Human Papilloma Vaccination Hesitancy Among Parents With 10-14 Years In Athi River Sub-County Machakos County

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Abstract

Background: Cervical cancer can be prevented by human papillomavirus (HPV) vaccination. However, parents can have concerns about vaccinating their daughters. Consequently, there is a need to identify factors associated with vaccine hesitancy among adolescent females aged 10-14 yrs. The study used a descriptive cross sectional study design research, conducting in-depth interviews with parents of eligible children to gain a comprehensive understanding of their views on the vaccine within the community living in Athi River Sub-County.

Material and Methods: This study used descriptive cross-sectional approach. The Chi Square formula t-test and correlation analysis was utilized to generate study respondents for this study. Single stage sampling was employed in this study to recruit study respondents. The cut off for statistical significance was $p \leq 0.05$.

Results: Data on sociodemographic traits females were 110(71.9%) and males 43(28.10%), education level 80(52.3%) were from college, 64(40.52%) employed and religion 128(83.66%) were Christian, Muslim 18(11.76%)Buddhist 0(0.00%) and African church 7(4.58%). HPV knowledge, attitude, beliefs and vaccine hesitancy were collected. Out of 153 participants, 74(48.37%) were aged 31-40 years. Source of information was media whereby 52 (34.0%%) were females while 34(22.2%) were males. Most of the parents are moderately familiar with the HPV vaccine 68(44.4%), Factors like necessity, effectiveness, financial concerns, daughter's age, and healthcare professionals' opinions were found to influence parental decision-making regarding HPV vaccination.

Conclusion: Findings revealed that a notable majority of parents expressed confidence in the vaccine's effectiveness, perceived the accessibility of HPV vaccination services as substantial, and regarded healthcare providers' recommendations as pivotal. Societal stigmas or misconceptions about HPV and its vaccine were seen as barriers, along with concerns about vaccine safety and financial barriers. Educational campaigns and outreach efforts were considered influential, while lack of awareness or knowledge about HPV and its vaccine was perceived as a significant barrier. To address vaccine hesitancy and improve HPV vaccination rates, targeted interventions are needed. These interventions should focus on providing accurate information to address safety concerns and misconceptions, fostering trust in healthcare providers.

Key words: Hesitancy, Human Papilloma Virus, Vaccination, Adolescent

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Introduction

The term "cancer" refers to a group of connected disorders. In all forms of cancer, some body cells start to divide uncontrollably and spread to neighboring tissues. Through resource-appropriate techniques for prevention, early identification, and prompt, high-quality treatment, up to 3.7 million lives could be saved annually. However, according to the National Cancer Institute of Kenya, at least one-third of cancers can be avoided. Globally, the burden of cancer is increasing, placing a heavy burden on the population and the health system at all income levels. After cardiovascular disease and infectious disorders, cancer is the third most common cause of death in Kenya. The annual predicted number of new cases of cancer according to the International Agency for Research on Cancer's (IARC) GLOBOCAN reports for 2018 is 47,887, with a death rate of 32,987 Bray et al 2018.

Cervical cancer (CC) and genital warts have been definitively linked to the sexually transmitted human papilloma virus (HPV). Early sexual activity, multiple pregnancies, and STI infection increase the chance of contracting human papilloma virus and cervical cancer. Since 70% of infections clear up within a year, it is predicted that 20% of sexually active adolescent females will be infected by the age of 18. However, only a small proportion of women with high-risk genes for chronic infection go on to develop cancer. In the UK, cervical cancer is thought to be the cause of 1100 deaths every year. CC is the leading contributor to female cancer death and is the second most prevalent type of cancer in women worldwide everywhere, but particularly in sub-Saharan Africa Edith et al 2016.

Internationally, Sub-Saharan Africa records a larger number of cervical cancer cases. In Kenya a population of 16.8m women of 15 years of age and older are at risk of having cervical cancer. According to current statistics, 3,211 women die from the disease each year, while 5,236 women receive a cervical cancer diagnosis. According to the International Agency for Research on Cancer's 2023 report, cervical cancer is the second most common cancer among Kenyan women and the second most common cancer among women between the ages of 15 and 44. A number of Sub-Saharan African countries, notably Uganda and Tanzania, have performed pilot

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programmes for the effective administration of the HPV vaccine, where more than 80% are girl students from various primary schools. Additionally, Rwanda has a very high elementary school enrollment rate. Without concentrated and targeted actions for the hard-to-reach population, the HPV vaccination programme would be like that many people who suffer the most (Nelly Mugo, David A Ross 2015).

Parents, though, could have reservations about immunising their daughters. Therefore, it is necessary to determine the prevalence and risk factors for parents in Kenya who are reluctant to receive the HPV vaccine. In Kenya's Migori County, a renowned referral hospital, a cross-sectional descriptive study was undertaken among kids' parents between the ages of 9 and 14 who were patients. Data were gathered on sociodemographic characteristics, beliefs, HPV knowledge, and vaccine reluctance. 183 (93.5%) of the 195 participants were over the age of 30. A total of 34 (46.4%) men and 39 The fact that in order to mitigate HPV infection, administration of vaccine is needed was unknown to 35.1% of females Chester et al 2022.

Positively, there was a high level of vaccine acceptance (90%) despite a third's (37.9%) vaccine's efficacy poor opinion, with worries about safety associated with vaccine skepticism (76%) and sentiments that the kid was too young (48%). The willingness by parents to vaccinate their children was positively correlated with favourable opinions and knowledge about the vaccine. Mothers' younger ages and low parenteral education levels were connected negatively with their willingness to vaccinate. 77% of parents (n = 150) advised early sex education, and (59%) a majority of parents would before vaccination, provide their girls with counselling. Parents high desire to have their children vaccinated, existed despite inadequate awareness levels Chester et al 2022.

As a follow-up to a GAVI-supported demonstration experiment of HPV vaccine delivery to girls in Kitui County that began in May 2013, Kenya is suggesting a countrywide HPV vaccination plan for girls in standard four of primary school. Kenya's prior knowledge on teenage vaccination is minimal. The study's objective is to ascertain parents' knowledge, attitudes, and perspectives on HPV vaccination among females aged 10 to 14 in Machakos County's Athi-River Sub-County (Karanja-Chege, C.M 2022).

The study site for this study was Athi River Sub-County Kenya. This study sought to address human papilloma vaccination hesitancy among parents with 10-14 years in Athi River Sub-County Machakos County.

Materials and Methods

Study design

The study used descriptive cross-sectional study design to carry out in depth study on the factors associated with human papilloma vaccination hesitancy 10-14yrs adolescent females in Athi-River Sub-County. This study design was selected because it enables the exploration of complex and differentiated perspectives and the collection of extensive and detailed data. Detailed interviews are conducted with parents of girls aged 10 to 14 years who are candidates for HPV vaccination. The sample for the study is selected using the intentional sampling method. This method is used to select participants who are most likely to have relevant experience and opinions about HPV vaccination. Parents who participated in the study were both male and female, who have did not vaccinated their children.

Study area

The study was conducted in the Eastern Province of Athi River Sub-County in Machakos County. Circle of Machakos. Machakos County has a total population of 1,098,584 people, 264,500 households and covers an area of 6,208 m². km. The population density is 177 inhabitants per m².km. The Akamba are the dominant inhabitants of Machakos County. The Athi River District (Mavoko) consists of four districts: Athi River, Mlolongo/Syokimau, Kinanie and Muthwani with a population of 81,302 according to 2019 census projections (KNBS, 2019).

Study population

A population is a set of individuals, events, or objects with common characteristics according to a precise specification (Mugenda and Mugenda, 2013). The study population includes all girls aged 10 to 14 years who have not been vaccinated against HPV in the Athi River Sub-County.

Sample size determination

The study used Cochran formula to determine the size of the population, from which the sample size is extracted as follows, assuming a 95% confidence level.

Sampling technique

The researcher used cluster sampling method to select wards by ensuring each ward represents the population in the study. Single stage cluster selection was an ideal method in ensuring that there is no bias in selection of the respondents, therefore, it was used in picking parents of 10-14yrs female to take part in the study. In determining the sample size, the researcher will be guided by the level of confidence that they need to have in the data, the kind of analysis to be conducted, the accuracy and the total population of the study.

Data collection tools and procedures

Questionnaire was used to gather information, Part one of the questionnaire will be demographic data of respondents; part two consists of questions to address independent variables which will be in three sub sections. The data collection tool (questionnaire) for the study on knowledge, attitude, and perceptions of parents towards human papillomavirus (HPV) vaccination among 10–14-year-old female children will be Likert scale. In-depth interviews are a common method for collecting qualitative data, as they allow for the exploration of participants; thoughts, feelings, and experiences in a detailed and in-depth manner. In-depth interviews can be conducted in person, depending on the research setting and participants; availability. The questions asked during the in-depth interviews should be open-ended and designed to elicit rich,

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detailed responses from the participants. The questions should be based on the research objectives and should be relevant to the participant; experiences and perspectives.

Statistical analysis

After collecting the data, the researcher performs data cleansing and coding. SPSS version 21.0 is used for quantitative data analysis. Content analytics help with qualitative data analysis. The researcher presents the research results using tables and graphs, as well as in prose for qualitative data. Results are presented using dispersion as a table, percentage, central tendency, and frequency measures. Attitude, knowledge and perception are rated on a 5-point Likert scale. Various hypotheses are tested to arrive at empirical conclusions**.**

Ethical consideration

The researcher used a cover letter from Mount Kenya University. Approval from the National Commission for Science, Technology and Innovation (NACOSTI) is required to start data collection. A letter of approval for survey data collection was obtained from the area chief and Mavoko Level 4 Hospital. Informed consent was also obtained from respondents by filling in the informed consent forms after reviewing the objectives and modalities. The confidentiality of all information is assured to the individual participants. Participants were not to be addressed by their names and questionnaires was put under lock and key. Participants in the study were allowed to withdraw from the study willingly and also there is no reward in form of incentives to the participants in the study.

Results

Demographic characteristics of the respondents

Firstly, regarding gender, the study reflects a substantial participation of females, comprising 71.90% of the total respondents, in contrast to males who accounted for 28.10%. This gender distribution underscores the significance of female perspectives and decision-making processes in the context of HPV vaccination hesitancy among parents with adolescent girls. Secondly, examining age distribution, the study encompasses a diverse range of age groups. Notably, the age bracket of 31-40 years constitutes the largest proportion of respondents, with 48.37% falling within this category. This indicates that individuals within this age range play a prominent role in shaping vaccination attitudes and behaviors, potentially reflecting the influence of parenthood and familial responsibilities on vaccination decisions.

Furthermore, exploring educational backgrounds reveals a predominant inclination towards higher education among the respondents. Over half of the participants (52.29%) have attended college, emphasizing the importance of educational attainment in influencing health-related perceptions and decision-making processes. In terms of employment status, the study population demonstrates a varied occupational landscape. Self-employed individuals comprise the largest group, accounting for 34.64% of respondents, followed closely by those in formal employment at 40.52%. This diversity in employment status highlights the multifaceted socio-economic contexts within which vaccination decisions are made, encompassing factors such as financial stability, access to healthcare, and flexibility in scheduling. Lastly, religious affiliations shed light on the cultural and spiritual dimensions influencing vaccination attitudes. Christianity emerges as the predominant religious affiliation among the respondents, with 83.66% identifying as Christians. This suggests the potential impact of religious beliefs and values on perceptions of vaccination, underscoring the importance of culturally sensitive approaches in addressing vaccine hesitancy within diverse communities.

Brewer et al. (2017) further emphasize the significance of parental attitudes as barriers to HPV vaccination acceptance. Socio-demographic factors such as education, income level, and cultural beliefs also influence parental attitudes towards HPV vaccination. Studies have shown that parents with higher education levels and socio-economic status are more likely to have accurate knowledge about HPV and be receptive to vaccination for their children. Conversely, cultural beliefs or religious affiliations may influence perceptions of sexual health and vaccination, leading to varying levels of acceptance across different communities.

Table 1 provides demographic characteristics outline key details about the respondents involved in a study focusing on HPV vaccination hesitancy among parents with adolescent girls.

Source of information on human papilloma infection and vaccine

Figure 1 shows that 34.0 %(n=52) of the respondents were female said that their source of information was from media,22.2%(n=34) were male said their source of information is media. Majority of the respondents consider media as their source of the information while females are leading in the use of media to get information,19.60% (n=30) of the respondents were females who considered friends as source of information while males 14.4%(n=22), 5.9%(n=9) female respondents considered healthcare workers while male 2.6% (n=4), 0.654%(n=1) other sources while 0.654%(n=1) both males and female's respondents never had any information about HPV.

The most effective communication mean was through media. This was followed by friends and health care workers. The least was other sources. Study results showed that the source of information 56.2% of the respondents was media television since majority of the respondents were from college this agrees with study done in South East Asia Region by Daviya et al 2017 which states that the main source of information was mass media such as television since the respondents were from higher learning institutions. The study disagrees with the study Chester et al 2022 which was done in Kenya which states that the source of information was healthcare workers.

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Table1. Demographic characteristics of the respondents

Demographic data	Frequency (n=153)	Percentage
Gender		
Male	43	28.10%
Female	110	71.90%
Age		
20yrs and below	0	0.00%
21-30yrs	42	27.45%
31-40yrs	74	48.37%
41 and above	37	24.18%
Level of education		
High school	28	18.30%
College	80	52.29%
University	29	18.95%
Elementary school	16	10.46%
Others	0	0.00%
Employment status		
Self employed	53	34.64%
Employed	62	40.52%
Unemployed	38	24.84%
Religion		
Christianity	128	83.66%
Muslim	18	11.76%
Buddhist	0	0.00%
African Church	7	4.58%

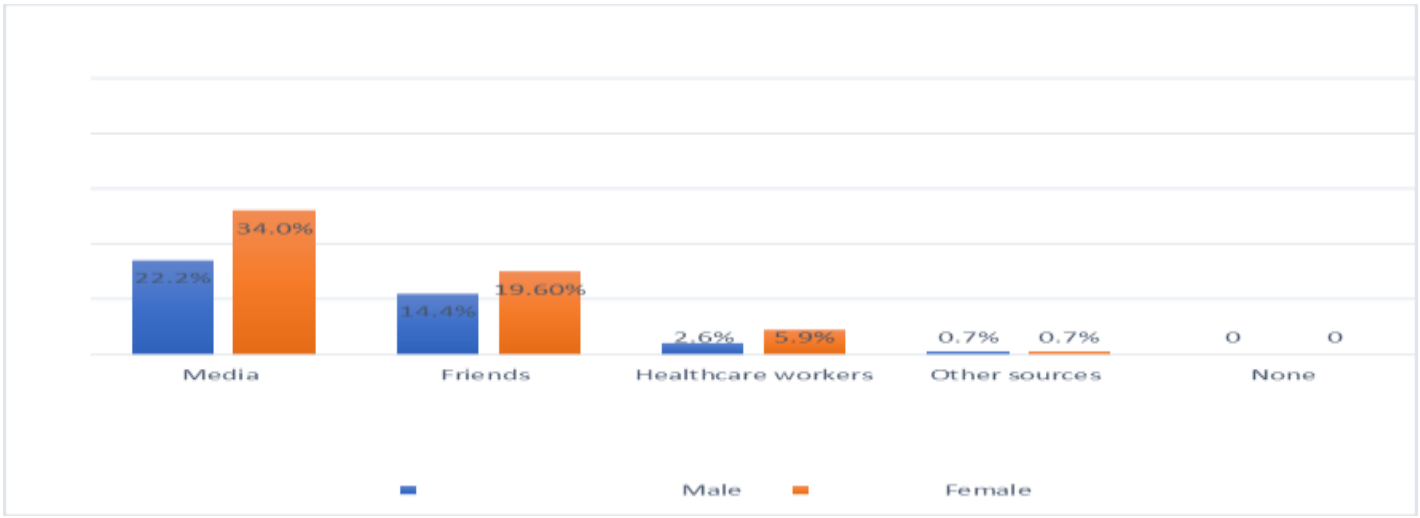

Figure 1: Source of information on human papilloma infection and vaccine

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Establishment of the knowledge and attitude of parents with female children aged 10-14years about HPV vaccination

To determine the relationship chi-square tests conducted to assess the association between various aspects of knowledge and attitudes regarding HPV vaccination among parents with female children aged 10-14 years from the above table 2. The Pearson Chi-Square value is reported as 7.510 with 16 degrees of freedom (df). The associated p-value (Asymptotic Significance) is .002, indicating that there is a statistically significant association between the variables being analyzed. Similarly, the Likelihood Ratio test yields a chi-square value of 8.175 with 16 degrees of freedom and a p-value of .000, further supporting the presence of a significant association. This concluded that there existed a statistically significant relationship between the knowledge and attitudes of parents regarding HPV vaccination for their female children aged 10-14 years. This implies that various factors such as familiarity, knowledge about benefits, confidence in safety, perceived necessity, willingness to discuss with healthcare providers, availability of information, concerns about side effects, and perceived importance of vaccination are interrelated and influence each other's outcomes.

Smith et al. (2019) conducted a comprehensive review, revealing that parental awareness of HPV and its associated risks is often low. Many parents lack understanding about the link between HPV infection and cervical cancer, which undermines their motivation to vaccinate their children. Additionally, misconceptions regarding the vaccine's safety and efficacy contribute to hesitancy among parents.

Brewer et al. (2017) further emphasize the significance of parental attitudes as barriers to HPV vaccination acceptance. Concerns about vaccine safety, including fears of adverse effects and misconceptions about long-term consequences, are commonly cited by parents. Moreover, doubts regarding the vaccine's efficacy and necessity for adolescents who are not yet sexually active influence parental decision-making. These attitudes are often rooted in misinformation or lack of access to accurate information about HPV and the vaccine.

Table 2: Respondent rating on establishment of the knowledge and attitude of parents with female children aged 10-14 years about HPV vaccination

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.510[a]	16	.002
Likelihood Ratio	8.175	16	.000
Linear-by-Linear Association	1.387	1	.009
N of Valid Cases	153		

Correlation Analysis of Knowledge and attitude of parents in association to demographic data

The findings as indicated in table 3 demonstrated a negative relationship between parent's knowledge and attitude about HPV vaccine and gender. This implies that there is no relationship between the parent's knowledge, attitude and perception about HPV vaccine and gender since P-value is 0.743 while r= -0.027, there is positive relationship between the age and parent's knowledge, attitude and perception about HPV vaccine this indicates that the more you advance in age the more knowledge you get

The finding revealed a positive and substantial correlation r=0.229, p<0.004. This indicates that the more you advance in age the more knowledge, attitude and perception you have about HPV vaccine.

The study results further demonstrate that there is no correlation relationship of parent's knowledge, attitude and perception about HPV vaccine and education (r= -0.16, p>0.846) linking parent's education negatively have impact on the knowledge, attitude and perception about HPV vaccine.

The study results further indicated that there is no significant association linking parent's knowledge, attitude and perception of human papilloma virus vaccine and employment in Athi River sub-county (r=0.348, p>0.0746).

Examination of the factors that influence the parents' decisions not to vaccinate their 10–14year-old female children against HPV

Concern about potential side effects of the HPV vaccine emerged as a significant factor influencing parents' decisions not to vaccinate their 10–14-year-old daughters, with 48.37% of respondents considering it "very influential" as shown in table 4. Out of 74 respondents, this concern resonated strongly, a finding supported by a statistically significant p-value of 5.772.

Similarly, the perceived effectiveness of HPV vaccination was deemed "very influential" by 37.91% of respondents, with 58 individuals concurring, and a statistically significant p-value of 9.468 reinforcing its impact this study agrees with the study done in Kenya, Njunguna et al 2021 where parents expressed safety concerns for their children and were reluctant to vaccinate them it also disagrees with the study conducted in Kenya Chester et al 2022 where more than 60% of the respondents had a positive belief about the safety and efficacy of the human papilloma virus vaccine. This study also

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disagrees with study done in Kenya by Chester et al 2022 which states 77% of the parents feels the vaccine is safe for their children and would recommend it to other parents.

Meanwhile, the necessity of the HPV vaccine, perceived as "moderately impacting" by 48.37% of respondents, maintained statistical significance with a p-value of 1.503. Conversely, religious or cultural beliefs were largely deemed "not significant at all" in influencing the decision, as affirmed by 56.21% of respondents out of 86, supported by a significant p-value of 4.378 this agrees with Kayoll V et al 2019 which states that most mothers and daughters said that their religious beliefs did not influence their decision to receive the HPV vaccine and eventually stopped them from receiving it.

Additionally, concerns regarding the cost of HPV vaccination were considered "very influential" by 40.52% of respondents, with 62 individuals expressing agreement, and a significant p-value of 0.988. Misinformation or lack of knowledge about HPV and its vaccine was deemed "very impacting" by 38.56% of respondents, with 59 individuals indicating agreement, and a statistically significant p-value of 2.308. The influence of friends or family members' opinions was considered "moderately significant" by 40.52% of respondents, with 62 individuals concurring, and a significant p-value of 6.027. However, the belief that the daughter is not at risk for HPV infection, while influential to some extent ("very influential" for 39.87% of respondents), did not achieve statistical significance, as indicated by a p-value of 0.071.

This correlates to research by Forster et al. (2019) which underscores how safety apprehensions, including worries about vaccine ingredients and perceived risks of adverse reactions, contribute to parental vaccine hesitancy that parents may harbor fears about potential adverse effects or long-term consequences of the HPV vaccine. Misinformation and misconceptions also play a pivotal role in shaping parental decisions regarding HPV vaccination. Studies by Rosenthal et al. (2018) have highlighted the prevalence of misinformation about HPV transmission, vaccine efficacy, and potential harms. False beliefs, such as concerns about vaccine-induced infertility or the vaccine's association with promiscuity, can sway parents away from vaccinating their children.

Distrust in healthcare systems and providers can also deter parents from vaccinating their children against HPV. Studies by Smith et al. (2017) have identified skepticism towards vaccine recommendations from healthcare professionals and concerns about the motives of pharmaceutical companies as barriers to HPV vaccination acceptance. Lack of confidence in the healthcare system's recommendations or suspicion regarding potential conflicts of interest may lead parents to reject HPV vaccination.

Research by Downs et al. (2016) suggests that cultural taboos surrounding discussions of sexual health and modesty may contribute to vaccine refusal among certain communities. Similarly, religious beliefs that conflict with vaccination practices, such as concerns about vaccine ingredients or moral objections, can dissuade parents from opting for HPV vaccination for their daughters.

Establishment of the perceptions of parents about the uptake of HPV vaccine and the associated barriers

The results from the one-sample t-tests as in Table 5 reveal crucial insights into parents' perceptions regarding the uptake of the HPV vaccine and associated barriers. Firstly, the substantial t-value of 27.755 at a significance level of .000 indicates a statistically significant difference from zero, suggesting that parents hold a significant level of confidence in the effectiveness of the HPV vaccine. Similarly, the t-value of 37.681 with a significance level of .000 underscores the significant influence parents attribute to the accessibility of HPV vaccination services, reflecting its importance in vaccination uptake. Furthermore, the t-value of 45.003 at a significance level of .000 emphasizes the significant role parents assign to healthcare providers' recommendations in vaccination decisions. Moreover, perceptions regarding societal stigmas or misconceptions, as indicated by a t-value of 27.697 with a significance level of .000, are deemed significantly influential barriers by parents. Additionally, concerns about the safety of the HPV vaccine, financial barriers, and lack of awareness or knowledge all exhibit significant impacts, as demonstrated by their respective t-values of 31.470, 41.515, and 34.784, all with significance levels of .000. These findings collectively highlight the multifaceted nature of factors influencing parental attitudes and decision-making processes regarding HPV vaccination, underscoring the importance of addressing these factors to enhance vaccination uptake effectively.

A study by Laz et al. (2018) suggests that some parents may underestimate the significance of vaccinating their children against HPV, particularly if they perceive their daughters to be at low risk of contracting the virus. Lack of awareness about HPV-related diseases and their potential consequences may lead parents to prioritize other vaccines over the HPV vaccine, thereby affecting uptake rates. Parental concerns about vaccine safety and efficacy significantly influence perceptions of HPV vaccination. Studies by Perkins et al. (2019) have highlighted how safety apprehensions, including worries about potential side effects and long-term health impacts, contribute to vaccine hesitancy among parents. Similarly, doubts about the vaccine's effectiveness in preventing HPV infection and related diseases may deter parents from vaccinating their children.

Hughes et al. (2016) have shown that parents express apprehensions about potential side effects and long-term health risks associated with the vaccine. Addressing these concerns through accurate information dissemination and communication of the vaccine's safety profile is crucial in promoting acceptance. Many parents lack adequate knowledge about HPV and its associated risks, which can impact their decision-making regarding vaccination. Research by Gerend et al. (2016) suggests that parents who are unaware of the link between HPV infection and cervical cancer may underestimate the importance of vaccination for their children. Educating parents about the risks of HPV-related diseases can help increase vaccine acceptance.

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In conclusion, parental perceptions play a significant role in shaping HPV vaccine uptake among adolescents. While many parents recognize the vaccine's effectiveness in preventing HPV-related diseases, concerns about safety, knowledge gaps, misinformation, and practical barriers such as access and affordability hinder vaccination acceptance. Addressing these barriers through targeted education, communication strategies, and efforts to improve vaccine accessibility is essential in increasing HPV vaccine uptake rates among adolescents.

Table 3: Correlation Analysis of Knowledge and attitude of parents in association to demographic data

Correlations

		K.A	Gender	Age	Education	Employment	Religion
K.A	Pearson Correlation	1	-0.027	.229**	-0.016	0.076	.837**
	Sig. (2-tailed)		0.743	0.004	0.846	0.348	.000
	N	153	153	153	153	153	153
Gender	Pearson Correlation	-0.027	1	0.053	.274**	.737**	-0.086
	Sig. (2-tailed)	0.743		0.519	0.001	0	0.289
	N	153	153	153	153	153	153
Age	Pearson Correlation	.229**	0.053	1	.539**	.339**	0.109
	Sig. (2-tailed)	0.004	0.519		0	0	0.181
	N	153	153	153	153	153	153
Education	Pearson Correlation	-0.016	.274**	.539**	1	.547**	-.163*
	Sig. (2-tailed)	0.846	0.001	0		0	0.044
	N	153	153	153	153	153	153
Employment	Pearson Correlation	0.076	.737**	.339**	.547**	1	-0.149
	Sig. (2-tailed)	0.348	0	0	0		0.065
	N	153	153	153	153	153	153
Religion	Pearson Correlation	.837**	-0.086	0.109	-.163*	-0.149	1
	Sig. (2-tailed)	0	0.289	0.181	0.044	0.065	
	N	153	153	153	153	153	153

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

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Table 4: Respondents rating on factors that influence the parents' decisions not to vaccinate their 10–14year-old female children against HPV

Test item		F	%	P, df, χ^2
How influential is the concern about potential side effects of the HPV vaccine on your decision not to vaccinate your 10-14-year-old daughter?	Not influential at all	6	3.92%	P = 5.772
	Slightly influential	16	10.46%	Df = 4
	Moderately influential	28	18.30%	$\chi2$ = 0.036
	Very influential	74	48.37%	
	Extremely influential	29	18.95%	
To what extent do you believe that the perceived effectiveness of HPV vaccination influences your decision not to vaccinate your daughter?	Not influential at all	15	9.80%	P = 9.468
	Slightly influential	26	16.99%	Df = 4
	Moderately influential	27	17.65%	$\chi2$ = 0.000
	Very influential	58	37.91%	
	Extremely influential	27	17.65%	
How much does the concern about the necessity of the HPV vaccine impact your decision not to vaccinate your daughter?	Not impacting at all	3	1.96%	P = 1.503
	Slightly impacting	19	12.42%	Df = 4
	Moderately impacting	74	48.37%	$\chi2$ = 0.014
	Very impacting	47	30.72%	
	Extremely impacting	10	6.54%	
How significant is the influence of religious or cultural beliefs on your decision not to vaccinate your 10-14-year-old daughter against HPV?	Not significant at all	86	56.21%	P = 4.378
	Slightly significant	24	15.69%	Df = 4
	Moderately significant	33	21.57%	$\chi2$ =0.000
	Very significant	7	4.58%	
	Extremely significant	3	1.96%	
To what extent do concerns about the cost of HPV vaccination influence your decision not to vaccinate your daughter?	Not influential at all	9	5.88%	P = 0.988
	Slightly influential	37	24.18%	Df = 4
	Moderately influential	22	14.38%	$\chi2$ =0.015
	Very influential	62	40.52%	
	Extremely influential	23	15.03%	
How much does misinformation or lack of knowledge about HPV and its vaccine impact your decision not to vaccinate your daughter?	Not impacting at all	2	1.31%	P = 2.308
	Slightly impacting	25	16.34%	Df = 4
	Moderately impacting	51	33.33%	$\chi2$ = 0.002
	Very impacting	59	38.56%	
	Extremely impacting	16	10.46%	
How significant is the influence of friends or family members' opinions on your decision not to vaccinate your daughter against HPV?	Not significant at all	8	5.23%	P = 0.000
	Slightly significant	12	7.84%	Df = 4
	Moderately significant	62	40.52%	$\chi2$ =6.027
	Very significant	35	22.88%	
	Extremely significant	36	23.53%	
How much does the belief that your daughter is not at risk for HPV infection influence your decision not to vaccinate her?	Not influential at all	18	11.76%	P = 0.071
	Slightly influential	24	15.69%	Df = 4
	Moderately influential	31	20.26%	$\chi2$ =1.279
	Very influential	61	39.87%	
	Extremely influential	19	12.42%	

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Table 5: One sample T-test on establishment of the perceptions of parents about the uptake of HPV vaccine and the associated barriers

One-Sample Test						
	Test Value = 0					
					95% Confidence Interval of the Difference	
Test Item	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
How confident are you in the overall effectiveness of the HPV vaccine in preventing cervical cancer and other related diseases?	27.755	152	.000	3.059	2.84	3.28
To what extent do you believe that the accessibility of HPV vaccination services influences its uptake among parents and their daughters?	37.681	152	.000	3.392	3.21	3.57
How significant do you consider the role of healthcare providers' recommendations in encouraging parents to vaccinate their daughters against HPV?	45.003	152	.000	3.745	3.58	3.91
To what extent do you perceive societal stigmas or misconceptions about HPV and its vaccine as barriers to its uptake among parents?	27.697	152	.000	2.542	2.36	2.72
How much do concerns about the safety of the HPV vaccine contribute to hesitancy among parents to have their daughters vaccinated?	31.470	152	.000	3.105	2.91	3.30
To what extent do financial barriers, such as the cost of the vaccine or lack of insurance coverage, impact the uptake of HPV vaccination among parents?	41.515	152	.000	3.928	3.74	4.12
How much do you believe that educational campaigns and outreach efforts influence parents' decisions to vaccinate their daughters against HPV?	43.113	152	.000	3.294	3.14	3.45
To what extent do you perceive lack of awareness or knowledge about HPV and its vaccine as a barrier to its uptake among parents?	34.784	152	.000	3.405	3.21	3.60

Examination of any concerns or reservations parents may have about HPV vaccination for their 10-14year old female children

The results of the Chi-Square tests as shown in table 6 indicate significant associations between parents' concerns or reservations about HPV vaccination for their 10-14-year-old daughters and the variables under study. The Pearson Chi-Square test yielded a value of 15.154 with 16 degrees of freedom and a p-value of .003, signifying a statistically significant relationship. Similarly, the Likelihood Ratio Chi-Square test produced a value of 16.192 with 16 degrees of freedom and a p-value of .040, indicating a significant association. Additionally, the Linear-by-Linear Association test, with a value of .986 and 1 degree of freedom, resulted in a p-value of .021, suggesting a significant linear relationship between the variables. These findings collectively suggest that various factors influencing parental concerns or reservations regarding HPV vaccination for their daughters are significantly related, emphasizing the complexity of the issue and the interplay between different considerations.

A study by Gilkey et al. (2019) found that parents worry about potential side effects and long-term health impacts of the vaccine on their children. Common misconceptions, such as the association of the vaccine with infertility or autoimmune disorders, contribute to parental hesitancy. Addressing these concerns through accurate information dissemination is crucial in alleviating parental fears. Research by Kornides et al. (2018) indicates that some parents perceive the vaccine as irrelevant for their preteen daughters due to misconceptions about HPV transmission and risk. Educating parents about the importance of vaccinating before potential exposure to HPV is essential in overcoming this barrier.

Cultural and religious beliefs may influence parental attitudes towards HPV vaccination. Studies by Marlow et al. (2019) highlight how cultural taboos surrounding discussions of sexual health can lead to resistance to vaccinating adolescents against a sexually transmitted infection like HPV. Understanding and respecting cultural diversity while providing culturally sensitive information about the vaccine are crucial steps in addressing these concerns. Research by Bednarczyk et al. (2016) underscores disparities in HPV vaccine uptake based on socio-economic factors, indicating that cost and accessibility issues hinder vaccination efforts among certain populations. Implementing strategies to

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improve access, such as school-based vaccination programs or subsidized vaccine initiatives, can help alleviate these concerns.

In conclusion, parents may harbor various concerns and reservations regarding HPV vaccination for their 10-14-year-old female children, ranging from safety apprehensions to cultural beliefs and logistical challenges. Addressing these concerns through targeted educational interventions, culturally sensitive communication, and improved access to vaccination services is essential in promoting HPV vaccine acceptance and uptake among adolescents.

Table 6: Chi Square Test on the examination of any concerns or reservations parents may have about HPV vaccination for their 10-14year old female children

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.154[a]	16	.003
Likelihood Ratio	16.192	16	.040
Linear-by-Linear Association	.986	1	.021
N of Valid Cases	153		

Discussion

The study investigated the knowledge and attitudes of parents with female children aged 10-14 years regarding HPV vaccination. Through a comprehensive analysis presented in various aspects such as familiarity with HPV, knowledge about vaccination benefits, safety confidence, perceived necessity, willingness to discuss with healthcare providers, information availability, concerns about side effects, and the importance of vaccination were evaluated.

Findings revealed a commendable level of awareness among respondents regarding HPV vaccination, with most considering themselves moderately to very familiar with it. However, there was ambiguity regarding the benefits of vaccination, and confidence in its safety varied. Despite concerns about side effects, the majority perceived HPV vaccination as necessary for their daughters' health and recognized its importance.

Chi-square tests established a significant association between different dimensions of knowledge and attitudes regarding HPV vaccination among parents. This suggests interrelations among factors like familiarity, knowledge about benefits, safety confidence, perceived necessity, willingness to discuss with healthcare providers, information availability, concerns about side effects, and perceived importance of vaccination.

Responses from participants regarding various aspects such as worries about side effects, long-term effects, safety information, necessity of the vaccine, effectiveness, financial concerns, influence of daughter's age, and healthcare professionals' opinions. Findings revealed significant concerns among respondents regarding side effects and long-term effects of the vaccine, while a notable proportion expressed confidence in safety information provided. Factors like necessity, effectiveness, financial concerns, daughter's age, and healthcare professionals' opinions were found to influence parental decision-making regarding HPV vaccination.

To determine relationships between different parameters, chi-square tests were conducted and presented results that indicated significant associations between parents' concerns or reservations about HPV vaccination for their daughters and the variables under study. These findings suggest a complex interplay of various factors influencing parental attitudes and decisions regarding HPV vaccination.

Concerns about potential side effects, vaccine effectiveness, necessity, and cost emerged as significant factors influencing parents' decisions not to vaccinate their daughters against HPV. Safety apprehensions, including worries about vaccine ingredients and perceived risks of adverse reactions, were highlighted as major contributors to parental vaccine hesitancy. Misinformation and misconceptions about HPV transmission, vaccine efficacy, and potential harms also played a pivotal role in shaping parental decisions.

Distrust in healthcare systems and providers, skepticism towards vaccine recommendations, and concerns about pharmaceutical companies' motives were identified as barriers to HPV vaccination acceptance. Cultural taboos surrounding discussions of sexual health, modesty, and religious beliefs that conflict with vaccination practices were also noted as deterrents to HPV vaccination among certain communities.

Findings revealed that a notable majority of parents expressed confidence in the vaccine's effectiveness, perceived the accessibility of HPV vaccination services as substantial, and regarded healthcare providers' recommendations as pivotal. Societal stigmas or misconceptions about HPV and its vaccine were seen as barriers, along with concerns about vaccine safety and financial barriers. Educational campaigns and outreach efforts were considered influential, while lack of awareness or knowledge about HPV and its vaccine was perceived as a significant barrier.

One-sample t-tests confirmed the significance of these perceptions, indicating that parents attribute substantial importance to factors influencing HPV vaccine uptake,

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including effectiveness, accessibility, healthcare providers' recommendations, societal stigmas or misconceptions, safety concerns, financial barriers, and lack of awareness or knowledge.

Conclusion

The study concludes that parental knowledge and attitudes play a crucial role in HPV vaccination uptake among adolescents. To promote vaccine acceptance, it is imperative to address misconceptions, provide accurate information, and alleviate concerns about vaccine safety. Tailored educational interventions considering socio-demographic factors and cultural sensitivities are essential for enhancing parental awareness and attitudes towards HPV vaccination, thereby increasing vaccine uptake rates among female children aged 10-14 years.

Moreover, the statistically significant association revealed by chi-square tests underscores the interconnectedness of various factors influencing parental attitudes towards HPV vaccination. These findings highlight the need for comprehensive strategies aimed at improving parental understanding and acceptance of HPV vaccination, ultimately contributing to public health initiatives aimed at preventing HPV-related diseases among adolescents.

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Competing Interests

The author declares that there is no conflict of interest.

Availability of Data Statement

The corresponding author can provide the datasets used or analyzed in the current study upon reasonable request.

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