
Graduation and above	98 (44.5%)
Marital status	
Married	205 (93.2%)
Unmarried/Divorced/Widowed	15 (6.8%)
Parity	
Nulliparous	34 (15.5%)
1–2	116 (52.7%)
≥3	70 (31.8%)

A total of 220 women were enrolled, with a response rate of 89.8%. The mean age of participants was 32.6 ± 7.8 years, with the largest proportion (41.8%) in the 18–29 years age group. Most women resided in urban areas (68.6%) and were married (93.2%). Educational attainment varied, with 21.4% having no formal education, 34.1% completing secondary education, and 44.5% holding college degrees or higher. More than half (52.7%) had 1–2 children, while nearly one-third (31.8%) had three or more (Table 1).

Table 2: Knowledge and attitudes regarding cervical cancer prevention (n=220).

Characteristic	Yes	No
	Frequency (%)	Frequency (%)
Awareness of Pap smear	92 (41.8%)	128 (58.2%)
Awareness of HPV vaccine	73 (33.2%)	147 (66.8%)
Adequate knowledge (≥70% correct)	85 (38.6%)	135 (61.4%)
Positive attitude towards prevention	124 (56.4%)	96 (43.6%)

Knowledge of cervical cancer prevention was suboptimal. Less than half of participants (41.8%) were aware of Pap smear testing, and only one-third (33.2%) had heard of the HPV vaccine. Overall, just 38.6% achieved adequate knowledge scores (≥70% correct). On the other hand, attitudes were somewhat more favourable, with 56.4% expressing a positive orientation toward preventive measures such as screening and vaccination (Table 2).

Table 3: Acceptance of Pap smear and HPV vaccination (n=220).

Acceptance indicator	Yes	No
	Frequency (%)	Frequency (%)
Ever had Pap smear	62 (28.2%)	158 (71.8%)
Willingness for Pap smear (within 6 months)	122 (55.4%)	98 (44.6%)
Ever received HPV vaccine	28 (12.7%)	192 (87.3%)
Willingness for HPV vaccination (self/daughter)	107 (48.6%)	113 (51.4%)

The acceptance rates for both Pap smear and HPV vaccination were modest. Only 28.2% of women reported having ever undergone a Pap smear, while an additional 55.4% expressed willingness to undergo the test within the next six months after counselling. Uptake of the HPV vaccine was even lower, with just 12.7% of women reporting prior vaccination. However, nearly half (48.6%) indicated willingness to vaccinate themselves or their daughters in the near future (Table 3).

Table 4: Barriers to Pap smear and HPV vaccination (n=220, multiple responses allowed).

Barrier	Yes	No
	Frequency (%)	Frequency (%)
Lack of awareness	141 (64.1%)	79 (35.9%)
Fear of pain/diagnosis	92 (41.8%)	128 (58.2%)
Embarrassment	85 (38.6%)	135 (61.4%)
Perceived cost	76 (34.5%)	144 (65.5%)
Vaccine safety concerns	64 (29.1%)	156(70.9%)
Spousal disapproval	40 (18.2%)	180 (81.8%)
Distance/transport issues	33 (15%)	187 (85%)
Religious/cultural reasons	19 (8.6%)	201 (91.4%)

The most frequently cited barrier was lack of awareness (64.1%), followed by fear of pain or diagnosis (41.8%), embarrassment (38.6%), and perceived cost (34.5%). Concerns regarding vaccine safety were reported by 29.1% of women, while 18.2% mentioned spousal disapproval. Structural barriers such as distance to health facilities (15.0%) and religious/cultural reasons (8.6%) were also identified (Table 4).

Table 4: Multivariable logistic regression of determinants of Pap smear and HPV vaccine acceptance (n=220)

Determinant	aOR (95% CI)	p-value
Age ≥35 years	1.12 (0.65–1.92)	0.68
Urban residence	1.34 (0.77–2.32)	0.30
Education (College vs ≤Secondary)	2.14 (1.19–3.82)*	0.011
Adequate knowledge (≥70%)	2.96 (1.71–5.13)***	<0.001
Provider recommendation	3.42 (1.95–6.01)***	<0.001
Perceived cost barrier	0.54 (0.31–0.95)*	0.031

On multivariable logistic regression analysis, several factors emerged as independent predictors of Pap smear and HPV vaccine acceptance (Table 5). Women with college-level education were more than twice as likely to accept screening/vaccination compared to those with lower education (aOR 2.14, 95% CI: 1.19–3.82, p=0.011). Similarly, women with adequate knowledge scores had nearly threefold higher odds of acceptance (aOR 2.96, 95% CI: 1.71–5.13, p<0.001). The strongest determinant was provider recommendation, which increased acceptance by more than threefold (aOR 3.42, 95% CI: 1.95–6.01, p<0.001). In contrast, women who perceived cost as a barrier were significantly less likely to accept (aOR 0.54, 95% CI: 0.31–0.95, p=0.031). Age and residence were not significantly associated with acceptance.

DISCUSSION

This hospital-based cross-sectional study explored acceptance rates and barriers to Pap smear screening and HPV vaccination among women attending a tertiary care gynaecology OPD in South India. The study highlights low baseline uptake of preventive strategies, with only 28.2% of participant's ever undergoing Pap smear screening and 12.7% reporting HPV vaccination. However, willingness improved substantially following counselling, with 55.4% of women expressing readiness for Pap smear and nearly half (48.6%) indicating willingness for HPV vaccination. These findings reveal significant gaps but also opportunities for targeted interventions to improve cervical cancer prevention. The low uptake observed is consistent with national surveys and regional studies. According to NFHS-5, less than 25% of Indian women aged 30-49 years have undergone cervical cancer screening.[9] Similar hospital-based studies report Pap smear uptake between 20% and 35%.[13,14] Our findings align with these estimates, reinforcing that opportunistic screening remains underutilised. HPV vaccination coverage was also poor (12.7%), which mirrors data from Maharashtra and Karnataka reporting uptake of 10–15%.[15] In contrast, high-income countries with organised vaccination programmes have achieved coverage >70%.[10] These disparities underline systemic challenges in India, where cervical cancer remains the second most common cancer among women.[16]

The most frequently cited barrier was lack of awareness (64.1%). This finding mirrors earlier Indian studies, where lack of knowledge consistently emerges as the strongest obstacle.[17,18] Fear of pain or diagnosis (41.8%) and embarrassment (38.6%) were also prevalent, reflecting cultural and psychosocial dimensions of healthcare-seeking behaviour. Studies in Delhi and Tamil Nadu similarly reported embarrassment, fear of cancer detection, and concerns about modesty as major deterrents.[18,19]

For HPV vaccination, safety concerns (29.1%) and spousal disapproval (18.2%) were notable. Misconceptions linking HPV vaccines to infertility or sexual promiscuity have been reported widely in South Asia.[20] Vaccine hesitancy is compounded by misinformation, as described by Larson et al., who noted declining vaccine confidence in several LMICs.[12] The cost of vaccination, perceived as high by 34.5% of women, further constrained uptake. Although India recently introduced an affordable indigenous HPV vaccine through the Universal Immunisation Programme, cost-related perceptions persist.[21]

Multivariable analysis highlighted education, knowledge, and provider recommendation as strong predictors of acceptance. Women with college-level education were more than twice as likely to accept screening and vaccination. This finding is consistent with Gakidou et al., who demonstrated a positive correlation between educational attainment and cervical cancer screening across 57 countries.[22] Adequate knowledge similarly increased acceptance nearly threefold, echoing findings from Gupta et al., where knowledge significantly influenced preventive practices.[14]

The strongest determinant was provider recommendation (aOR 3.42). Gilkey MB et al. reported that healthcare provider advice is the single most powerful driver of HPV vaccine uptake.[23] In India, physician influence is particularly pronounced, as women often defer health decisions to trusted clinicians. This emphasises the need to institutionalise routine provider-led counselling in

OPD settings. Conversely, perceived cost barriers reduced acceptance (aOR 0.54). Out-of-pocket expenditure remains a major barrier to preventive healthcare in India.[24] Subsidising Pap smear services and ensuring free vaccine availability through public programmes may mitigate this challenge. The results underscore the urgent need for structured awareness campaigns targeting women of reproductive age. Educational interventions using culturally sensitive messages, visual aids, and community health workers could address misconceptions. Integrating counselling into routine gynaecology OPD consultations would leverage provider influence. Ensuring privacy during screening and availability of female providers could reduce embarrassment-related barriers. Furthermore, engaging men and families in educational efforts may overcome spousal resistance. At the policy level, sustained implementation of the indigenous HPV vaccine within the Universal Immunisation Programme offers an opportunity to enhance vaccine coverage. Coupling vaccination with school-based or adolescent health initiatives could further improve uptake. The study's strengths include systematic sampling, use of a validated questionnaire, and application of multivariable analysis to identify determinants. However, limitations must be acknowledged. Being a single-centre, hospital-based study, generalisability to community settings may be limited. Self-reported practices and willingness may be subject to recall and social desirability bias. Moreover, intention to screen or vaccinate may not always translate into actual behaviour.

CONCLUSION

In summary, this study demonstrates low but improvable acceptance of Pap smear and HPV vaccination among women attending a tertiary care OPD. Awareness deficits, psychosocial barriers, and cost concerns remain major obstacles, while higher education, adequate knowledge, and provider recommendation significantly enhance acceptance. Targeted health education, affordability measures, and routine provider-driven counselling can bridge the gap between willingness and actual uptake, thereby advancing India's cervical cancer prevention agenda.

REFERENCES

1. Sung H, et al. Global cancer statistics 2020: GLOBOCAN estimates. CA Cancer J Clin. 2021;71(3):209-249.
2. Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, et al. Global Cancer Observatory: Cancer Today. Lyon: International Agency for Research on Cancer; 2020 (https://gco.iarc.fr/today, accessed February 2021).
3. Raychaudhuri S, Mandal S. Socio-demographic and behavioural risk factors for cervical cancer and knowledge, attitude and practice in rural and urban areas of North Bengal, India. Asian Pac J Cancer Prev. 2012;13(4):1093-1096.
4. India State-Level Disease Burden Initiative Cancer Collaborators. The burden of cancers and their variations across the states of India: The Global Burden of Disease Study 1990-2016. Lancet Oncol. 2018;19(10):1289-1306.
5. Bosch FX, Lorincz A, Muñoz N, Meijer CJ, Shah KV. The causal relation between human papillomavirus and cervical cancer. J Clin Pathol. 2002;55(4):244-265.
6. Franco EL, Duarte-Franco E, Ferenczy A. Cervical cancer: epidemiology, prevention and the role of human papillomavirus infection. CMAJ. 2001;164(7):1017-1025.
7. World Health Organization. Electronic address: sageexecsec@who.int. Human papillomavirus vaccines: WHO position paper, May 2017-Recommendations. Vaccine. 2017;35(43):5753-5755.
8. Arbyn M, Anttila A, Jordan J, et al. European Guidelines for Quality Assurance in Cervical Cancer Screening. Second edition--summary document. Ann Oncol. 2010;21(3):448-458.
9. NFHS-5. National Family Health Survey-5 (2019–21), India Report. IIPS & MoHFW.
10. Bruni L, Saura-Lázaro A, Montoliu A, et al. HPV vaccination introduction worldwide and WHO and UNICEF estimates of national HPV immunization coverage 2010-2019. Prev Med. 2021;144:106399.
11. Government of India. Operational guidelines for HPV vaccine introduction. MoHFW; 2023.
12. Larson HJ, Jarrett C, Eckersberger E, Smith DM, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: a systematic review of published literature, 2007-2012. Vaccine. 2014;32(19):2150-2159.
13. Raychaudhuri S, Mandal S. Socio-demographic and behavioural risk factors for cervical cancer and knowledge, attitude and practice in rural and urban areas of North Bengal, India. Asian Pac J Cancer Prev. 2012;13(4):1093-1096.
14. 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. 2021;28:10732748211010799.
15. Madhivanan P, Li T, Srinivas V, Marlow L, Mukherjee S, Krupp K. Human papillomavirus vaccine acceptability among parents of adolescent girls: obstacles and challenges in Mysore, India. Prev Med. 2014;64:69-74.
16. WHO. Global strategy to accelerate the elimination of cervical cancer as a public health problem. Geneva: WHO; 2020.
17. Nelson SB, Viswanathan N,Jenifer NA, Priyanka B. A cross-sectional study oncervical cancer and its prevention among women ofage group 25- 50 years in a rural area of South TamilNadu, India. Int J Community Med Public Health2018;5:2536-41.
18. Petersen Z, Jaca A, Ginindza TG, et al. Barriers to uptake of cervical cancer screening services in low-and-middle-income countries: a systematic review. BMC Womens Health. 2022;22(1):486.
19. Shetty S, Prabhu S, Shetty V, Shetty AK. Knowledge, attitudes and factors associated with acceptability of human papillomavirus vaccination among undergraduate medical, dental and nursing students in South India. Hum Vaccin Immunother. 2019;15(7-8):1656-1665.
20. Perlman S, Wamai RG, Bain PA, Welty T, Welty E, Ogembo JG (2014) Knowledge and Awareness of HPV Vaccine and Acceptability to Vaccinate in Sub-Saharan Africa: A Systematic Review. PLoS ONE 9(3): e90912.
21. Government of India. Operational guidelines for HPV vaccine introduction. MoHFW; 2023.
22. Gakidou E, Nordhagen S, Obermeyer Z. Coverage of cervical cancer screening in 57 countries: low average levels and large inequalities. PLoS Med. 2008;5(6):e132.
23. Gilkey MB, McRee AL. Provider communication about HPV vaccination: A systematic review. Hum Vaccin Immunother. 2016 Jun 2;12(6):1454-68.
24. Gupta S, Dey A, Kundu S, Sinha Gupta S. Barriers to Cervical Cancer Screening in India: Insights from National Family Health Survey-5 Data. Asian Pac J Cancer Prev. 2025 May 1;26(5):1853-1861.