ASSESSMENT OF KNOWLEDGE, ATTITUDES, AND PRACTICES AMONG PHYSICIANS, PAEDIATRICIANS, AND GYNAECOLOGISTS IN KOCHI REGARDING HPV VACCINE PRESCRIPTION

Dissertation Submitted to

The IIHMR University, Jaipur

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Master of Business Administration (MBA)

in

Hospital and Health Management

by

Maneesha Mohan

Under the Supervision and Guidance of

Dr. Mamta Chauhan

2025

IIHMR UNIVERSITY

CERTIFICATE

This is to certify that Ms. Maneesha Mohan in partial fulfillment of the requirements for the award of the degree of MBA(Hospital and Health Management) from the IIHMR University, Jaipur has successfully completed her internship at Center for Behavioral Sciences, IIHMR University during Mar 10 - May 31, 2025 under the guidance and supervision of Dr.Mamta Chauhan, Professor and Head, Centre for Behavioral Sciences.

Place: Jaipur

Dr.Mamta Chauhan

Preceptor/Head of the Organization

Center for Behavioral Sciences,
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Date:16.06.2025

IIHMR UNIVERSITY

CERTIFICATE

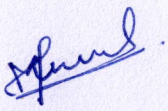
This is to certify that the dissertation titled **'Assessment of Knowledge, Attitudes, And Practices Among Physicians, Paediatricians, And Gynaecologists In Kochi Regarding** HPV **Vaccine Prescription'** is a record of the research work undertaken by Maneesha Mohan in partial fulfilment of the requirements for the award of the degree of MBA- Hospital and Health Management from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

Faculty Guide
IIHMR University, Jaipur
Date: 16.06.2025

School Dean
IIHMR University, Jaipur
Date: 16.06.2025

DECLARATION BY STUDENT

I hereby declare that this dissertation titled '**Assessment of Knowledge, Attitudes, And Practices Among Physicians, Paediatricians, And Gynaecologists in Kochi Regarding HPV Vaccine Prescription'** is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.



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Date: 16.06.2025

Abstract

Keywords:
HPV Vaccine, Cervical Cancer, KAP Study, Physicians, Gynaecologists, Paediatricians, Cervavac, Vaccine Prescription, Kochi

Background:
Cervical cancer is one of the most preventable but common cancers among Indian women. Human Papillomavirus (HPV) is the major etiological agent, and prevention through vaccination is accepted worldwide. In spite of the existence of vaccines such as Gardasil, Cervarix, and now India's own indigenous Cervavac, the acceptability has been poor in India. The role of the healthcare provider in vaccine promotion and patient acceptance cannot be undermined and requires a determination of their knowledge, attitude, and practice (KAP) regarding prescription of HPV vaccine.

Objective:
To evaluate the knowledge, attitude, and practice (KAP) of physicians—gynaecologists and paediatricians—of Kochi towards HPV vaccine prescription and to determine enablers and barriers that impact their prescribing behaviours.
A cross-sectional quantitative survey was carried out among 120 registered medical professionals in Kochi during April and May 2025. A validated 24-item structured questionnaire, expert reviewed, and pilot tested, was used to measure KAP. Participants were sampled by convenience sampling and consisted of paediatricians, gynaecologists, and general practitioners. Descriptive and inferential statistics were carried out using SPSS.

Results
High awareness among physicians regarding HPV, its spread, and its association with cervical cancer was reported in the study. At the same time, gaps within normal prescription of the vaccine were largely noted. Though 80% stated that they had once prescribed the vaccine, only 55% prescribed the vaccine consistently. Cost, patient resistance, and cultural barriers were the key deterrents. Statistically significant relationships between medical specialty and knowledge or attitude measures, with gynaecologists and paediatricians being more strongly aligned with vaccine-related practice.

Conclusion:

Although there is extensive theoretical expertise and positive attitudes toward HPV vaccination, realworld prescribing habits among physicians continue to be variable. Scal ed-up target Continuing Medical Education (CME), institutional guidelines, and public-private collaborations—like Cervavac introduction—can improve HPV vaccine coverage. These results add evidence to national immunization programme planning and physician-targeted interventions to effectively stem cervical cancer.

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This dissertation marks the culmination of an academic journey that has been both intellectually rewarding and personally meaningful. Its successful completion would not have been possible without the generous support, encouragement, and guidance of several individuals and institutions.

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CHAPTER ONE: INTRODUCTION

Cervical cancer is a common public health issue globally; its burden is disproportionately high in low- and middle-income nations. In India, it is the second most common cancer among women and has an estimated 132,000 new cases and over 80,000 deaths every year [1]. These statistics are especially alarming considering that cervical cancer can be prevented by early detection and immunization against human papillomavirus (HPV), the primary etiological factor. HPV types 16 and 18 cause over 70% of cervical cancers globally [2]. The history of the illness is most often silent and symptomatic only in advanced cases, further cementing the significance of early intervention and prevention.

Physicians, gynecologists, and pediatricians hold a key position in recommending and prescribing such life-saving vaccines, but research suggests that there remains a lingering gap between provider knowledge and practice [3]. The importance of healthcare providers' roles in vaccine acceptance cannot be overstated providers' recommendations have a substantial impact on patient choices, particularly for new vaccines such as HPV vaccines [4]. In the Indian setting, where cultural acceptability of sexual health issues usually makes matters complex, provider confidence and belief in prescribing HPV vaccination becomes even more important [5].

This research thus aims to understand the knowledge, attitudes, and practices (KAP) of healthcare workers toward HPV vaccination in Kochi, Kerala, with a view to determining action-oriented avenues for increasing vaccination coverage.

Even since the availability of effective HPV vaccines in the world, Gardasil®, an FDA-approved quadrivalent vaccine in June 2006, and Cervarix®, an EU-approved bivalent vaccine in 2007 and a US-approved one in 2009, their use in India has been restricted [6]. Although these vaccines entered India in the year 2008, they were mainly available in the private sector and at very expensive prices, rendering them out of reach for the majority of the population. The newer Gardasil 9®, a nine-valent vaccine, was licensed in the US in December 2014, providing wider protection against still more HPV types; however, it also encountered the same issues of access and affordability in India. Failure to include the HPV vaccine in the Universal Immunization Program (UIP) and the lackluster national rollout plans further slowed its universal acceptance. Availability of India's first indigenous HPV vaccine, Cervavac, in 2023, under a public-private partnership between the Serum Institute of India and Department of Biotechnology, is a

significant move toward enhancing accessibility and affordability, especially at the public health level [7].

Yet, for this innovation to be realized at the population level, provider participation is key. Knowing what motivates physician prescription practices—especially the gap between knowledge and practice—is thus important to ensuring the full potential of this indigenous innovation [8].

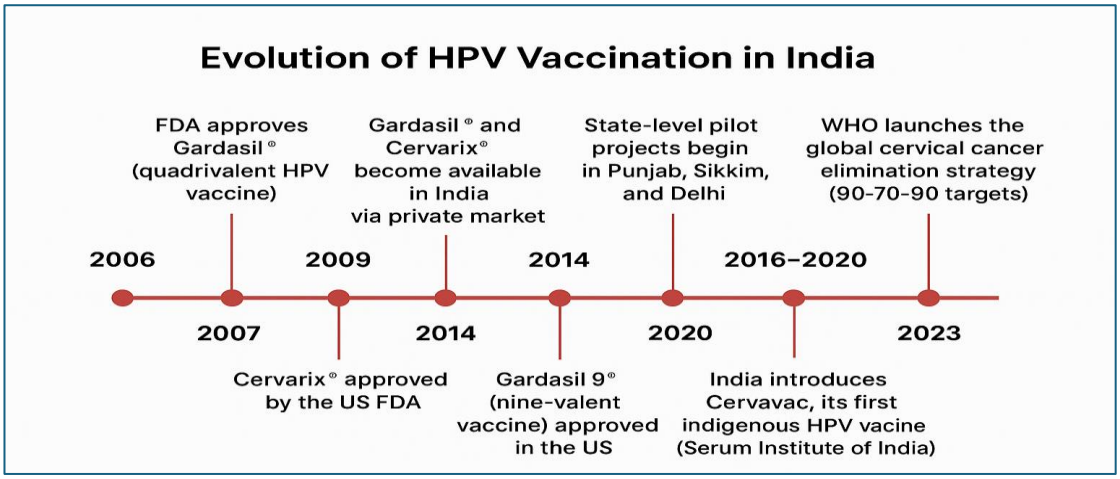

Fig.1: Evolution of HPV vaccines

1.1 Purpose of the Study

Indian doctors hold a gatekeeping role in the prescription and adoption of vaccines in the healthcare system. Studies conducted across the nation reflect a consistent picture: while doctors are knowledgeable about the vaccine and its benefits, rates of prescribing and recommending are low [3,4]. This gap between knowledge and action must be addressed further. The Knowledge, Attitude, and Practice (KAP) model provides a suitable framework to bridge this gap and identify targeted interventions.

Kerala offers a special setting in which to analyse HPV vaccination practices because of its singular healthcare environment. The state systematically beats national averages on every health indicator, with a maternal mortality rate of 43 (compared with national 113), infant mortality rate of 7 (compared with national 28), and female literacy of 97.9% (compared with national 70.3%). Kerala's health system is typified by a high density of public facilities supported by a strong private sector, and through initiatives such as the Karunya Arogya Suraksha Paddhati (KASP), it has almost universal health coverage. In this forward-thinking health setting, Kochi (Cochin) presents an ideal location for exploring provider behaviour toward HPV vaccination. As Kerala's commercial and healthcare hub, Kochi hosts multiple tertiary care centers, specialty

hospitals, and a diverse mix of healthcare providers across public and private sectors. The city's urban professional population represents an ideal demographic for early HPV vaccine adoption, yet preliminary observations suggest variable prescription patterns. Investigation of provider KAP in this comparably advanced health environment provides insights of value—if knowledge-practice gaps are here, they presumably represent systemic rather than educational problems. In addition, effective interventions designed for this environment may have the potential to serve as replicable models for other urban Indian cities,

The rationale for the research is established on this need. There is a need to urgently investigate not just the levels of awareness among doctors regarding HPV and cervical cancer prevention but also what they perceive are wary of and end up prescribing [5]. A KAP study among doctors, gynaecologists, and paediatricians in Kochi, Kerala provides a platform to study these interactions in the context of a health-literate urban setting. Wherever knowledge-practice gaps have taken place in such ideal circumstances, they can be even greater elsewhere within the country. Furthermore, the KAP study findings can be inputs to shape behaviour change programs, Continuing Medical Education (CME) modules, and institutional policies.

1.2 Aim of the Study:

To evaluate the knowledge, attitudes, and practices of physicians, paediatricians, and gynaecologists in Kochi towards prescribing HPV vaccines and to determine the most relevant factors affecting their prescribing behaviour.

1.3 Primary Objective:

To assess the knowledge, attitudes, and practices of physicians, paediatricians, and gynaecologists in Kochi with regard to HPV vaccine prescriptions.

1.4 Secondary Objectives:

- To determine the extent to which doctors are aware of HPV infection, existing vaccines and introduction of Cervavac and national immunization policies.
- To determine perceived barriers—social, cultural, economic, or institutional—that affect HPV vaccine recommendation by physicians.
- To examine physician-reported prescribing habits and consultation behaviors concerning HPV vaccination.

To maintain rigor in methodology, the KAP survey tool in this study was formulated following a review of comparable national and international questionnaires. The questions were worded within the Indian context and validated through pilot testing by expert opinions. The tool had questions across three broad areas: knowledge of HPV and its vaccine, attitude to its prescription, and practice of prescribing it. The survey was conducted among a stratified sample of healthcare workers in Kochi, with representation among specialties and practices. Preliminary signs from the survey are that there is high theory awareness, but unwillingness to translate this to practice due to social, institutional, or systems-related obstacles.

HPV situation in India must be analysed not merely from clinical but also from epidemiological, policy, and market perspectives. Epidemiologically, India has one of the highest age-standardized incidence rates of cervical cancer in the world [1]. The infection affects mostly women in their reproductive and early menopausal years, so its consequences fall particularly hard on families and communities. National guidelines prepared by the Indian Academy of Paediatrics and other professional associations recommend that the HPV vaccine must be administered to girls between 9–14 years of age [6]. These guidelines have not been equally converted into common clinical practice or public health measures.

In terms of immunization action, HPV vaccines are not yet added to India's Universal Immunization Programme. Demonstration projects have been piloted in selected states, including Sikkim, Punjab, and Delhi, with promising results; however, a nationwide scale-up is pending. While Cervavac is set to be a game changer, its introduction requires collaborative efforts from central and state governments, regulatory bodies, private healthcare networks, and frontline health workers [7].

India's HPV vaccine landscape is changing from a market view. The market of the vaccine initially depended on global companies like Merck and GlaxoSmithKline; however, with the arrival of Cervavac, a new era on indigenous production has begun [7]. With its extensive network of distribution, the Serum Institute of India will assist in reducing import reliance and overcoming cost hurdles. Yet efficient supply chains, equitable distribution, and robust demand-generating systems need to be implemented in order to reach the last mile. Demand estimation reveals an enormous gap between the number of girls who qualify, and the number of vaccinations delivered annually. Vaccine access can be restricted by a variety of factors. Sociocultural attitudes toward sexuality and immunizations among young people have a tendency to generate

resistance among parents and health workers [5]. Financial considerations remain a consideration despite cheaper vaccines, especially if vaccines are not publicly funded. Logistical challenges in terms of cold chain requirements, paperwork, and lack of assigned personnel make delivery challenging in resource-limited settings. The absence of standardized protocols and non-standardized messaging from institutions and authorities at the health system level creates uncertainty among physicians and the public.

1.5 Global Commitment to Eliminate Cervical Cancer: The WHO 90-70-90 Strategy

Fig.2: https://www.who.int/initiatives/cervical-cancer-elimination-initiative

In response to the increasing burden of cervical cancer, the World Health Organization (WHO) published a Global Strategy to Accelerate the Elimination of Cervical Cancer as a Public Health Problem in 2020 [1]. At the core of this plan is the "90-70-90" targets to be reached by 2030: 90% of girls fully vaccinated with the HPV vaccine by age 15, 70% of women screened with a high-performance test by 35 and again by 45, 90% of women diagnosed with cervical disease having received appropriate treatment.

This research supports the first pillar of this global strategy: increasing HPV vaccine coverage. Reaching the 90-70-90 goal involves synchronized efforts across several levels such as public health infrastructure, healthcare provider motivation, cost reduction, supply chains, and community awareness. In India, enabling doctors to recommend a vaccine confidently is one of the most urgent and powerful levers to expand immunization coverage.

The current research, by integrating primary KAP survey data with secondary data on the HPV vaccine market, challenges of implementation, and policy environment of Cervavac, attempts to provide an evidence-based explanation of what impedes and enables HPV vaccination in India. Such a strategy is in line with the goals of an MBA in

Hospital and Health Management, where provision of healthcare is not only viewed from a clinical angle, but rather as a complex intermix of behaviour, policy, economics, and systems thinking.

Overall, this research seeks to bridge the gap between action and evidence. In targeting physicians—the frontline defenders of preventive health—it pinpoints behavioural levers that can be used to scale HPV vaccination. Placing these findings in the broader context of Cervavac rollout and Indian policy, this study offers strategic guidance to health managers, administrators, and policymakers. It espouses a more human-centered, system-responsive framework for meeting cervical cancer that is attuned to the leading role of provider conduct, public trust, and mass innovation.

CHAPTER TWO: REVIEW OF LITERATURE

Cervical cancer continues to be one of the leading preventable causes of cancer-related deaths worldwide among Indian women. As much as the disease is preventable through early HPV vaccination and screening, the uptake has yet to improve. HPV types 16 and 18 cause more than 70% of all cervical cancers globally, a figure repeated in India. The illness, although preventable, tends to remain undetected because of poor awareness, sociocultural taboos, and systemic delivery barriers [10]. In this context, several studies have been conducted that evaluate the Knowledge, Attitude, and Practices (KAP) of healthcare providers and communities.

2.1 Indian KAP Studies Among Healthcare Providers and Users

Honcoop (2010), in qualitative research in New Delhi, investigated the diffusion of the HPV vaccine among doctors with Rogers' Diffusion of Innovation Theory. The study revealed salient barriers such as unease in discussing sexual health, low visibility of the target group (girls aged 12–18), and safety concerns. Doctors recognized the merits of the vaccine but mentioned cost and parental opposition as major obstacles. The study emphasized the importance of systematic education, family participation, and policy advocacy [11].

A notable study by Chawla et al. (2016) in Delhi-NCR investigated KAP among 590 healthcare workers. Although 81% of the respondents had heard of HPV vaccines, only 47% prescribed it. A glaring difference was observed between knowledge and practice, with private sector workers being more aware compared to government workers. Notably, just 27% of paramedical workers knew the names of HPV vaccines, reflecting a knowledge gap in frontline workers. The research concluded that continuous medical education and public education are essential to enhancing vaccine use.

A paper by Narayana et al. (2017) from South India on women patients visiting gynaecology departments showcased limited KAP even among consumers of health. Just 14.2% were aware of HPV, and fewer than 5% knew about the HPV vaccine. The findings showed considerable gaps by gender and education. This consumer-level barrier only adds more emphasis on physician-initiated vaccine promotion.

Misra et al. (2020) in a tertiary care setup in North India evaluated KAP among 368 females attending a gynaecology OPD. Although 41.8% had sufficient knowledge, just 6.2% of them had ever been vaccinated against HPV. A positive attitude was seen in 85.5% of the sample but poor practice, citing economic limitations and lack of

awareness as significant obstacles. It underscored financial accessibility and education in the community [12].

Goruntla et al. (2020) performed a cross-sectional survey in Andhra Pradesh among 296 physicians. They identified that the HPV vaccine was recommended by just 33.4% of physicians despite a relatively good overall awareness. The main hindrances were the absence of government supply, misinformation about safety, and exorbitant price in private sectors. Incorporation of the vaccine in national programs and increased CME coverage were suggested by the study [13].

Mandal et al. (2024), at AIIMS Kalyani, surveyed 250 nurses and junior doctors. Scores for knowledge and attitude were significantly high (over 70%), yet merely 9.3% routinely advised the HPV vaccine. The deterrents mentioned were institutional barriers, low patient demand, and a lack of training. The study highlighted enhancing provider communication and orientation to vaccine policy [14].

2.2 Policy Developments and Cervavac Introduction

As per the Press Information Bureau (2023), Cervavac's launch is a landmark step toward health equity. The announcement reiterated affordability, public-private partnerships, and implementation strategies targeting girls between 9–14 years of age through schools. It reflected policy commitment at the national level for the prevention of cervical cancer.

The Gavi Alliance (2023) placed Cervavac as a strategic option for low- and middle-income nations. The report spoke to India's global leadership in low-cost vaccine manufacturing and focused on how Cervavac could bridge gaps in affordability and supply chain worldwide.

Chatterjee et al. (2024) spoke about the introduction and implementation of Cervavac, the first indigenous HPV vaccine in India. With assistance from the Serum Institute of India and the Department of Biotechnology, Cervavac was launched in 2023 and subsequently included in the Universal Immunization Programme (UIP) in 2024. The paper focused on cost, reach, and WHO's single-dose policy as game changers, but also noted gaps in awareness and system-readiness [15].

2.3 Global Perceptions and Gender-Neutral Vaccine Models

Kaur et al. (2024) delivered an overview policy perception of the gender-neutrality of HPV vaccination in India. The article highlighted the insufficiency of female-centric vaccination and urged gender-neutral approaches. Relying on global experiences from Sweden, Australia, and the Netherlands, the research suggested that India implement a wider, gender-neutral vaccination policy for balanced health outcomes [16,17].

2.4 HPV Vaccination Studies in Kerala

The research on HPV vaccination in Kerala offers a fascinating reverse to national trends. A community-based survey by Aswathy et al. (2019) in rural Thiruvananthapuram district reported that even with high literacy in Kerala, HPV vaccination awareness was still low at 27.5% among adult women. Interestingly, when informed about the vaccine, however, 75.2% were willing to vaccinate their daughters, implying that informational interventions may be highly effective in this education-susceptible population. Within the context of healthcare providers, Mathew et al. (2022) interviewed 186 primary care physicians from three districts in Kerala and found that although 92% were familiar with HPV vaccines, just 38% routinely prescribed them to eligible patients. The study recognized a number of Kerala-specific factors that shaped prescription behaviour, such as the state's decentralized health decision-making, robust women's self-help networks (Kudumbashree), and comparatively higher patient health literacy leading to more nuanced vaccination conversations. The authors indicated that Kerala providers indicated more ease in discussing sexual health issues compared to others in other states but nonetheless listed parental reluctance as a significant obstacle. Subsequently, Thomas and Nair (2023) undertook a facility survey of 42 health institutions in Kerala and found wide disparities in the provision of HPV vaccine between the public and private sectors. While 86% of private centers carried HPV vaccines, just 12% of government centers did, leaving an access-equity problem in the face of otherwise robust state public health infrastructure. Importantly, no studies have directly addressed provider attitudes in Kochi, even though it is an important urban center of healthcare, and no studies have considered the potential effect of the introduction of Cervavac on provider prescribing practices in the Kerala setting.

2.5 Research Gaps and Requirement for the Current Study

Notwithstanding the large body of literature on HPV vaccination in India, various important knowledge gaps remain which the current study fills. Firstly, few studies have explored provider behavior after introducing Cervavac in 2023—a revolutionary event which possibly changes the cost-benefit considerations and accessibility factors that earlier guided prescription patterns. Second, prior research has tended to emphasize single-specialty views (mainly gynaecologists) instead of contrasting knowledge and practice across the various specialties engaged in adolescent immunization decisions. Third, a majority of Indian KAP studies have investigated rural areas or urban hubs like Delhi and Mumbai, with less emphasis on tier-2 cities that could have their own set of implementation dynamics. Furthermore, while several studies have documented knowledge-practice gaps, few have systematically investigated the underlying behavioural determinants or organizational factors influencing this disconnect. The current research overcomes these limitations by: (1) offering post-introduction data on provider practice; (2) comparing viewpoints between three important specialties—gynaecology, paediatrics, and general medicine; (3) targeting Kochi as a typical tier-2 urban city with high literacy but heterogeneous models of healthcare delivery; and (4) using an integrated KAP model that investigates not just the level of knowledge but also attitudinal and system-related barriers influencing prescription practices. This multi-dimensional strategy will produce actionable information for developing focused interventions to close the ongoing gap between provider knowledge and vaccination behaviours [18].

Table 2.1: Thematic Summary of Empirical Studies on HPV Vaccine Prescription, Provider Behavior, and Policy Initiatives in India

Study Theme	Author (Year)	Study Setting	Salient Features / Methodology	Key Findings / Implications
KAP Study	Honcoop (2010)	New Delhi	Qualitative interviews using Diffusion of Innovation Theory	Physicians hesitated to recommend the vaccine due to stigma, cost concerns, and lack of perceived demand. Recommended system-

Study Theme	Author (Year)	Study Setting	Salient Features / Methodology	Key Findings / Implications
				level education and public sensitization.
KAP Study	Chawla et al. (2016)	Delhi NCR	Cross-sectional survey of 590 healthcare providers in private and public hospitals	While 81% doctors were aware of the HPV vaccine, only 47% recommended it. Awareness among paramedics was low. The study stressed the need for targeted CME and front-line training.
KAP Study (Users)	Narayana et al. (2017)	South India	Cross-sectional hospital-based study among gynaecology patients	Only 14.2% had heard of HPV; <5% knew of the vaccine. Gender, education, and rural residence influenced awareness. Advocated for stronger provider advocacy.
KAP Study	Misra et al. (2020)	North India (tertiary hospital)	Hospital OPD-based survey among 368 women	85.5% had positive attitudes, but only 6.2% had been vaccinated. Main barriers were cost and misinformation. Highlighted the need for outreach and subsidization.

Study Theme	Author (Year)	Study Setting	Salient Features / Methodology	Key Findings / Implications
KAP Study	Goruntla et al. (2020)	Andhra Pradesh	Cross-sectional survey of 296 physicians	Only 33.4% recommended the vaccine. Barriers included cost, safety doubts, and lack of government supply. Emphasized expanding national policy and reducing price barriers.
Govt. Announcement	Press Information Bureau (2023)	India	Official government policy announcement	Declared Cervavac inclusion in UIP for girls 9–14. Highlighted school-based vaccination, PPP model, and alignment with WHO goals.
Global Access	Gavi Alliance (2023)	India / Global	Strategic access report for LMICs	Cervavac presented as scalable low-cost option for LMICs. Commended India for vaccine production capacity and global equity role.
KAP Study	Mandal et al. (2024)	AIIMS Kalyani, West Bengal	Survey of 250 junior doctors and nursing officers	High knowledge and attitude, but only 9.3% prescribed HPV vaccine. Identified systemic inertia, low demand, and institutional gaps.

Study Theme	Author (Year)	Study Setting	Salient Features / Methodology	Key Findings / Implications
Cervavac Policy	Chatterjee et al. (2024)	India	Narrative review of Cervavac's launch and UIP integration	Explained shift to Cervavac, India’s first indigenous HPV vaccine. Emphasized affordability, single-dose WHO backing, but noted system-level rollout challenges.
Policy / Gender	Kaur et al. (2024)	India (National Perspective)	Policy and global model review	Argued for gender-neutral HPV vaccination. Compared India with global leaders like Sweden. Noted Gardasil-9 cost and access barriers in India.

CHAPTER THREE: METHODOLOGY

This chapter provides an in-depth description of the research methodology used in this study, including the research design, setting, population, sampling methods, instrument development, data collection processes, analysis plan, and ethical considerations. Each methodological component was carefully chosen to be aligned with the research goals while optimizing the validity, reliability, and applicability of the findings.

3.1 Key Research Questions

The following research questions guided the study:

1. What is the knowledge level of doctors in Kochi about Human Papillomavirus (HPV) and the HPV vaccine?

2. What are the physicians' attitudes towards prescribing and recommending the HPV vaccine to their patients?

3. What are the existing practices among physicians, gynaecologists, and paediatricians in Kochi about prescription and recommendation of the HPV vaccine?

4. What are the barriers and facilitating factors affecting the decision of healthcare providers to prescribe or recommend the HPV vaccine?

3.2 Research Design

This research utilized a descriptive, cross-sectional design with a primarily quantitative methodology. The cross-sectional design was found to be applicable since it allows one to collect data at a single point in time, affording a picture of the current knowledge, attitudes, and practices among health providers. This exploratory research seeks to provide establishment insights into provider opinion within an urban Indian context, which can guide subsequent interventional studies and health promotion activities.

3.3 Setting of Study

The study was carried out in Kochi (previously known as Cochin), a key urban city in Kerala, southern India. This site was deliberately chosen for a number of reasons:

1. Kochi is a metropolitan city with a diverse healthcare provision consisting of public hospitals, private clinics, and specialty centers.

2. Kerala state is noted for high rates of literacy and healthcare indicators higher than the national average, providing an appropriate context in which to study provider behaviours within a relatively developed healthcare context.

3. Findings from this urban hub can be taken as a benchmark for similar metropolitan hubs throughout India, while remaining cognizant of regional differences.

3.4 Study Population

The target group included practicing healthcare professionals in Kochi who have a direct impact on preventive healthcare and decisions regarding vaccination, namely:

1.General physicians/family physicians who offer primary healthcare services

2.Gynecologists who take care of women's reproductive health

3.Pediatricians who take care of child and adolescent health and vaccination schedules

These experts were chosen based on their critical positions in recommending prevention, specifically HPV vaccination for preventing cervical cancer. Attention to various specialties permitted comparison among various types of providers who have contact with potential vaccinees.

3.5 Sampling Technique and Sample Size

3.5.1 Sampling Method

The research used a non-probability convenience sampling strategy to enrol participants. Though initially framed as a pan-India examination, logistical limitations compelled the exclusion of the field to Kochi. Professional networks, medical associations, and institutional connections were leveraged to reach potential participants from a range of practice settings.

3.5.2 Sample Size Calculation

The sample size was calculated with Cochran's formula:

$n = Z^2p(1-p)/e^2$

Where:

•n = required sample size

•Z = standard normal deviate (1.645 for 90% confidence level)

•p = estimated proportion of providers with sufficient knowledge (0.439, using similar studies in Andhra Pradesh)

•e = desired precision (0.05)

This estimate provided a necessary sample size of 267. Given the exploratory nature of the research, time limitations, and expected response rates for surveys with healthcare providers, a pragmatic goal of 120 completed questionnaires was set. This sample size will provide initial insights with recognition of limitations in statistical power for subgroup analysis. [18,19]

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion Criteria

• Registered medical professionals (MBBS, MD, MS, DNB, or equivalent) currently practicing in Kochi

• Specialists in general medicine, family medicine, gynaecology, or paediatrics

• Providers providing preventive care and vaccination counselling

• Minimum one year of experience in clinical practice

• Voluntary agreement to participate in the study

3.6.2 Exclusion Criteria

• Medical professionals not actively involved in patient care

• Specialists whose practice is not typically preventive care counselling

• Providers practicing outside the geographical limits of Kochi

• Medical students and trainee doctors

• Those who refused to participate or provided very incomplete answers

3.7 Research Instrument Development and Validation

3.7.1 Questionnaire Design

A standardized, self-completion questionnaire was constructed as the main tool for data collection. The 24-question questionnaire, "Survey on HPV Vaccine Awareness and Practices Among Doctors in Kochi," was divided into four sections:

1.Demographic and Practice Information (4 items): Gender, specialty of medicine, number of years of experience, and location of practice

2. Knowledge Assessment (9 questions): Items testing factual knowledge of HPV infection, cervical cancer risk factors, diseases related to HPV, types of vaccine available in India, national immunization program status, age for vaccination recommended, and transmission aspects [20].

3.Attitude Assessment (7 items): Mostly 5-point Likert scale items (Strongly Agree to Strongly Disagree) measuring beliefs regarding vaccine effectiveness, cost-related barriers, cultural reluctance, support for mandatory vaccination, concern for safety, and concerns regarding the sexually transmitted nature of HPV.

4.Practice Assessment (4 items): Items for self-reported current recommendation practice, specific barriers to recommending HPV vaccines, what time in a patient visit is ideal for having the HPV discussion, and how often to provide information on cervical cancer prevention [21].

3.7.2 Instrument Validation

The questionnaire was constructed by a structured process that started with an extensive literature review of pre-tested KAP instruments of studies carried out in Andhra Pradesh, North India, AIIMS Kalyani, and the UAE. Content validation was subsequently conducted by my faculty advisor. After scrutiny, the instrument was refined based on their comments to improve clarity, relevance, and cultural appropriateness.

The knowledge section was marked on a binary scale (correct/incorrect) for questions with clear-cut answers (e.g., "Is HPV infection a sexually transmitted disease?"), and multiple-select knowledge questions (e.g., "Which HPV vaccines are available in India?") were marked by the number of correct options endorsed. Attitude items employed a 5-point Likert scale from "strongly disagree" (1) to "strongly agree" (5). Practice items had both categorical answers and "select all that apply" with an open-ended aspect to identify other barriers not mentioned in the predetermined choices.

3.8 Data Collection Procedure

Data collection took place over six weeks from April 1 through May 15, 2025. A multi-modal method was used to maximize response rates:

1. **Online Distribution of Survey**: A Google Form survey called "Survey on HPV Vaccine Awareness and Practices Among Doctors in Kochi" was developed and shared via WhatsApp groups to the potential respondents using professional connections and medical associations.

2. **Professional Network Dissemination**: The survey link was circulated by medical society WhatsApp groups and professional networks after taking permission from the group administrators, follow up was carried out manually.

3. **Data Security**: Answers were automatically saved in a password-protected Google Drive only accessible to the lead investigator

The survey began with a comprehensive introduction stating the purpose of the study, estimated time to complete (5-7 minutes), voluntary participation, and confidentiality guarantees. Clear informed consent was elicited by requiring a forced choice of "I Agree to Participate" prior to allowing respondents to access the questionnaire items. Respondents who chose "I Do Not Agree" were automatically removed from the survey.

3.9 Data Analysis Plan

All the data was organized and coded using Microsoft Excel and analysed using Statistical Package for Social Sciences (SPSS) version 20.0, continuous variables expressed in frequencies and percentage, and to assess the association between variables using cross tabs and chi-square test, all statistical significance will be defined as $p<0.05$.

3.10. Ethical Considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and national research ethics guidelines. Specific ethical considerations included:

3.10.1 Institutional Review

Ethical clearance was obtained from the Institutional Ethics Committee of IIHMR University prior to commencing the study.

3.10.2 Informed Consent

Participants were provided with comprehensive information regarding:

- Study purpose and objectives
- Voluntary nature of participation

- Right to withdraw at any stage
- Confidentiality assurances
- Intended data use and dissemination plans

Digital informed consent was obtained from all participants before they could access the survey questions.

3.10.3 Confidentiality and Data Protection

- No personally identifiable information was collected
- IP addresses were not stored
- Data were stored in encrypted, password-protected files
- Access to raw data was restricted to the principal investigator
- Results are reported only in aggregate form

3.10.4 Risks and Benefits

The study posed minimal risk to participants, primarily the opportunity cost of time spent completing the survey (approximately 10-15 minutes). While there were no direct benefits to participants, they were informed that their contributions would advance understanding of provider perspectives on HPV vaccination in India, potentially informing future educational initiatives and policy recommendations.

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Chapter 4: Results

This chapter reports the results from the Knowledge, Attitude, and Practice (KAP) survey among 120 doctors in Kochi prescribing HPV vaccine.
The findings are arranged into five sections: Demographic
Profile, respondents' Knowledge, Attitude, and Practice, followed by an analysis of associations between demographic and KAP variables.

4.1 Demographic Profile of Respondents

There were 120 doctors involved in the study. Of these, 55.8% were women and 44.2% were men. Most of them were from the specialties of paediatrics (40.0%) and gynaecology (31.7%), followed by physicians (22.5%) and general practitioners (5.8%). Most of the respondents had good clinical experience and were practicing for 31.7% of 11–15 years and 27.5% of 6–10 years. In terms of setting, 68.3% worked in private hospitals, 20.8% in private clinics, and 10.8% in government hospitals.

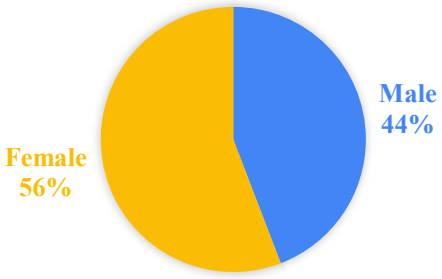
4.1.1 Gender of Respondents

Out of the 120 doctors who participated in the survey, a majority were female (55.8%), while 44.2% were male.

Table 4.1.1: Gender Distribution of Respondents

Gender	Frequency (n)	Percentage (%)
Male	53	44.20%
Female	67	55.80%
Total	**120**	**100.00%**

FIGURE 4.1 Gender Distribution Of Respondents



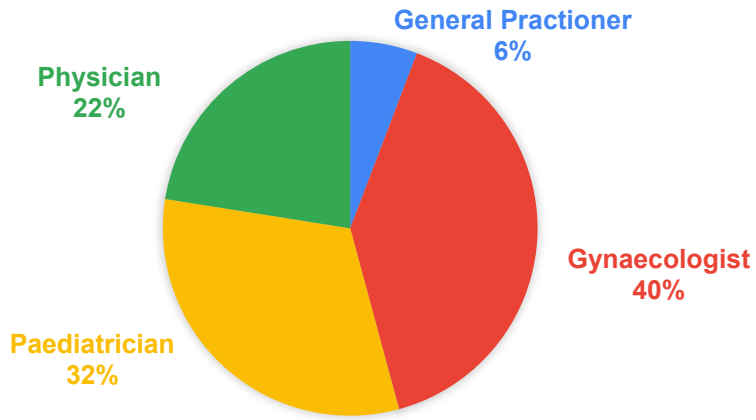
4.1.2 Medical Specialty of Respondents

Participants in the study belonged to various specialties, with the majority being gynaecologists (40%), followed by paediatricians (31.7%).

Table 4.1.2: Medical Specialty of Respondents

Specialty	Frequency (n)	Percentage (%)
General Practitioner	7	5.80%
Gynaecologist	48	40.00%
Paediatrician	38	31.70%
Physician	27	22.50%
Total	**120**	**100.00%**

FIGURE 4.1.2 Medical Specialties Of Respondents



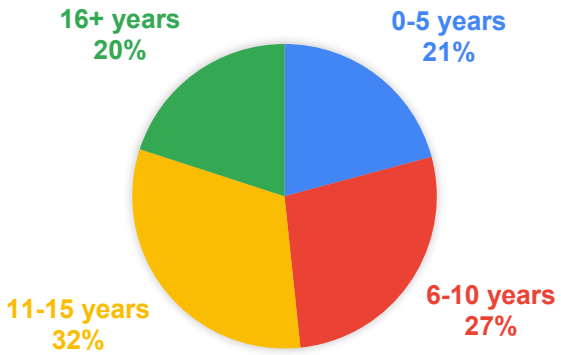
4.1.3 Years of Practice

Respondents reported a wide range of clinical experience. Most had been practicing for 11–15 years (31.7%), followed by 6–10 years (27.5%).

Table 4.1.3: Years of Medical Practice

Years of Experience	Frequency (n)	Percentage (%)
0-5 years	25	20.80%
6-10 years	33	27.50%
11-15 years	38	31.70%
16+ years	24	22.00%
Total	**120**	**100.00%**

FIGURE 4.1.3 Years Of Medical Practice Among Respondents



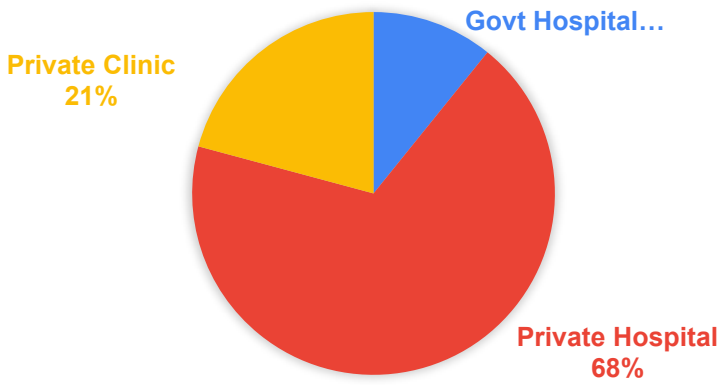
4.1.4 Type of Healthcare Setting

A significant majority of respondents (68.3%) were affiliated with private hospitals, while 20.8% worked in private clinics and 10.8% in government hospitals.

Table 4.1.4: Primary Healthcare Setting of Respondents

Healthcare Setting	Frequency (n)	Percentage (%)
Government Hospital/Sector	13	10.80%
Private Hospital	82	68.30%
Private Clinic	25	20.80%
Total	**120**	**100.00%**

FIGURE 4.1.4 Healthcare Setting Of Respondents



4.2 HPV and HPV Vaccine Knowledge

The respondents indicated high knowledge levels about HPV infection and immunization. All the participants mentioned cervical cancer as an HPV-related disease, and 89.2% mentioned vaginal cancer as well. Strong awareness of marketed HPV vaccine brands was also evident, with Gardasil and Gardasil-9 being known by 85% of the respondents, followed by 69.2% knowing Cervavac.

Whereas 90% correctly responded that HPV vaccine is presently not part of India's national immunization program, 83.3% properly identified 9–14 years as the age of vaccination.

Almost all (98.3%) identified HPV as a sexually transmitted disease, and 99.2% properly linked HPV infection to cervical cancer.

Majority of doctors (85.8%) knew that HPV infection is typically asymptomatic, although there was some doubt.

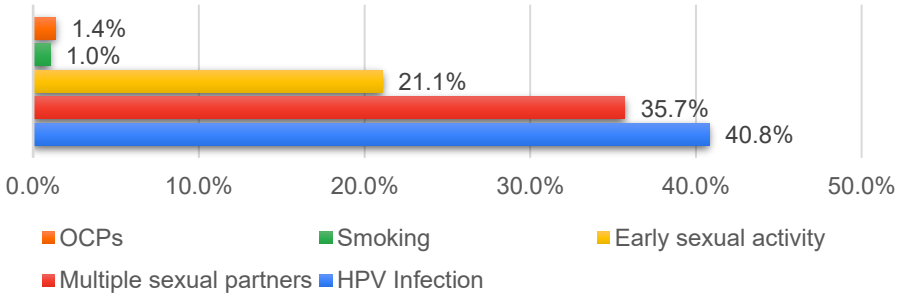
4.2.1 Risk Factor Knowledge for Cervical Cancer

The respondents were questioned on the main cervical cancer risk factors. The majority of respondents identified the risk factors as HPV infection (100%), having multiple partners (87.5%), and early initiation of sex (51.7%).

Table 4.2.1: Knowledge of Risk Factors for Cervical Cancer

Risk Factor	Frequency (n)	Percent of Responses (%)	Percent of Cases (%)
HPV Infection	120	40.80%	100.00%
Multiple sexual partners	105	35.70%	87.50%
Early sexual activity	62	21.10%	51.70%
Smoking	3	1.00%	2.50%
Oral contraceptive pills (OCPs)	4	1.40%	3.30%
Total Responses	**294**	**100.00%**	**245.0%***

Figure 4.2.1: Awareness of Major Risk Factors for Cervical Cancer



Note: Total % of cases >100 due to multiple responses allowed.

4.2.2 Awareness of Available HPV Vaccines in India

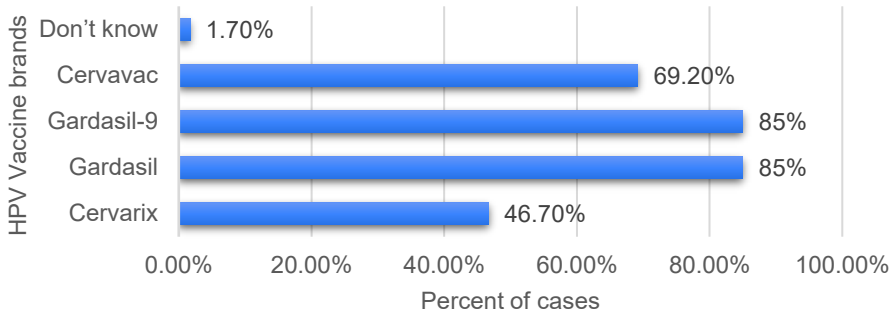
Doctors were asked to identify HPV vaccines available in India. The most commonly recognized vaccines were Gardasil and Gardasil-9 (each selected by 85%), followed by Cervavac (69.2%) and Cervarix (46.7%).

Table 4.2.2: Awareness of Available HPV Vaccines in India

HPV Vaccine	Frequency (n)	Percent of Responses (%)	Percent of Cases (%)
Cervarix	56	16.20%	46.70%
Gardasil	102	29.60%	85.00%

Gardasil-9	102	29.60%	85.00%
Cervavac	83	24.10%	69.20%
Don’t know	2	0.60%	1.70%
Total Responses	**345**	**100.00%**	**287.5%***

Figure 4.2.2 Awareness of HPV vaccine brands in India



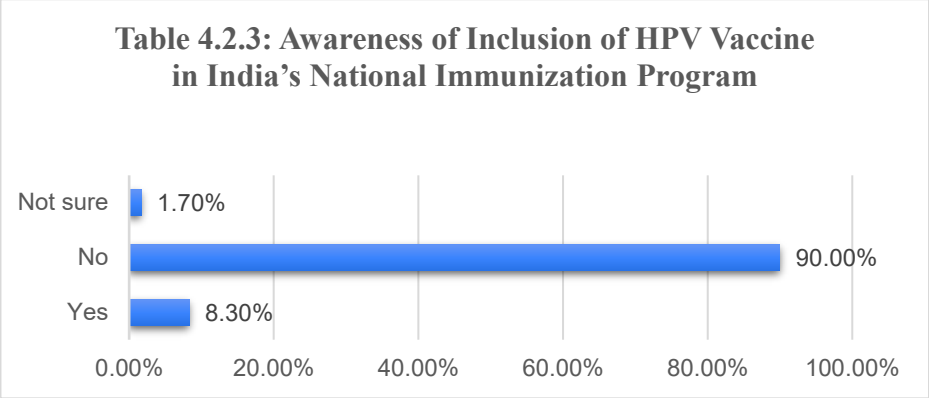
Note: Percent of cases >100 due to multiple selections.

4.2.3 Inclusion of HPV Vaccine in India’s National Immunization Program

A large majority of respondents (90%) correctly identified that the HPV vaccine is **not** currently included in India's national immunization program, while a small fraction (8.3%) believed it was, and 1.7% were unsure.

Table 4.2.3: Awareness of Inclusion of HPV Vaccine in India’s National Immunization Program

Response	**Frequency (n)**	**Percentage (%)**
Yes	10	8.30%
No	108	90.00%
Not sure	2	1.70%
Total	**120**	**100.00%**

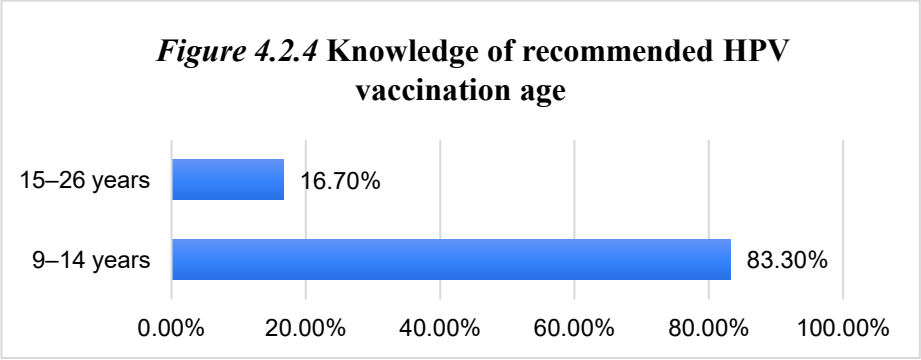


4.2.4 Recommended Age for HPV Vaccination (Per Current Guidelines)

Most doctors (83.3%) correctly identified that the appropriate age to initiate HPV vaccination is between **9–14 years**, in line with WHO and national guidelines. A smaller proportion (16.7%) believed the suitable age to be 15–26 years.

Table 4.2.4: Knowledge of Recommended Age for HPV Vaccination

Age Group	Frequency (n)	Percentage (%)
9–14 years	100	83.30%
15–26 years	20	16.70%
Total	**120**	**100.00%**

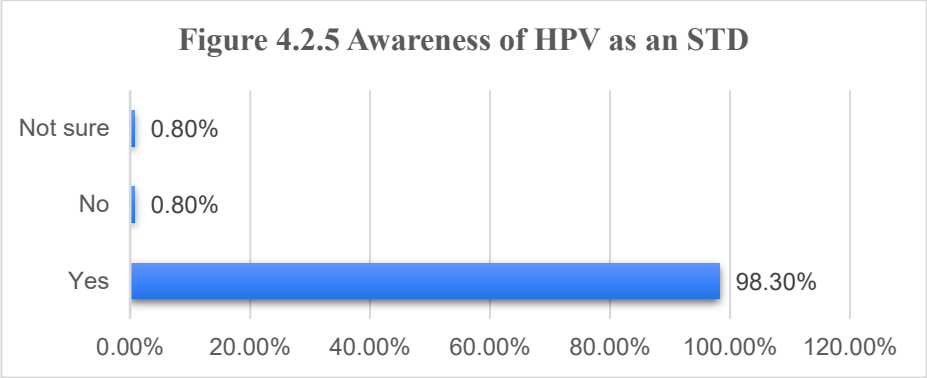


4.2.5 HPV Infection - A Sexually Transmitted Disease

Almost all respondents (98.3%) correctly identified HPV as a sexually transmitted disease. Only one respondent answered "No," and one was unsure.

Table 4.2.5: Awareness of HPV as a Sexually Transmitted Disease

Response	Frequency (n)	Percentage (%)
Yes	118	98.30%
No	1	0.80%
Not sure	1	0.80%
Total	**120**	**100.00%**



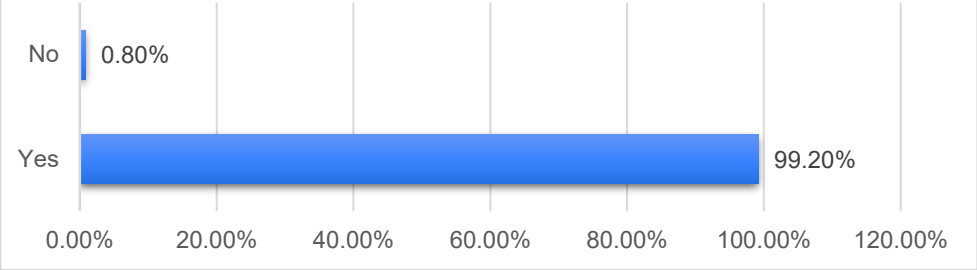
4.2.6 HPV Infection and Cervical Cancer

An overwhelming majority of respondents (99.2%) correctly acknowledged that HPV infection can cause cervical cancer.

Table 4.2.6: Knowledge of HPV as a Cause of Cervical Cancer

Response	Frequency (n)	Percentage (%)
Yes	119	99.20%
No	1	0.80%
Total	**120**	**100.00%**

Figure 4.2.6 Belief that HPV can cause cervical cancer



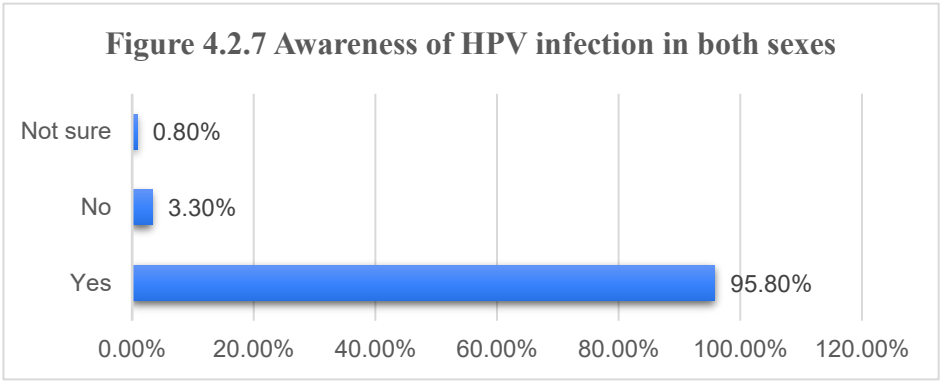
4.2.7 HPV Infection in Both Men and Women

Nearly all participants (95.8%) correctly indicated that HPV can infect both men and women. However, a small proportion were either unsure or incorrect.

Table 4.2.7: Awareness of HPV Affecting Both Men and Women

Response	Frequency (n)	Percentage (%)
Yes	115	95.80%
No	4	3.30%
Not sure	1	0.80%
Total	**120**	**100.00%**

Figure 4.2.7 Awareness of HPV infection in both sexes

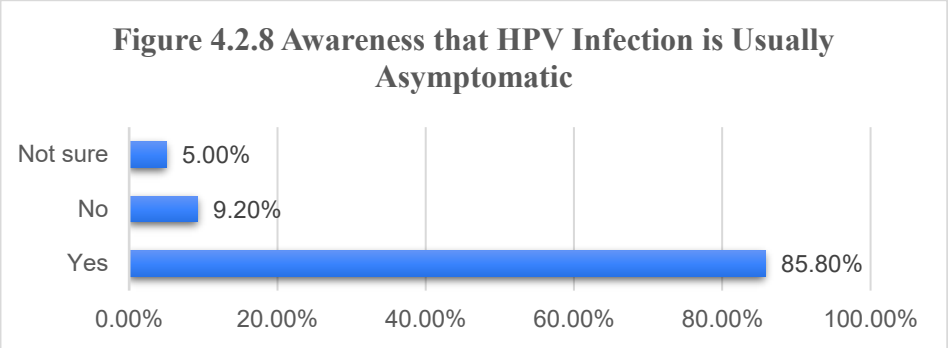


4.2.8 Is HPV Infection Usually Asymptomatic?

The majority of respondents (85.8%) were aware that HPV infection is typically asymptomatic. However, 9.2% incorrectly believed it is not, and 5% were unsure.

Table 4.2.8: Awareness that HPV Infection is Usually Asymptomatic

Response	Frequency (n)	Percentage (%)
Yes	103	85.80%
No	11	9.20%
Not sure	6	5.00%
Total	**120**	**100.00%**



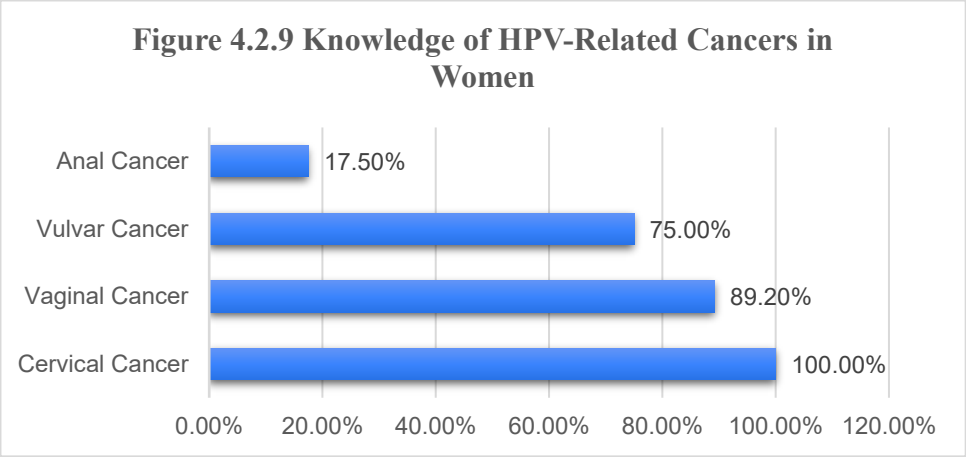
4.2.9 HPV-Related Cancers in Women

4.2.9 Knowledge of HPV-Related Cancers in Women (Q12)

Respondents were asked to identify which cancers in women are caused by HPV. All respondents correctly identified cervical cancer (100%). A majority also recognized vaginal cancer (89.2%) and vulvar cancer (75%) as HPV-related. Fewer respondents (17.5%) identified anal cancer as associated with HPV.

Table 4.2.9: Knowledge of HPV-Related Cancers in Women

Cancer Type	Frequency (N)	Percent of Responses (%)	Percent of Cases (%)
Cervical Cancer	120	35.50%	100.00%
Vaginal Cancer	107	31.70%	89.20%
Vulvar Cancer	90	26.60%	75.00%
Anal Cancer	21	6.20%	17.50%
Total Responses	**338**	**100.00%**	—



Note: Respondents could select multiple answers. Percent of Cases is based on 120 participants. Percent of Responses refers to share of total selections (N = 338).

4.3 Perceived attitude towards HPV Vaccination

HPV vaccination attitudes were mostly favourable. Ninety-six percent of the respondents agreed or strongly agreed that HPV vaccination prevents cervical cancer. Cost was felt by 90.8% to be the greatest barrier, and 87.5% felt that cultural or religious beliefs were a cause of parental reluctance.

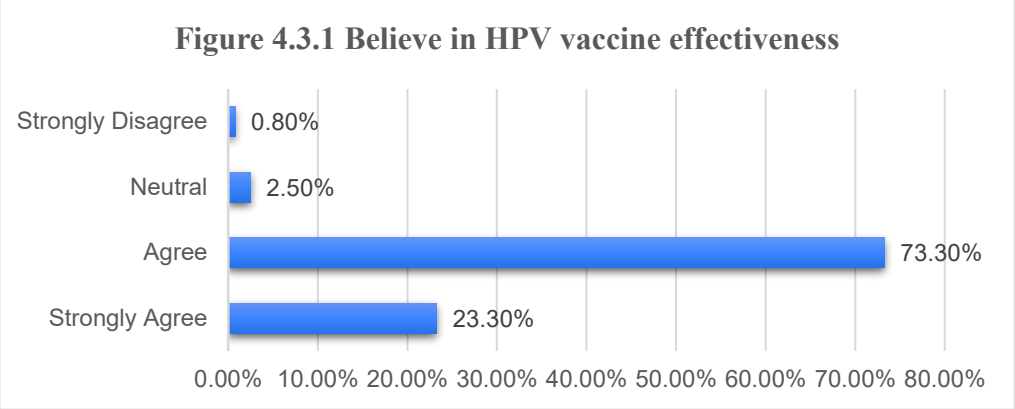
Nearly all (95.8%) of the respondents said they would recommend the HPV vaccine and Favor requiring it if offered at no cost. But concerns regarding vaccine efficacy and safety were in evidence but not prevalent.

4.3.1 Perceived Effectiveness of the HPV Vaccine

Most respondents (96.6%) concurred or strongly concurred that the HPV vaccine is effective against cervical cancer. Just one respondent strongly disagreed.

Table 4.3.1: Belief in the Effectiveness of HPV Vaccine

Response	Frequency (n)	Percentage (%)
Strongly Agree	28	23.30%
Agree	88	73.30%
Neutral	3	2.50%
Strongly Disagree	1	0.80%
Total	**120**	**100.00%**

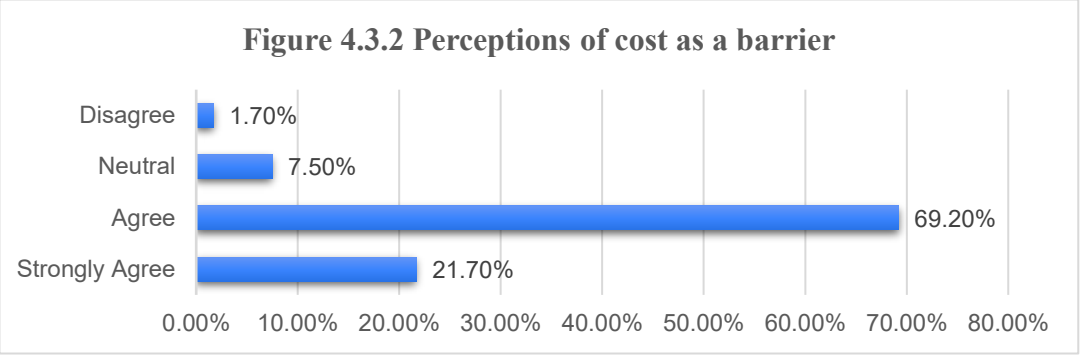


4.3.2 Perceived Cost as a Barrier

Most respondents (90.9%) agreed or strongly agreed that the high cost of the HPV vaccine is a major barrier to its uptake.

Table 4.3.2: Perception of High Cost as a Barrier

Response	Frequency (n)	Percentage (%)
Strongly Agree	26	21.70%
Agree	83	69.20%
Neutral	9	7.50%
Disagree	2	1.70%
Total	**120**	**100.00%**



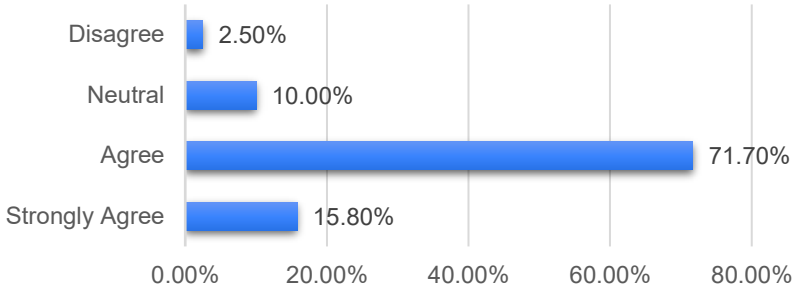
4.3.3 Parental Hesitation Due to Cultural or Religious Beliefs

A majority (87.5%) agreed or strongly agreed that cultural or religious beliefs contribute to parental hesitation toward HPV vaccination.

Table 4.3.3: Perceived Parental Hesitation Due to Cultural/Religious Beliefs

Response	Frequency (n)	Percentage (%)
Strongly Agree	19	15.80%
Agree	86	71.70%
Neutral	12	10.00%
Disagree	3	2.50%
Total	**120**	**100.00%**

Figure 4.3.3 Perception of parental hesitation



4.3.4 Recommendation and Support for Mandatory HPV Vaccination if Freely Available

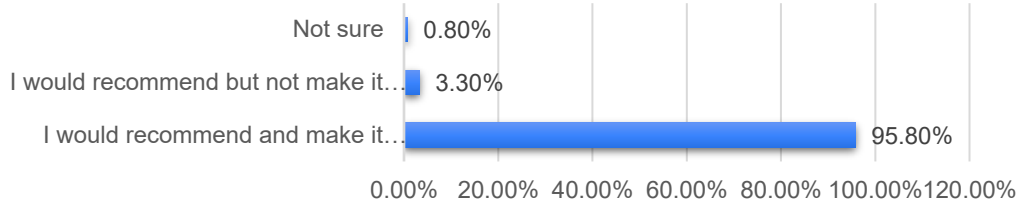
Almost all respondents (95.8%) indicated that they would recommend the HPV vaccine and support making it mandatory if it were freely available. Only a small fraction was unsure or would recommend without making it mandatory.

Table 4.3.4: Recommendation and Support for Mandatory HPV Vaccination if Freely Available

Response	Frequency (n)	Percentage (%)
I would recommend and make it mandatory	115	95.80%
I would recommend but not make it mandatory	4	3.30%

Not sure	1	0.80%
Total	**120**	**100.00%**

Figure 4.3.4 Recommendation and mandatory support for HPV vaccine if freely available

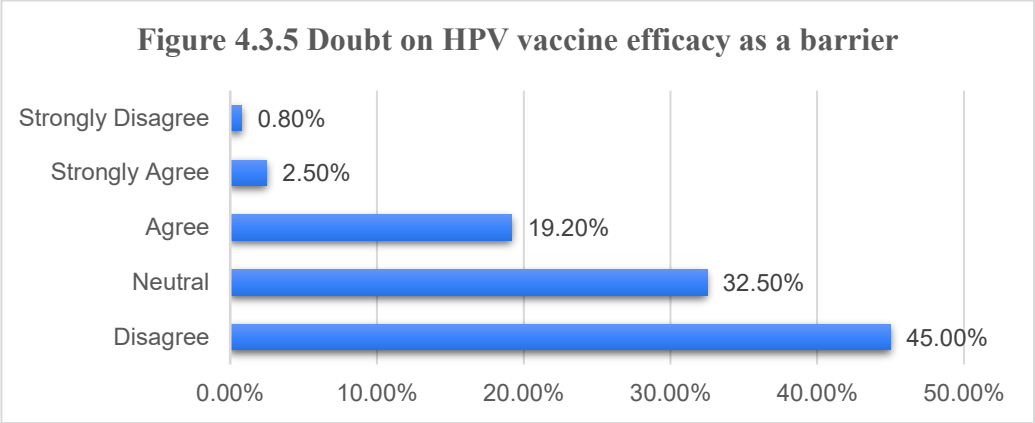


4.3.5 Doubt on HPV Vaccine Efficacy as a Barrier to Recommendation

Nearly half of the respondents (45%) disagreed that doubt about the HPV vaccine's efficacy is a barrier, while about 21.7% agreed or strongly agreed.

Table 4.3.5: Doubt on HPV Vaccine Efficacy as a Barrier to Recommendation

Response	Frequency (n)	Percentage (%)
Disagree	54	45.00%
Neutral	39	32.50%
Agree	23	19.20%
Strongly Agree	3	2.50%
Strongly Disagree	1	0.80%
Total	**120**	**100.00%**

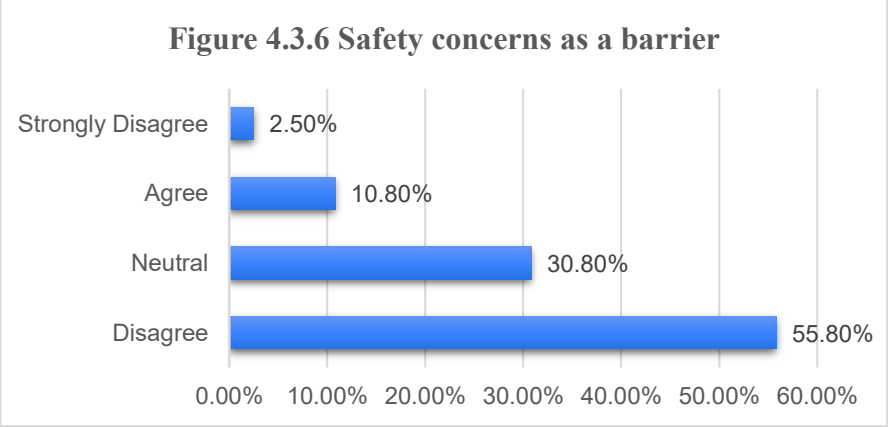


4.3.6 Safety Concerns as a Barrier to HPV Vaccine Recommendation

More than half (58.3%) disagreed or strongly disagreed that safety concerns limit HPV vaccine recommendation. However, 10.8% agreed that safety concerns are a barrier.

Table 4.3.6: Safety Concerns as a Barrier to HPV Vaccine Recommendation

Response	Frequency (n)	Percentage (%)
Disagree	67	55.80%
Neutral	37	30.80%
Agree	13	10.80%
Strongly Disagree	3	2.50%
Total	**120**	**100.00%**

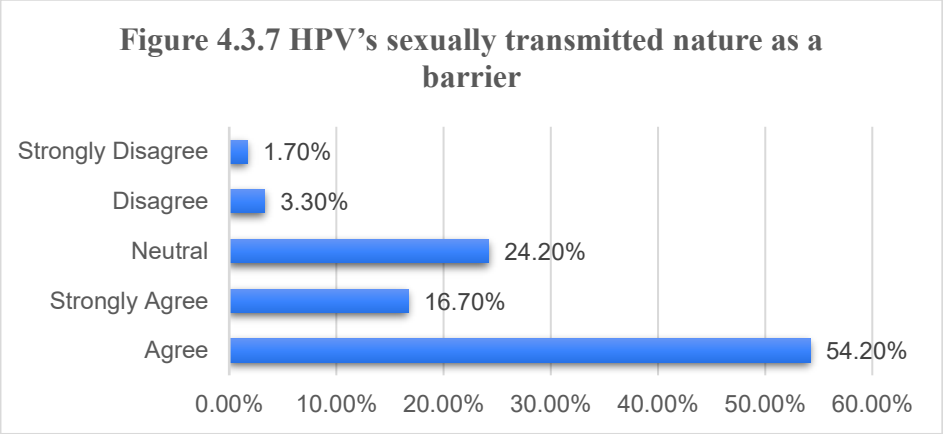


4.3.7 Sexually Transmitted Nature of HPV as a Barrier

More than 70% (70.9%) of respondents agreed or strongly agreed that the sexually transmitted nature of HPV acts as a barrier for recommending the vaccine.

Table 4.3.7: Sexually Transmitted Nature of HPV as a Barrier to Recommendation

Response	Frequency (n)	Percentage (%)
Agree	65	54.20%
Strongly Agree	20	16.70%
Neutral	29	24.20%
Disagree	4	3.30%
Strongly Disagree	2	1.70%
Total	**120**	**100.00%**



4.4 Practice Related to HPV Vaccine Prescription

This section summarizes respondents' self-reported practices regarding HPV vaccine recommendation and counselling. Eighty percent of respondents reported having recommended the HPV vaccine. Over half (55%) routinely discussed HPV vaccination during consultations, and 72.5% provided information on cervical cancer prevention at least sometimes.

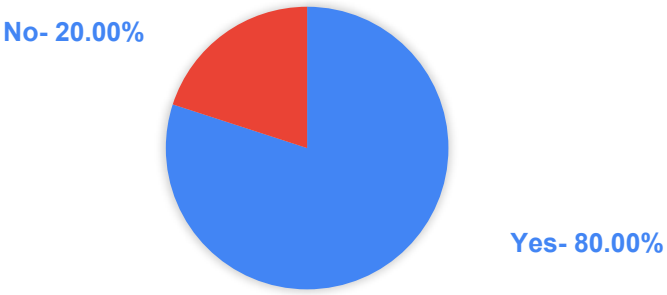
4.4.1 Have You Ever Recommended the HPV Vaccine?

The majority (80%) of doctors reported that they have recommended the HPV vaccine to their patients at least once.

Table 4.4.1: History of Recommending HPV Vaccine

Response	Frequency (n)	Percentage (%)
Yes	96	80.00%
No	24	20.00%
Total	**120**	**100.00%**

Figure 4.4.1 HPV vaccine recommendation by doctors



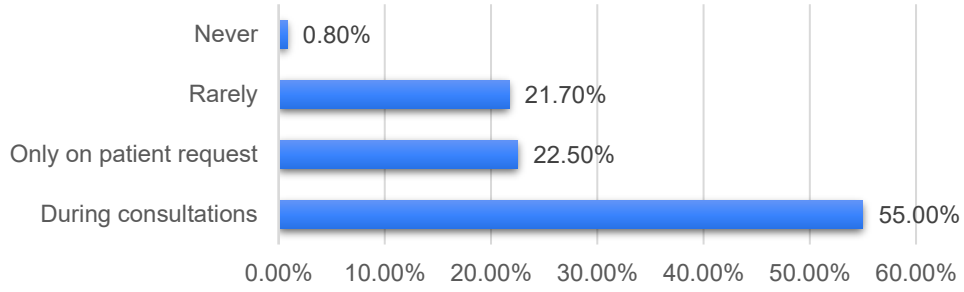
4.4.2 Frequency of Discussing HPV Vaccination with Patients

More than half of respondents (55%) discuss HPV vaccination routinely during consultations, while 22.5% do so only upon patient request.

Table 4.4.2: Frequency of Discussing HPV Vaccination with Patients

Frequency of Discussion	Frequency (n)	Percentage (%)
During consultations	66	55.00%
Only on patient request	27	22.50%
Rarely	26	21.70%
Never	1	0.80%
Total	**120**	**100.00%**

Figure 4.4.2 Frequency of HPV vaccine discussion with patients



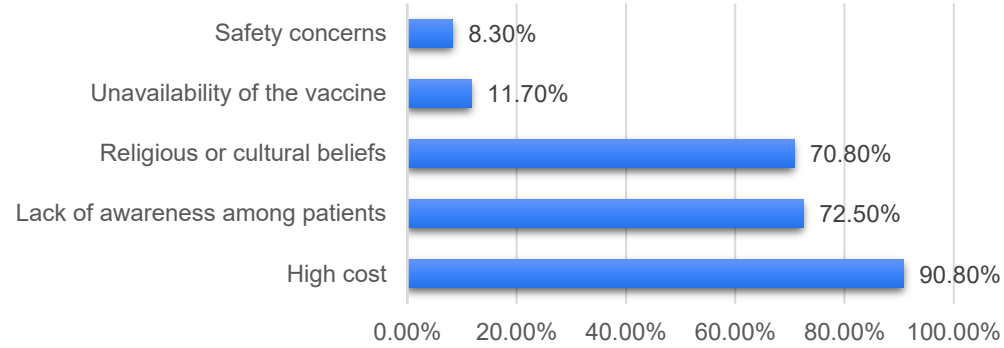
4.4.3 Barriers to Recommending HPV Vaccine (Q22)

Respondents identified several barriers to recommending the HPV vaccine. The most frequently cited barrier was the high cost (90.8%), followed by lack of awareness among patients (72.5%) and cultural or religious beliefs (70.8%). Safety concerns (8.3%) and unavailability of the vaccine (11.7%) were less commonly reported.

Table 4.4.3: Barriers to Recommending HPV Vaccine

Barrier	Frequency (N)	Percent of Responses (%)	Percent of Cases (%)
High cost	109	35.70%	90.80%
Lack of awareness among patients	87	28.50%	72.50%
Religious or cultural beliefs	85	27.90%	70.80%
Unavailability of the vaccine	14	4.60%	11.70%
Safety concerns	10	3.30%	8.30%
Total Responses	**305**	**100.00%**	—

Figure 4.4.3 Barriers to HPV vaccine recommendation



Note: Multiple responses were allowed. Percent of Cases is based on 120 respondents. Percent of Responses refers to share of total mentions (N = 305).

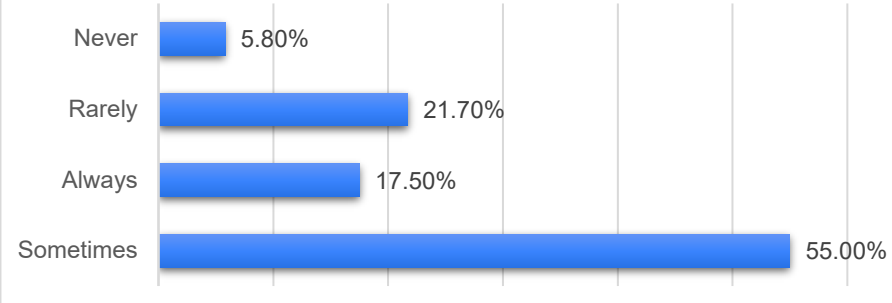
4.4.4 Provision of Information on Cervical Cancer Prevention During Routine Consultations

Most doctors (72.5%) provide information about cervical cancer prevention at least sometimes, with 17.5% always providing such information.

Table 4.4.4: Provision of Cervical Cancer Prevention Information

Frequency of Information Provision	Frequency (n)	Percentage (%)
Sometimes	66	55.00%
Always	21	17.50%
Rarely	26	21.70%
Never	7	5.80%
Total	**120**	**100.00%**

Figure 4.4.4 Frequency of cervical cancer prevention counseling



4.5 Correlations Between Demographic Variables and KAP

This section provides the association analysis between demographic variables (gender, medical specialty) and Knowledge, Attitude, and Practice (KAP) about HPV vaccine prescription by physicians in Kochi. Chi-square tests were run to examine associations between demographic variables (medical specialty, gender) and KAP variables. Significant and non-significant results are reported to present the complete picture.

Strong associations were found between specialty in medicine and knowledge of HPV vaccine coverage under the National Immunization Program ($\chi^2 = 18.52$, $p = 0.005$) and knowledge that HPV is a sexually transmitted disease ($\chi^2 = 32.83$, $p < 0.001$). Gynaecologists and paediatricians showed greater awareness in these fields.

No substantial correlations were noted for awareness that HPV leads to cervical cancer ($p = 0.537$), infects men and women equally ($p = 0.159$), or is typically asymptomatic ($p = 0.473$). Awareness of cervical cancer risk factors and vaccine brands was consistently high.

4.5.1 Medical Specialty and Knowledge

Some of the associations between medical specialty and knowledge variables were tested. There were significant associations for awareness of HPV inclusion in the National Immunization Program ($\chi^2 = 18.52$, $p = 0.005$) and knowledge of HPV as a sexually transmitted infection ($\chi^2 = 32.83$, $p < 0.001$). Gynaecologists and paediatricians were more aware in these aspects.

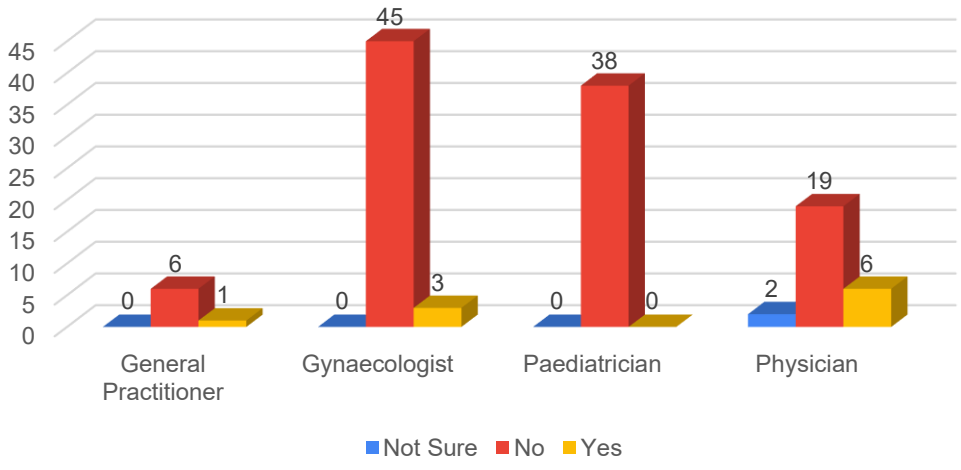
4.5.1 Medical Specialty and Knowledge of HPV Vaccine Exclusion in the National Immunization Program

There was a statistically significant relationship between awareness of the HPV vaccine being included in the national immunization program and specialty in medicine (χ^2 = 18.52, p = 0.005). Gynaecologists and paediatricians had greater awareness than physicians and general practitioners.

Table 4.5.1: Cross-tabulation – Specialty × Awareness of HPV Vaccine Exclusion in NIP

Specialty	Not Sure	No	Yes	Total
General Practitioner	0	6	1	7
Gynaecologist	0	45	3	48
Paediatrician	0	38	0	38
Physician	2	19	6	27
Total	2	108	10	120

Figure 4.5.1 Specialty x Awareness of HPV Vaccine Exclusion in NIP



Chi-square (χ^2) = 18.521, **df** = 6, **p** = 0.005

Interpretation: Awareness significantly differed by specialty.

However, no statistically significant differences were found between specialties regarding knowledge that HPV causes cervical cancer ($p = 0.537$), infects both men and women ($p = 0.159$), or is usually asymptomatic ($p = 0.473$). Awareness of cervical cancer risk factors and HPV vaccine brands was uniformly high across specialties.

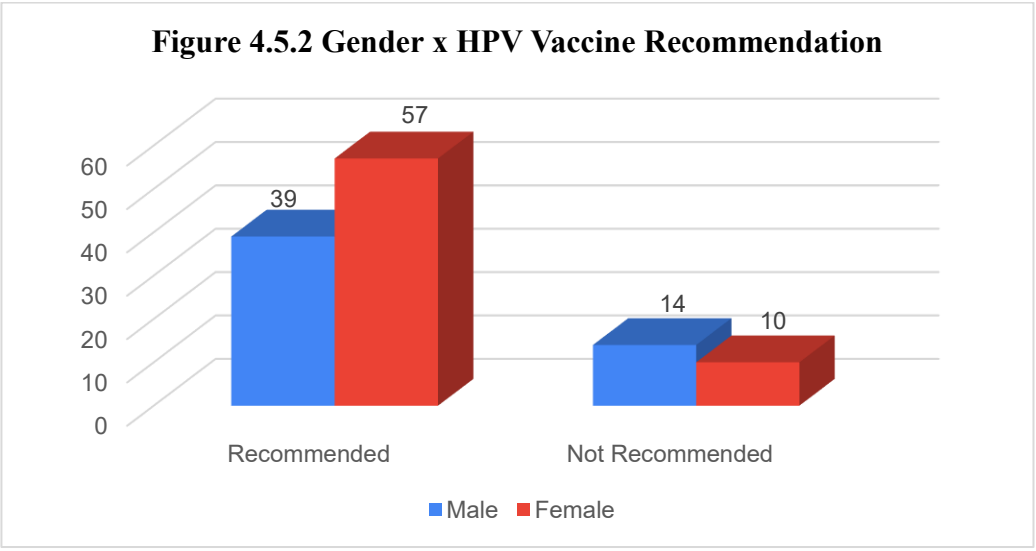
4.5.2 Gender and Practice of HPV Vaccine Recommendation

No statistically significant association was found between gender and whether respondents had ever recommended the HPV vaccine ($\chi^2 = 2.44$, $p = 0.118$). However, a slightly higher proportion of female doctors (85.1%) reported recommending the vaccine compared to males (73.6%).

Table 4.5.2: Cross-tabulation – Gender × HPV Vaccine Recommendation

Gender	Recommended	Not Recommended	Total
Male	39	14	53
Female	57	10	67
Total	**96**	**24**	**120**

Figure 4.5.2 Gender x HPV Vaccine Recommendation



Chi-square (χ^2) = 2.442, **df** = 1, **p** = 0.118

Interpretation: The difference was not statistically significant.

4.5.3 Gender and Specialty in Relation to HPV Vaccine Recommendation

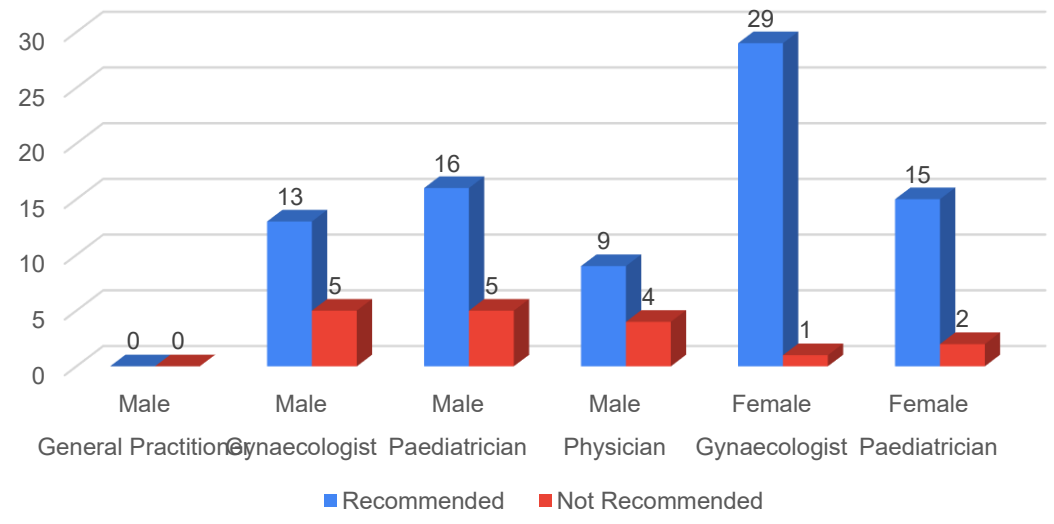
A three-way crosstab was conducted to examine if gender and specialty together influenced the likelihood of recommending the HPV vaccine. While the highest rates of

recommendation were among female gynaecologists and male paediatricians, no statistically significant association was found.

Table 4.5.3: Cross-tabulation – Gender × Specialty × HPV Vaccine Recommendation

Specialty	Gender	Recommended	Not Recommended	Total
General Practitioner	Male	0	0	1
Gynaecologist	Male	13	5	18
Paediatrician	Male	16	5	21
Physician	Male	9	4	13
Gynaecologist	Female	29	1	30
Paediatrician	Female	15	2	17
Physician	Female	9	5	14

Figure 4.5.3 Gender × Specialty × HPV Vaccine Recommendation



Chi-square (χ^2) = 5.471, **df** = 3, **p** = 0.140

Interpretation: No significant association was observed.

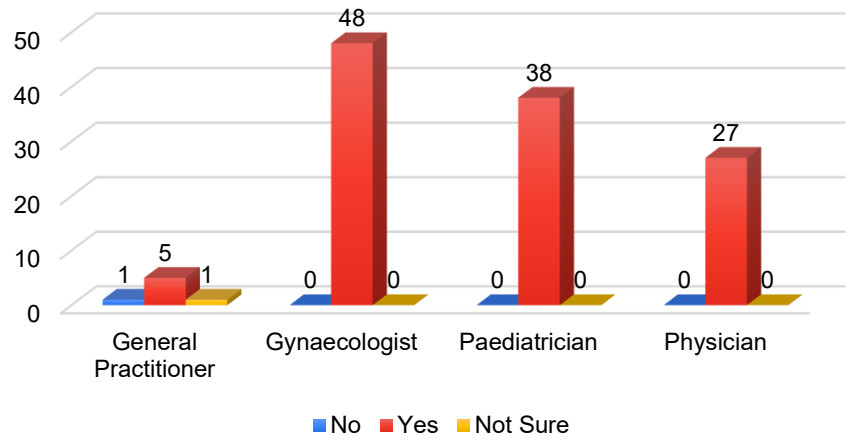
4.5.4 Medical Specialty and Knowledge of HPV as a Sexually Transmitted Disease

There was a **statistically significant association** between medical specialty and the knowledge that HPV is a sexually transmitted disease ($\chi^2 = 32.83$, $p < 0.001$). All gynaecologists, paediatricians, and physicians answered correctly, while the only incorrect or unsure responses came from general practitioners.

Table 4.5.4: Cross-tabulation – Specialty × Knowledge of HPV as an STD

Specialty	No	Yes	Not Sure	Total
General Practitioner	1	5	1	7
Gynaecologist	0	48	0	48
Paediatrician	0	38	0	38
Physician	0	27	0	27
Total	1	118	1	120

Figure 4.5.4 Specialty × Knowledge of HPV as an STD



Chi-square (χ^2) = 32.833, **df** = 6, **p** < 0.001

Interpretation: A significant association was found—general practitioners showed less consistent knowledge compared to specialists.

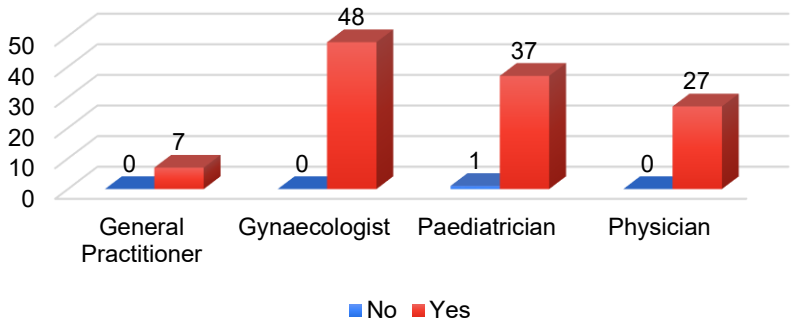
4.5.5 Medical Specialty and Knowledge of HPV Causing Cervical Cancer

There was **no statistically significant association** between medical specialty and knowledge that HPV causes cervical cancer ($\chi^2 = 2.18$, $p = 0.537$). Almost all respondents answered correctly, with only one incorrect response observed among paediatricians.

Table 4.5.5: Cross-tabulation – Specialty × Knowledge of HPV as a Cause of Cervical Cancer

Specialty	No	Yes	Total
General Practitioner	0	7	7
Gynaecologist	0	48	48
Paediatrician	1	37	38
Physician	0	27	27
Total	1	119	120

Figure 4.5.5 Specialty × Knowledge of HPV as a Cause of Cervical Cancer



Chi-square (χ^2) = 2.176, **df** = 3, **p** = 0.537

Interpretation: No significant association observed. Knowledge was uniformly high across specialties.

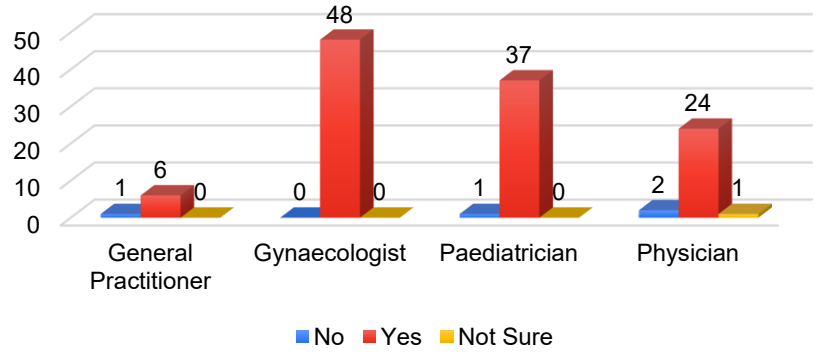
4.5.6 Medical Specialty and Knowledge that HPV Infects Both Men and Women

No statistically significant association was found between medical specialty and knowledge of HPV's ability to infect both men and women ($\chi^2 = 9.27$, $p = 0.159$). While awareness was very high across all specialties, general practitioners and physicians had a slightly higher number of incorrect or unsure responses.

Table 4.5.6: Cross-tabulation – Specialty × Knowledge of HPV Infecting Both Men and Women

Specialty	No	Yes	Not Sure	Total
General Practitioner	1	6	0	7
Gynaecologist	0	48	0	48
Paediatrician	1	37	0	38
Physician	2	24	1	27
Total	4	115	1	120

Figure 4.5.6 Specialty × Knowledge of HPV Infecting Both Men and Women



Chi-square (χ^2) = 9.271, **df** = 6, **p** = 0.159

Interpretation: Although not statistically significant, knowledge gaps were more apparent among general practitioners and physicians.

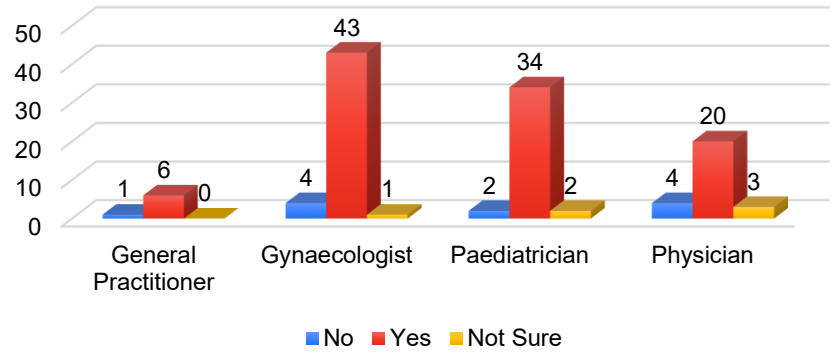
4.5.7 Medical Specialty and Knowledge of HPV Being Asymptomatic

The association between medical specialty and knowledge of HPV's asymptomatic nature was **not statistically significant** ($\chi^2 = 5.57$, $p = 0.473$). While most respondents across specialties were aware that HPV is usually asymptomatic, a few incorrect or unsure responses were recorded among physicians, paediatricians, and gynaecologists.

Table 4.5.7: Cross-tabulation – Specialty × Knowledge of HPV Being Asymptomatic

Specialty	No	Yes	Not Sure	Total
General Practitioner	1	6	0	7
Gynaecologist	4	43	1	48
Paediatrician	2	34	2	38
Physician	4	20	3	27
Total	11	103	6	120

Figure 4.5.7 Specialty × Knowledge of HPV Being Asymptomatic



Chi-square (χ^2) = 5.569, **df** = 6, **p** = 0.473

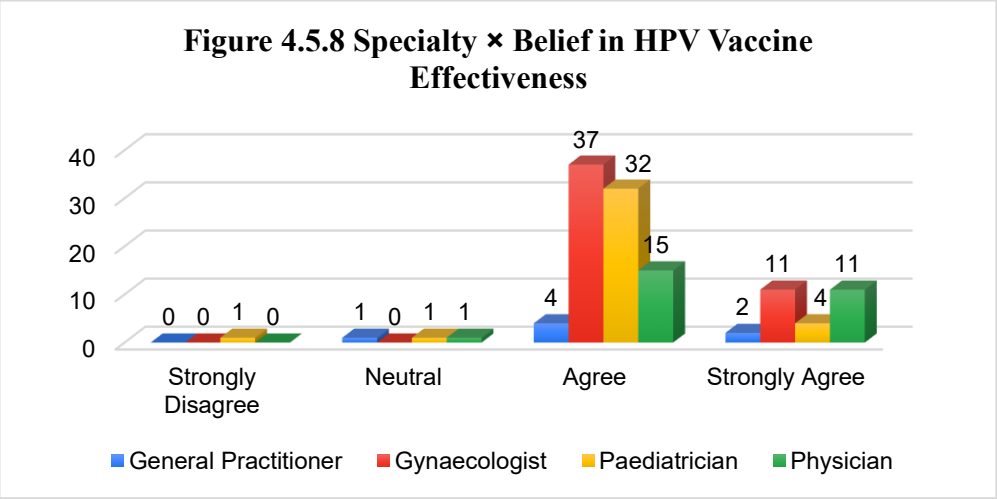
Interpretation: No significant association. Minor gaps in knowledge were spread across specialties.

4.5.8 Medical Specialty and Belief in HPV Vaccine Effectiveness

While this association was not statistically significant at the 5% level ($\chi^2 = 15.79$, $p = 0.071$), the trend suggests that gynaecologists and physicians had stronger confidence in the vaccine's effectiveness. Most paediatricians and general practitioners also agreed, but there was slightly more variation in responses.

Table 4.5.8: Cross-tabulation – Specialty × Belief in HPV Vaccine Effectiveness

Specialty	Strongly Disagree	Neutral	Agree	Strongly Agree	Total
General Practitioner	0	1	4	2	7
Gynaecologist	0	0	37	11	48
Paediatrician	1	1	32	4	38
Physician	0	1	15	11	27
Total	1	3	88	28	120



Chi-square (χ^2) = 15.789, **df** = 9, **p** = 0.071

Interpretation: Not statistically significant, but gynaecologists and physicians showed higher overall agreement on vaccine effectiveness.

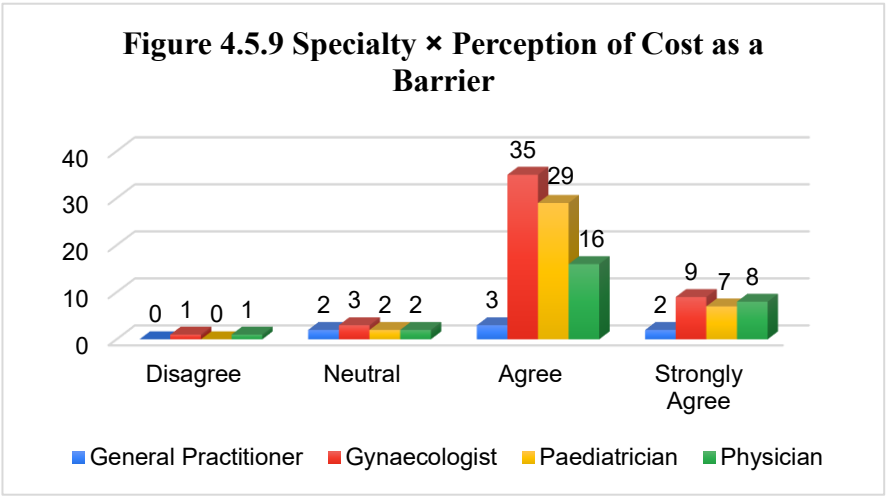
4.5.9 Medical Specialty and Perception of Cost as a Barrier

There was **no statistically significant association** between medical specialty and the belief that high cost is a major barrier to recommending the HPV vaccine ($\chi^2 = 8.75$, $p = 0.461$). However, the belief that cost is a barrier was consistently high across all specialties, especially among gynaecologists and paediatricians.

Table 4.5.9: Cross-tabulation – Specialty × Perception of Cost as a Barrier

Specialty	Disagree	Neutral	Agree	Strongly Agree	Total
General Practitioner	0	2	3	2	7
Gynaecologist	1	3	35	9	48
Paediatrician	0	2	29	7	38
Physician	1	2	16	8	27
Total	2	9	83	26	120

Figure 4.5.9 Specialty × Perception of Cost as a Barrier



Chi-square (χ^2) = 8.750, **df** = 9, **p** = 0.461

Interpretation: No significant difference in perceptions across specialties; cost is widely viewed as a barrier.

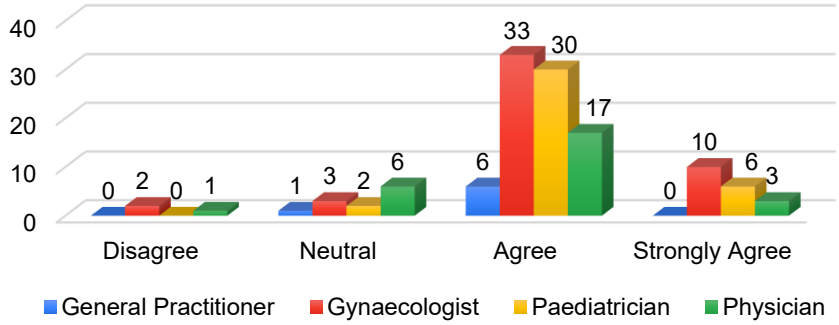
4.5.10 Medical Specialty and Perceived Cultural or Religious Barriers

There was **no statistically significant association** between specialty and the belief that cultural or religious beliefs cause parental hesitation ($\chi^2 = 10.57$, $p = 0.307$). However, most respondents across all specialties agreed that this is a barrier, particularly paediatricians and gynaecologists.

Table 4.5.10: Cross-tabulation – Specialty × Belief in Cultural/Religious Barriers

Specialty	Disagree	Neutral	Agree	Strongly Agree	Total
General Practitioner	0	1	6	0	7
Gynaecologist	2	3	33	10	48
Paediatrician	0	2	30	6	38
Physician	1	6	17	3	27
Total	3	12	86	19	120

Figure 4.5.10 Specialty × Belief in Cultural/Religious Barriers



Chi-square (χ^2) = 10.567, **df** = 9, **p** = 0.307

Interpretation: No significant association, but agreement was strongest among gynaecologists and paediatricians.

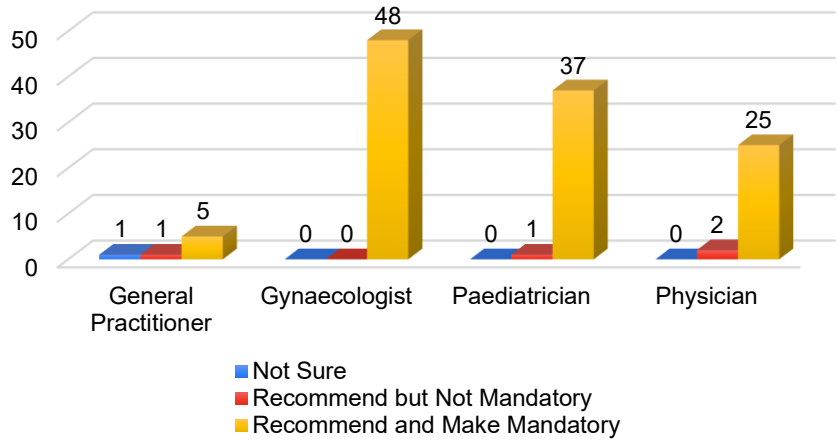
4.5.11 Medical Specialty and Support for HPV Vaccine Recommendation or Mandate if Freely Available

There was a **statistically significant association** between medical specialty and willingness to recommend or make the HPV vaccine mandatory if freely available (χ^2 = 22.22, p = 0.001). All gynaecologists supported mandatory vaccination, whereas general practitioners and physicians showed slightly more variation in their responses.

Table 4.5.11: Cross-tabulation – Specialty × Recommendation or Mandate Support

Specialty	Not Sure	Recommend but Not Mandatory	Recommend and Make Mandatory	Total
General Practitioner	1	1	5	7
Gynaecologist	0	0	48	48
Paediatrician	0	1	37	38
Physician	0	2	25	27
Total	1	4	115	120

Figure 4.5.11 Specialty × Recommendation or Mandate Support



Chi-square (χ^2) = 22.223, **df** = 6, **p** = 0.001

Interpretation: Specialty influences willingness to recommend or mandate HPV vaccination; gynaecologists are unanimous in support.

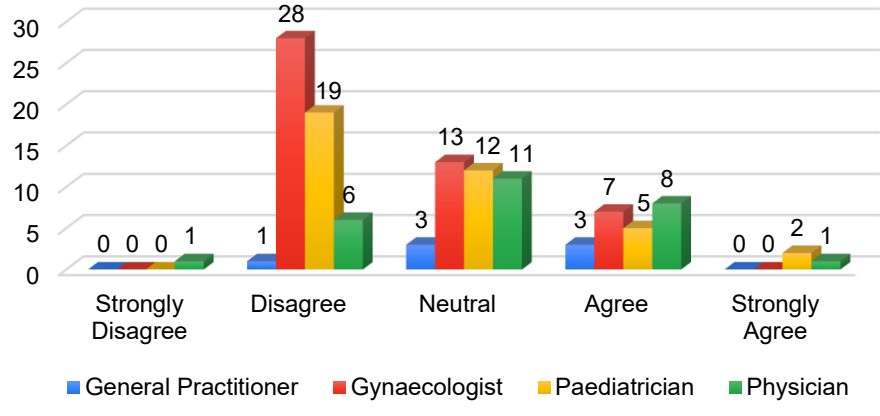
4.5.12 Medical Specialty and Doubt on HPV Vaccine Efficacy as a Barrier

There was **no statistically significant association** between medical specialty and doubt about HPV vaccine efficacy as a barrier to recommendation ($\chi^2 = 18.90$, $p = 0.091$). However, a notable portion of gynaecologists and paediatricians remained neutral or agreed that doubt could be a barrier.

Table 4.5.12: Cross-tabulation – Specialty × Doubt on HPV Vaccine Efficacy as a Barrier

Specialty	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
General Practitioner	0	1	3	3	0	7
Gynaecologist	0	28	13	7	0	48
Paediatrician	0	19	12	5	2	38
Physician	1	6	11	8	1	27
Total	1	54	39	23	3	120

Figure 4.5.12 Specialty × Doubt on HPV Vaccine Efficacy as a Barrier



Chi-square (χ^2) = 18.897, **df** = 12, **p** = 0.091

Interpretation: No significant difference, but some uncertainty about efficacy remains, especially among paediatricians and physicians.

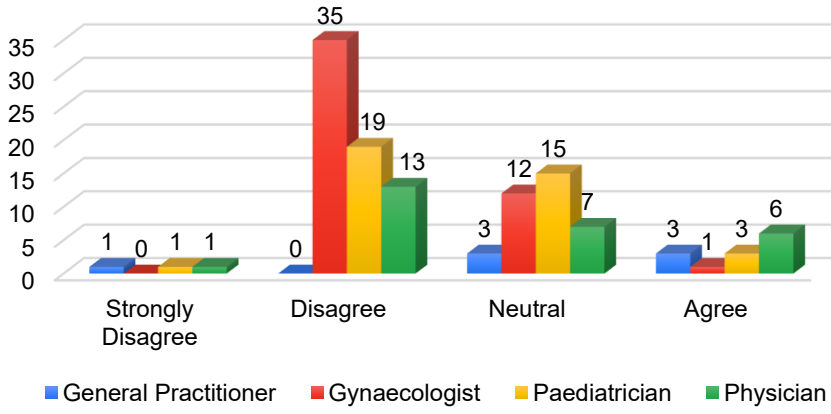
4.5.13 Medical Specialty and Perception of Safety Concerns as a Barrier

A **statistically significant association** was found between medical specialty and the belief that safety concerns limit HPV vaccine recommendation ($\chi^2 = 27.73$, $p = 0.001$). Gynaecologists were less likely to agree that safety concerns are a barrier compared to paediatricians and physicians.

Table 4.5.13: Cross-tabulation – Specialty × Perception of Safety Concerns as a Barrier

Specialty	Strongly Disagree	Disagree	Neutral	Agree	Total
General Practitioner	1	0	3	3	7
Gynaecologist	0	35	12	1	48
Paediatrician	1	19	15	3	38
Physician	1	13	7	6	27
Total	3	67	37	13	120

Figure 4.5.13 Specialty × Perception of Safety Concerns as a Barrier



Chi-square (χ^2) = 27.726, **df** = 9, **p** = 0.001

Interpretation: Safety concerns vary significantly by specialty, with gynaecologists showing less concern than others.

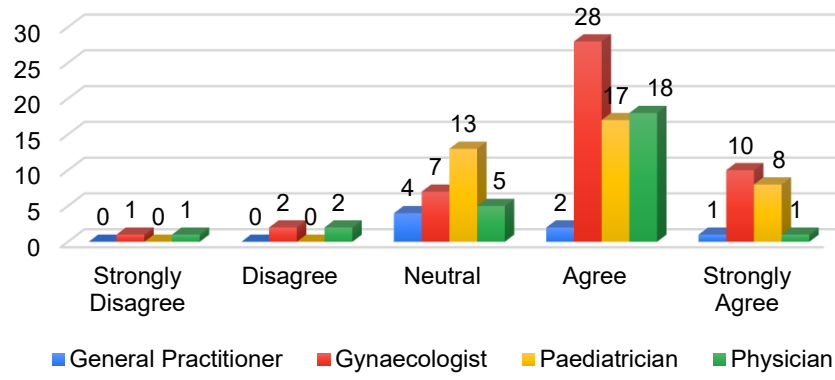
4.5.14 Medical Specialty and Perception of HPV's Sexually Transmitted Nature as a Barrier

There was **no statistically significant association** between specialty and the belief that the sexually transmitted nature of HPV acts as a barrier to recommendation ($\chi^2 = 17.42$, $p = 0.134$). However, most gynaecologists and paediatricians agreed or strongly agreed that this is a barrier.

Table 4.5.14: Cross-tabulation – Specialty × Perception of HPV's Sexually Transmitted Nature as a Barrier

Specialty	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
General Practitioner	0	0	4	2	1	7
Gynaecologist	1	2	7	28	10	48
Paediatrician	0	0	13	17	8	38
Physician	1	2	5	18	1	27
Total	2	4	29	65	20	120

Figure 4.5.14 Specialty × Perception of HPV's Sexually Transmitted Nature as a Barrier



Chi-square (χ^2) = 17.421, **df** = 12, **p** = 0.134

Interpretation: No significant difference by specialty, though many agree this is a barrier.

Other attitude-related variables such as belief in vaccine effectiveness (p = 0.071), perception of high cost as a barrier (p = 0.461), cultural or religious barriers (p = 0.307), doubt about efficacy (p = 0.091), and the sexually transmitted nature of HPV as a barrier (p = 0.134) showed no significant differences by specialty, though these perceptions were generally widespread.

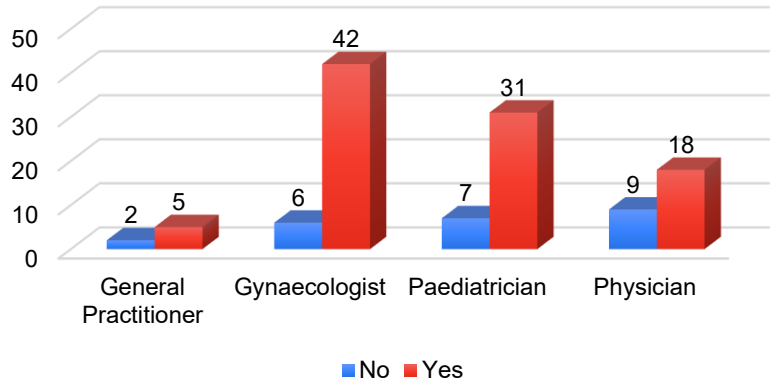
4.5.15 Medical Specialty and Practice of HPV Vaccine Recommendation

No statistically significant association was found between medical specialty and whether respondents had ever recommended the HPV vaccine ($\chi^2 = 5.07$, p = 0.167). Gynaecologists reported the highest recommendation rates, followed by paediatricians and physicians.

Table 4.5.15: Cross-tabulation – Specialty × HPV Vaccine Recommendation

Specialty	No	Yes	Total
General Practitioner	2	5	7
Gynaecologist	6	42	48
Paediatrician	7	31	38
Physician	9	18	27
Total	24	96	120

Figure 4.5.15 Specialty × HPV Vaccine Recommendation



Chi-square (χ^2) = 5.068, **df** = 3, **p** = 0.167

Interpretation: No significant association; however, gynaecologists are more likely to recommend the HPV vaccine.

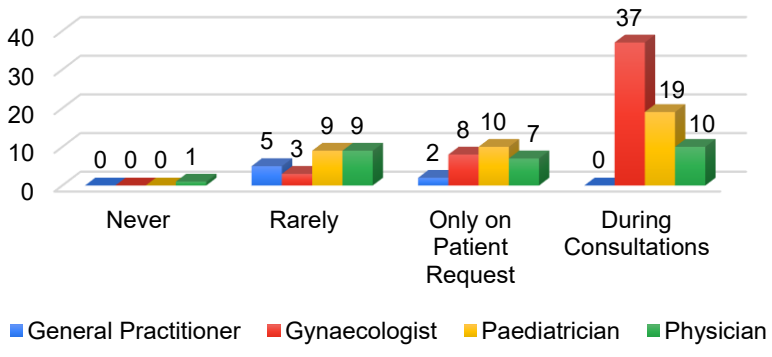
4.5.16 Medical Specialty and Frequency of Discussing HPV Vaccination with Patients

A **statistically significant association** was observed between medical specialty and how often doctors discuss HPV vaccination with patients ($\chi^2 = 29.57$, $p = 0.001$). Gynaecologists most frequently discussed HPV vaccination during consultations, whereas general practitioners rarely or never initiated the discussion.

Table 4.5.16: Cross-tabulation – Specialty × Frequency of HPV Vaccination Discussion

Specialty	Never	Rarely	Only on Patient Request	During Consultations	Total
General Practitioner	0	5	2	0	7
Gynaecologist	0	3	8	37	48
Paediatrician	0	9	10	19	38
Physician	1	9	7	10	27
Total	1	26	27	66	120

Figure 4.5.16 Specialty × Frequency of HPV Vaccination Discussion



Chi-square (χ^2) = 29.568, **df** = 9, **p** = 0.001

Interpretation: Frequency of discussing HPV vaccine differs by specialty; gynaecologists are the most proactive.

4.5.17 Medical Specialty and Knowledge of Cervical Cancer Risk Factors

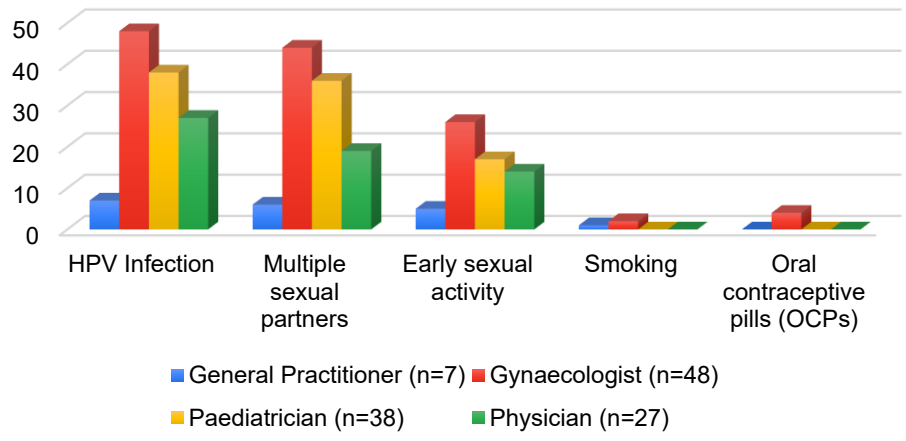
Respondents across specialties identified HPV infection as a major risk factor for cervical cancer, with universal recognition among all groups. Multiple sexual partners and early sexual activity were also widely acknowledged, though to a lesser extent by physicians and paediatricians. Awareness of smoking and oral contraceptive pills (OCPs) as risk factors was low across all specialties.

Table 4.5.17: Cervical Cancer Risk Factors Identified by Medical Specialty

Risk Factor	General Practitioner (n=7)	Gynaecologist (n=48)	Paediatrician (n=38)	Physician (n=27)	Total (n=120)
HPV Infection	7	48	38	27	120
Multiple sexual partners	6	44	36	19	105
Early sexual activity	5	26	17	14	62
Smoking	1	2	0	0	3
Oral contraceptive pills (OCPs)	0	4	0	0	4

Note: Respondents could select multiple risk factors.

Figure 4.5.17 Cervical Cancer Risk Factors Identified by Medical Specialty



4.5.18 Medical Specialty and Awareness of HPV Vaccine Brands Available in India

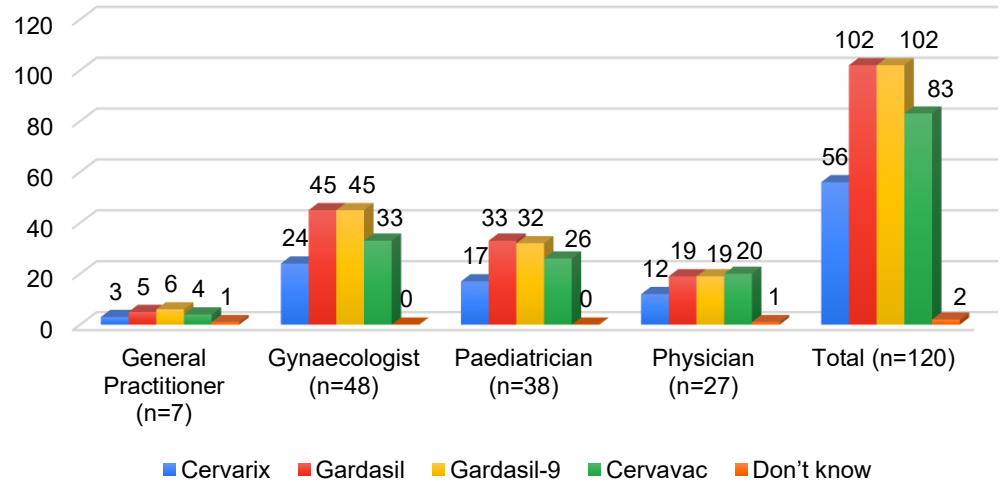
Respondents' awareness of HPV vaccine brands varied by specialty. Gynaecologists showed the highest awareness across all vaccines, with Cervarix, Gardasil, Gardasil-9, and Cervavac being well recognized. Paediatricians and physicians also showed good awareness, while general practitioners had the lowest recognition overall.

Table 4.5.18: Awareness of HPV Vaccine Brands by Medical Specialty

Vaccine Brand	General Practitioner (n=7)	Gynaecologist (n=48)	Paediatrician (n=38)	Physician (n=27)	Total (n=120)
Cervarix	3	24	17	12	56
Gardasil	5	45	33	19	102
Gardasil-9	6	45	32	19	102
Cervavac	4	33	26	20	83
Don't know	1	0	0	1	2

Note: Multiple responses allowed.

Figure 4.5.18 Awareness of HPV Vaccine Brands by Medical Specialty



Summary of Associations:

Significant associations were found primarily between medical specialty and variables related to knowledge (e.g., HPV as an STD, inclusion in NIP) and practice (e.g.,

discussion frequency). Attitude-related perceptions showed fewer differences. Gender did not significantly influence KAP outcomes.

The findings highlight that medical specialty is a key determinant of doctors' knowledge, attitudes, and practices regarding HPV vaccination, with gynaecologists and paediatricians generally exhibiting higher awareness and proactive practices. Gender had limited influence. The inclusion of both significant and non-significant associations provides a transparent and comprehensive understanding of factors influencing HPV vaccine prescription.

CHAPTER FIVE: Rwanda's HPV Vaccination Program: Implementation Strategy and Outcome Analysis

This chapter provides an analysis of Rwanda's HPV vaccination program as a case study that presents the practical implementation of principles elaborated in earlier chapters. Rwanda is a specific and useful case to study considering it has managed to achieve above 90% coverage of its vaccinations despite notable resource limitations, which defied common assumptions about the implementation demands of low-income environments. The case study of Rwanda's strategy offers real-world proof of how strategic alliances, delivery innovations, and community involvement can surmount obstacles noted in the quantitative results outlined above [23].

This case study supplements the wider analysis within this dissertation by providing depth to the breadth in earlier chapters. As discussed in the methodology chapter, case study analysis enables scrutiny of implementation as a dynamic process, which unlocks contextual adaptations unattainable through quantitative approaches alone. Lessons from Rwanda's experience feed into the recommendations that follow in later chapters, notably on transferable strategies for environments with limited resources.

5.1 Background

In considering effective models of HPV vaccination implementation, Rwanda stands out as a valuable case to study. Before programme implementation in 2011, cervical cancer was the most common cancer among Rwandan women and the primary cause of cancer-related death among this group (Binagwaho et al., 2012). The heavy disease burden was largely due to sparse screening infrastructure and the lack of organized prevention programs against HPV, the recognized etiologic agent for cervical cancer. Rwanda's intervention merits particular mention because of the context challenges to implementation: at the time that programs began, Rwanda's gross national income per capita was about $550, making it clearly one of the low-income countries (Farmer et al., 2013) [24,25].

Rwanda's health system functions under a centralized system of governance that permits coordinated policy implementation between levels of administration. Immunization infrastructure that already had proved to be effective through the Expanded Program on Immunization (EPI) had high childhood vaccination coverage rates, which were an operational platform for introducing HPV vaccines. The implementation policy framework was created by the National Strategic Plan for the Prevention, Control, and

Management of Cervical Cancer, situating the HPV vaccine within a holistic cancer control strategy as opposed to being a standalone intervention.

5.2 Implementation Strategy

5.2.1 Strategic Partnerships

Rwanda's model of implementation involved an innovative public-private partnership with the vaccine developer Merck. This arrangement allowed for a three-year vaccine donation starting in 2011, allowing program launch despite strong resource limitations (Binagwaho et al., 2012). In a critical maneuver, Rwanda secured sustainable pricing mechanisms to be phased in after the period of donation, creating a graduated transition toward program sustainability [26]. The collaboration extended beyond vaccine delivery to technical assistance in planning for implementation, as an example of an integrated partnership model potentially useable in other resource-constrained settings.

The partnership arrangement is reflective of a strategic style of resource mobilization that held simultaneous concern with current intervention demand requirements and ultimate considerations of long-term sustainability. By contrast with instilling dependence upon donor subsidization, the Rwanda negotiations to obtain post-donation price structures left a platform towards programmatic sustainability. It would be advisable as a transposable model across low-resource environments wherein start-up cost for early investment presents appreciable entry hurdle towards program formation.

Rwanda used a school-based approach with a focus on vaccinating girls at age 12, chosen according to epidemiologic factors and the capacity of the health system. The high rate of primary school enrolment (about 96%) allowed for effective population coverage through schools. The model for delivery comprised visiting schools on a fixed schedule by mobile vaccination teams, with health workers immunizing in school to reduce access constraints for the target group [27]. School administrators and teachers functioned as essential intermediaries, distributing consent forms, ensuring student attendance on vaccination days, and reinforcing educational messages about cervical cancer prevention.

The implementation at the operations level needed to be of unprecedented collaboration between education and health sectors. Technical guidance, training of healthcare workers, and management of vaccine logistics were contributed by the Ministry of Health, institutional access supported by the Ministry of Education, and educational staff recruited as implementation partners. Community mobilization and context-

specific issues faced during implementation were supported by local government authorities [28]. This multi-sectoral approach is a prime example of integrated governance for public health interventions with well-defined roles across institutional players.

5.2.2 Community Engagement Framework

Rwanda's strategy for implementation involved a community engagement plan that had a structured approach to address socio-cultural aspects of vaccine acceptance. The communication plan strategically framed HPV vaccination as cancer prevention instead of highlighting its link to sexual transmission, a framing that was culturally sensitive to adolescent sexuality. Communication channels utilized mass media (largely radio), community forums, religious assemblies, and print materials, with messaging presented in a way to address the unique concerns and information needs of various stakeholder groups [29].

Community health workers (CHWs) were a key operational feature of the outreach strategy. Household outreach by the community-embedded agents provided information, answered concerns, identified girls out of school who needed to be vaccinated, and followed up on those missing doses. The established community base and cultural competencies allowed navigating sensitive topics for adolescent health interventions. Additionally, program implementers systematically engaged religious leaders, traditional authorities, and community elders through consultative meetings and educational sessions, mobilizing their influence to enhance program credibility and address potential resistance.

5.3 Outcomes Analysis

5.3.1 Coverage and Equity Dimensions

Quantitative measurement of program performance shows outstanding performance indicators. During the initial implementation year, 93.2% of girls who were eligible received the three-dose HPV vaccine series, surpassing coverage rates in many high-income nations with well-established vaccination programs (Binagwaho et al., 2012). High coverage was maintained in later implementation years, with coverage rates always above 90%, reflecting continued program effectiveness and community acceptance [30].

Equity analysis shows few geographic differences, with similar coverage obtained in urban and rural areas despite differing infrastructure constraints. The program was able to extend coverage to out-of-school girls through complementary community-based strategies of vaccination, thereby mitigating a risk of exclusion for this marginalized subpopulation. These findings defy widespread assumptions about the feasibility of implementation in poor environments, showing that programs adapted to local context are able to maintain high coverage in spite of economic constraints.

5.3.2 Health System Effects

The HPV immunization program created meaningful positive externalities for Rwanda's overall health system. Rollout required cold chain capacity increase, which then accrued to other vaccines in the national immunization program. The monitoring requirements for the multi-dose schedule spurred development of more robust data collection and monitoring systems, building capabilities that can be applied to other health interventions [31]. Program rollout consolidated operational linkages between schools and health services, building foundations for further adolescent health programming beyond HPV vaccination.

Perhaps most importantly, the program drove advances in integrated cervical cancer control. With introduction of HPV vaccine, availability of screening services increased through trained provider increases and equipment supply to implement visual inspection with acetic acid (VIA) [32]. Capacity for precancerous lesion management was increased, and referral systems for more advanced cases were improved. This integration of preventive and clinical services resulted in a more cohesive approach to cervical cancer control throughout the care continuum, optimizing population health impact beyond the vaccination intervention alone.

5.4 Implementation Challenges and Adaptive Responses

5.4.1 Operational Constraints

In spite of total implementation success, the program was faced with operational challenges that called for adaptive management. Cold chain maintenance in geographically remote locations called for infrastructure investments and planning. Vaccinee tracking throughout the multi-dose regimen was problematic, especially among girls who moved schools or changed residence during the time of implementation. The program overcame these challenges by means of microplanning at the district level, using existing immunization infrastructure where possible, and

creating HPV-specific monitoring tools where needed. Routine review meetings enabled cross-site exchange and ongoing improvement during implementation [33].

5.4.2 Sustainability Mechanisms

After the initial period of donor funding, Rwanda faced the big challenge of financial sustainability. The government responded with progressive incorporation of HPV vaccination expenses into the national health budget, reflecting policy commitment to program sustainability. Rwanda also negotiated tiered pricing arrangements with the vaccine manufacturer, lowering per-dose prices significantly relative to high-income market prices [34]. The country also strategically leveraged support through global health initiatives while retaining implementation ownership. This diversified financing strategy balanced domestic accountability with external resources being used strategically, and this model of sustainability could be potentially applied in other resource-poor contexts.

5.4.3 Sociocultural Issues

Experience with implementation uncovered unexpected sociocultural dynamics needing programmatic response. Although widespread opposition did not occur, local concerns about vaccine safety and impact on fertility were voiced. Certain communities showed intricate family decision-making behaviours calling for involving male household members in their daughters' being vaccinated. The intervention tackled these issues using focused communication, the credibility of community health workers, and active community leaders to dispel misconceptions [35]. The experience highlights the value of foreseeing and addressing proactively sociocultural aspects of vaccine acceptance, especially for interventions in adolescent health.

5.5 Analysis and Implications

5.5.1 Critical Success Factors

Analysis of Rwanda's experience in implementing its policy draws out several key success factors likely to be replicable elsewhere. Sustained political will expressed through coherent leadership messaging and prioritization of resources, setting cervical cancer prevention as a national priority. Such commitment was not merely rhetorical but translated into actual policy decisions, administrative initiatives, and accountability processes. The approach to governance helped overcome the institutional fragmentation that all too often blocks complex public health interventions across sectors.

The delivery strategy of the program showed contextual adaptation to Rwanda's particular sociodemographic and health system features. The school-based implementation utilized high rates of enrolment while keeping access barriers low, while supporting community-based strategies maximized marginal population inclusion. This responsive implementation strategy balanced standardization with contextual sensitivity, developing an efficient population coverage without undermining intervention fidelity.

Perhaps most importantly, Rwanda's implementation strategy successfully tackled community-level determinants of vaccine uptake. Involvement of influential local figures, culturally tailored framing of messages, and active resolution of community concerns reframed a potentially controversial intervention as a widely accepted public health policy [36]. This experience implies that sociocultural obstacles to HPV vaccination can be more easily overcome than widely expected when engagement strategies are credible, respectful, and receptive to the voices of community members.

5.5.2 Theoretical Implications

Rwanda's experience adds to theoretical insight into implementing health innovation in resource-poor environments. The case counters deterministic thinking regarding available resources as the main constraint on implementation, showing how strategic alliances, adaptive management, and community mobilization can beat budget constraints. The model of implementation illustrates the "frugal innovation" model in public health, with remarkable results produced by contextually sound solutions rather than resource-hungry measures.

The example also highlights the possibility of synergistic interactions between health system strengthening and vertical interventions. Instead of building parallel organizations that could undermine current systems, Rwanda's solution incorporated HPV vaccination into overall health services while strengthening system elements at the same time. This experience validates theoretical models suggesting synergistic rather than competitive relationships between system development and disease-specific interventions.

5.5.3 Application to Other Contexts

Rwanda's model of implementation provides lessons for transfer across other low- and middle-income countries with a cervical cancer burden. The public-private partnership model shows one possible path to overcoming early investment constraints while setting

up pathways for programmatic sustainability. The multi-sectoral coordination approach offers a template for governance over interventions that need cross-institutional integration, especially those cutting across health and education sectors.

The community engagement framework provides especially insightful advice for situations in which sociocultural factors play a significant role in the acceptance of health innovation. Rwanda's experience indicates that investment in formative research, stakeholder mapping, and culturally adaptive communication strategies makes up an integral implementation component rather than a discretionary addition. The success with religious and traditional leaders illustrates the promise of harmonizing public health goals with established structures of authority and systems of value.

But contextual variations demand close attention in adaptation. Rwanda's centralised administrative system made coordinated implementation easier, which could be more difficult in decentralised systems. The high school participation levels made school-based delivery effective, which would need to be adapted in lower participation contexts. These observations highlight the need for contextual analysis in planning implementation to prevent blind borrowing of strategies without proper adaptation.

Rwanda's HPV vaccine program is an impressive implementation success that defies typical assumptions about the viability of complex health interventions in limited-resource settings. By combining strategic collaborations, locally tailored delivery approaches, and extensive community outreach, Rwanda attained vaccination coverage rates surpassing many high-income countries in the face of severe economic limitation. Integration into comprehensive cervical cancer control initiatives and impact on health system strengthening additionally enhance the magnitude of this program as a model to study.

Experience of implementation provides rich lessons about critical success factors potentially applicable across other settings, while at the same time underscoring the necessity of contextual adjustment over strict imitation. With increased global action to prevent cervical cancer, Rwanda's experience offers hands-on advice and conceptual lessons for policymaking and program planning in various contexts. The case shows that limitation of resources, though important, should not disallow successful implementation when blended with strategic vision, responsive management, and genuine partnership with the community.

CHAPTER SIX: Discussion

The chapter discusses the study's findings within the framework of past research and global practice, specifically referencing Rwanda's model HPV vaccination program that was outlined in the previous chapter. The discussion makes linkages between the knowledge, attitudes, and practices (KAP) of Kochi doctors observed and other issues in HPV vaccine delivery and uptake, providing both analytical value and pragmatic implications.

6.1 Overview of Findings

The research was shown to have a very optimistic scenario when it comes to awareness and attitudes towards HPV vaccination among physicians in Kochi. The majority correctly identified the relationship between HPV infection and cervical cancer, recognized the asymptomatic and sexually transmitted nature of the infection, and knew the optimal age category (9–14 years) for the initiation of vaccination. Attitudinally, respondents were highly supportive of the HPV vaccine, with 96 percent concurring that it is effective in preventing cervical cancer. A vast majority also indicated they would recommend or even advocate for making the vaccine mandatory if available free of charge.

In spite of these encouraging signs, a gap was revealed between what physicians perceived and understood and how often they carried it out in practice. Although 80 percent of the participants had prescribed the vaccine at least once, only 55 percent said they would discuss it with patients regularly. This inconsistency is a perennial problem in preventive medicine where knowledge and positive attitudes fail to move into consequent clinical action.

The results also indicated a strong effect of medical specialty. Gynaecologists and paediatricians were more likely to show high awareness levels and active recommendation behavior than general practitioners and doctors. Gender, by contrast, was not detected to have a statistically significant effect on any KAP variable.

6.2 Interpretation in the Context of Existing Literature

The results correlate highly with existing literature in India. Chawla et al. presented that while 81% of doctors in Delhi-NCR knew about the HPV vaccine, only 47% promoted it routinely [11]. Goruntla et al. also saw in Andhra Pradesh that only 33.4% of doctors prescribed the vaccine even with high awareness, blaming obstacles such as safety issues and the absence of government

support [13]. Mandal et al., in a study conducted at AIIMS Kalyani in 2024, noted that while junior nurses and doctors had good scores on knowledge and attitude, they recommended HPV vaccination regularly only to the extent of 9.3%—largely because of institutional lag and low patient demand [14].

Globally, Wong et al. from Malaysia reported an analogous knowledge-practice divide. Although doctors were aware of the need for HPV vaccination, practical issues like unease in talking about sex and no formal tools for guidance were deterrents for recommendation [22]. A meta-analysis by Holman et al., which included 34 international studies, supported the fact that although healthcare provider recommendation is the single most influential predictor of vaccine uptake, they do not recommend it due to poor training and systemic obstacles [23].

These results confirm the necessity for interventions that extend beyond awareness-raising. Continuing Medical Education (CME), systems of structured communication aids, and system-level supports—e.g., consultation scripts or electronic medical record reminders—are necessary to facilitate consistent HPV vaccine promotion by all specialties.

6.3 Connecting to Rwanda's HPV Immunization Program

The previous chapter on Rwanda's HPV immunization program provides a valuable real-world illustration of how high coverage has been attained in a resource-constrained setting. Rwanda's experience, with rates of vaccination above 90 percent, provides a stark contrast to India's existing coverage, which is still patchy and mostly reliant on private-sector action or state-level initiatives [38].

A number of Rwanda's strategic decisions squarely confront the concerns identified by this research. Employing a school-based delivery system provided for efficient access to the primary target group—12-year-old girls—while minimizing dependency on opportunistic or clinic-based vaccination, which might be unstable. Centralized administration and intersectoral coordination between the Ministries of Health and Education provided logistical integration and alignment of resources, replacing the decentralization-dependent fragmentation in health systems.

In addition, Rwanda's strategy of community mobilization was distinguished by cultural awareness and strategic communications. By presenting the HPV vaccine as a means of cancer prevention instead of its association with sexual transmission, program implementers minimized the likelihood of resistance and socially legitimized the

intervention. Local leaders, community health workers, and school staff played a crucial role in mobilizing support and responding to concerns—an experience that could be replicated in India to challenge cultural and parental reluctances [39].

A PATH and WHO evaluation in 2022 discovered that the countries with school-based immunization programs achieved 2.5times greater uptake compared to those that used clinic-based or opportunistic approaches [25].

Rwanda also used culturally appropriate communication, framing the vaccine as a cancer prevention strategy instead of highlighting its association with sexual activity. This helped to keep resistance low and make the intervention more normal.

Rwanda's achievement is also a challenge to assumption regarding the superiority of financial means. Strategic alliances with vaccine makers, strong donor negotiation, and inclusion in the national immunization budget proved that determination and strategic planning can trump economic constraints. This is a significant lesson for India, especially with the emergence of Cervavac—a low-cost indigenous vaccine—offering new opportunities for public-sector access to vaccines.

6.4 Implications for Policy and Practice

The findings of this research highlight the significance of engagement of healthcare providers as a keystone in HPV vaccine adoption. Although level of knowledge is good, there is still suboptimal consistency in recommending it. This is similar to an observation by Mathew et al., where they observed that although 92% of primary care doctors in Kerala knew about HPV vaccines, only 38% prescribed them regularly [18]. Efforts should target policy to not only improve vaccine accessibility through initiatives such as Cervavac but also to provide all levels of providers with adequate skills and tools for successful promotion.

The inclusion of HPV-related education into standard medical training, particularly among generalists, would be an essential first step [40].
Systemic aids should facilitate physician behavior: CME modules, practice-based job aids, visual charts, and EHR-based reminders can trigger doctors to order a conversation about vaccines. They can be especially helpful for generalists, who are not always responsible for adolescent care but are critical initial points of contact.

Outside of the clinic, India can learn from Rwanda's intersectoral approach. Tight integration between health and education sectors, along with strategized community outreach plans, has the potential to sharply enhance acceptance of vaccination. Activating school systems, religious institutions, and community health workers—through culturally sensitive and behaviourally based messaging—has the potential to demedicalize the vaccine and dissipate stigma and hesitancy.

6.5 Limitations

The results of this study should be understood within the context of some limitations. The population was confined geographically to Kochi and might not represent views in rural or underprivileged regions of the nation. The fact that the surveys were conducted online could have excluded older or less technologically advanced doctors, thus biasing the results. Second, the fact that patients responded on their own also introduces the likelihood of social desirability bias, whereby participants provide favourable attitudes or behaviours that are not always practiced in actuality.

In spite of these constraints, the research yields important insights into the behavioural dynamics of recommending vaccines and establishes a foundation for future in-depth exploration and targeted interventions.

6.6 Directions for Future Research

Following from these observations, it is recommended that future research investigate KAP among rural practitioners, nurses, and frontline health workers, all of whom play a significant role in adolescent health and outreach vaccination. The launch of Cervavac also opens a window to monitor trends in awareness, recommendation practice, and take-up patterns over time. Longitudinal analyses and qualitative studies can reveal underlying motivations, barriers, and facilitators for provider behavior and present a richer picture of the problems and opportunities for HPV vaccine promotion in India.

6.7 Conclusion

The research confirms the fact that healthcare professionals, especially gynaecologists and paediatricians, have solid knowledge and favourable attitudes towards HPV vaccination. Nevertheless, putting this awareness into regular practice is an ongoing issue. The findings indicate that educational, behavioural, and systemic interventions are required to fill this gap and ensure active vaccine recommendation in all categories of providers. The Rwanda example shows that even with serious fiscal and

infrastructure challenges, high-quality results can be attained with an effective strategy. India's roadmap for HPV vaccine scale-up will be able to take much from such experience if, however, an effort is made to tailor effective models to local settings. Enhanced provider incentives, intersectoral coordination, and behavioural insights integration into promotion for vaccines can all contribute towards moving India closer to its cervical cancer elimination targets.

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Annexure: KAP Questionnaire

Survey on HPV Vaccine Awareness and Practices Among Doctors in Kochi

Dear Participant,

I am **Dr. Maneesha Mohan**, conducting a study titled:

"Knowledge, Attitude, and Practice of Physicians, Paediatricians, and Gynaecologists in Kochi on HPV Vaccine Prescription: A Cross-Sectional Study"

This research aims to understand healthcare providers' perspectives, challenges, and experiences with **HPV vaccination** in Kochi. Your participation is **voluntary**, and all responses will remain **anonymous and confidential**.

- This survey will take approximately **5-7 minutes** to complete.
- You may **skip any question** or **withdraw at any time** without any consequences.
- The data collected will be used solely for research purposes.

By selecting "I Agree," you confirm that you understand the purpose of the study and voluntarily consent to participate.

☐ **I Agree to Participate** *(Required to proceed)*
☐ **I Do Not Agree** *(Exit survey if selected)*

……

Section 1: Demographics (Mandatory)

1. **How do you identify your gender?**
    - Male
    - Female
    - Prefer not to say
2. **Which of the following best describes your medical specialty?**
    - General Physician

- Gynaecologist
- Paediatrician
- Other (please specify)

3. **How many years have you been practicing medicine?**
    - 0-5 years
    - 6-10 years
    - 11-15 years
    - 16+ years
4. **What type of healthcare setting do you primarily work in?**
    - Government hospital
    - Private hospital
    - Private clinic

Section 2: Knowledge (Mandatory)

5. **What are the main risk factors for cervical cancer? (Select all that apply)**
    - HPV infection
    - Multiple sexual partners
    - Early sexual activity
    - Other (please specify)
6. **Which HPV vaccines are available in India? (Select all that apply)**
    - Cervarix
    - Gardasil
    - Gardasil-9
    - Cervavac
    - **Don't know**
7. **Is the HPV vaccine included in India's national immunization program?**
    - Yes
    - No
    - Not sure
8. **According to current guidelines, what is the most suitable age for initiating HPV vaccination?**
    - 9-14 years

- 15-26 years
- 26- 45 years
- Not sure

9. **Is HPV infection a sexually transmitted disease?**
   - Yes
   - No
   - Not sure
10. **Can HPV infection cause cervical cancer?**
   - Yes
   - No
   - Not sure
11. **Does HPV infect both men and women?**
   - Yes
   - No
   - Not sure
12. **Which of the following cancers in women are known to be caused by HPV?** ***(Select all that apply)***
   - Cervical cancer
   - Vulvar cancer
   - Vaginal cancer
   - Anal cancer
   - Not sure
13. **Is HPV infection usually asymptomatic?**
   - Yes
   - No
   - Not sure

Section 3: Attitude (Likert Scale, Mandatory)

(Responses: Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree)

14. **I believe the HPV vaccine is effective in preventing cervical cancer.**
15. **The high cost of the HPV vaccine is a major barrier.**
16. **Parents hesitate due to cultural or religious beliefs.**
17. **If the HPV vaccine were freely available, would you recommend it or support making it mandatory?**

- I would recommend it but not make it mandatory.
- I would recommend it and support making it mandatory.
- I would not recommend it.
- Not sure.

18. **Doubt on the efficacy of HPV vaccine is one of the barriers for the recommendation**

19. HPV vaccine is not recommended due to some safety concerns

20. Sexually transmitted nature of HPV is a barrier for a recommendation

Section 4: Practice (Mandatory)

21. **Have you ever recommended the HPV vaccine?**

- Yes
- No

22. **What are the biggest barriers to recommending HPV vaccines? (Select all that apply)**

- High cost
- Lack of awareness among patients
- Safety concerns
- Religious or cultural beliefs
- Unavailability of the vaccine
- Other (please specify)

23. **When do you most often discuss HPV vaccination with patients?**

- During consultations
- Only on patient request
- Rarely
- Never

24. **Do you provide information about cervical cancer prevention during routine consultations?**

- Always
- Sometimes
- Rarely
- Never

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