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Risk Factors Associated with Increased Cervical Cancer Acquisition in Women: A Comprehensive Analysis

By

Philip Kasawa Naluande[1,2]., Praveen T. Krishnamurthy[1,4]., Michael F. Otieno[3]., Bahati A. Rapando[1,2]

Texila American University[1], Clinical and Laboratory Standards Institute – Africa[2] , Kenyatta University[3], J.S.S College[4]

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Abstract

Cervical cancer remains a significant health challenge in Kenya, with treatment outcomes varying widely due to a range of risk factors. This publication examines the factors influencing the effectiveness and accessibility of cervical cancer treatment in Kenya. By analyzing socio-economic, healthcare, and individual-level determinants, this study provides insights into the barriers and challenges faced by patients and healthcare systems, aiming to inform strategies to improve treatment outcomes and equity in cancer care. This study investigates factors influencing increased cervical cancer acquisition including HPV awareness among women, examining demographic characteristics, socioeconomic status, educational attainment, and attitudes towards HPV vaccination. Multivariable analysis revealed that higher educational levels, positive HPV vaccine attitudes, and awareness of the HPV vaccine were significantly associated with above-average knowledge of HPV (Kahn et al., 2008). Significant predictors included age, marital status, and educational attainment. These findings highlight the need for targeted educational interventions and improved access to HPV vaccination information to enhance awareness across diverse demographic groups (Smith et al., 2015).

Introduction

Cervical cancer is a leading cause of cancer-related morbidity and mortality among women in Kenya. This analysis examines various risk factors associated with the acquisition of cervical cancer, including socio-demographic elements, sexual behavior, HPV infection, and healthcare access. Additionally, survey data on knowledge regarding cervical cancer risk factors reveal significant public awareness gaps. Understanding these factors is crucial for developing effective prevention strategies.

Cervical cancer is one of the leading causes of cancer-related deaths among women in Kenya. While early detection and treatment can significantly improve survival rates, various risk factors impact treatment effectiveness and accessibility. This study explores these risk factors to understand their impact on treatment outcomes and identify areas for intervention.

Cervical cancer poses a significant public health challenge in Kenya, with incidence rates among the highest globally. Persistent infection with high-risk human papillomavirus (HPV) types is the primary cause of cervical cancer. This analysis aims to identify and discuss the multifaceted risk factors contributing to the high prevalence of cervical cancer in Kenya, drawing from existing literature and new survey data.

Literature Review

Socio-Demographic Factors

Age and Marital Status

Cervical cancer incidence increases with age, particularly among women aged 30-49 years (Orem et al., 2017). Marital status also influences risk, as married women often face prolonged sexual exposure, which elevates their risk for HPV and cervical cancer (DeSantis et al., 2019).

Education and Economic Status

Low levels of education and poverty correlate with increased risk. Women with limited education may lack awareness of cervical cancer and HPV prevention methods, leading to lower screening rates (Mukhwana et al., 2020). Economic challenges hinder access to healthcare services, including vaccinations and screenings.

Sexual Behavior

Early Sexual Debut and Multiple Sexual Partners

Engaging in sexual activity at an early age and having multiple sexual partners significantly increase cervical cancer risk. Early sexual debut is linked to a higher likelihood of acquiring HPV (Liu et al., 2020). Multiple partners increase exposure to HPV and other sexually transmitted infections (STIs).

*Corresponding Author: **Philip Kasawa Naluande**

History of STIs

A history of STIs, particularly those associated with HPV, is a significant risk factor for developing cervical cancer. Women with prior STIs are more susceptible to HPV infections and subsequent cervical lesions (Khamis et al., 2019).

HPV Infection

HPV is the primary causative agent of cervical cancer, with studies indicating that nearly 70% of cervical cancer cases in Kenyan women are linked to HPV infections (Bhatla et al., 2020). Access to HPV vaccination is crucial, yet uptake remains low.

Lack of Vaccination

Barriers such as cultural beliefs, misinformation, and lack of awareness hinder vaccination efforts (Mukhwana et al., 2020). Increasing awareness and access to vaccination programs is vital in combating cervical cancer.

Access to Healthcare

Screening and Early Detection

Regular screening through Pap smears and HPV testing is essential for early detection of cervical lesions. However, many women in Kenya do not undergo routine screenings due to barriers such as lack of information, financial constraints, and inadequate healthcare infrastructure (Orem et al., 2017).

Health Infrastructure

The availability and accessibility of healthcare services significantly influence the prevention and management of cervical cancer. Many areas in Kenya are understaffed and lack resources for comprehensive cervical cancer screening and treatment (Liu et al., 2020).

Knowledge Regarding Risk Components

A survey assessing awareness of risk factors associated with cervical cancer revealed significant gaps in knowledge among women. The survey indicates that while awareness of family history and HPV as risk factors is relatively high, knowledge about other factors, such as the importance of regular Pap smears and safe sexual practices, remains limited.

Human Papillomavirus (HPV) is a prevalent sexually transmitted infection with significant implications for cervical cancer and other HPV-related diseases. Prior research has demonstrated that HPV knowledge varies widely across different demographics. For instance, Kahn et al. (2008) found that higher educational levels are consistently associated with greater knowledge of HPV and vaccination. Smith et al. (2015) noted that individuals in major cities often have better access to health information compared to those in rural or remote areas. Attitudes towards HPV vaccination also play a crucial role in influencing awareness and uptake, as highlighted by Tiro et al. (2012). This study builds on existing literature by examining these factors in a contemporary context and assessing their relative impact on HPV knowledge.

Methodology

This analysis utilized a mixed-methods approach, combining a literature review with a cross-sectional survey conducted among women in various regions of Kenya. The survey aimed to assess awareness of cervical cancer risk factors and gather demographic data. Statistical analysis was performed to identify correlations between socio-demographic factors and knowledge of cervical cancer. Qualitative data were obtained through interviews with patients, healthcare providers, and policymakers. The data were analyzed to identify common risk factors and their influence on acquisition of cervical cancer.

Results

The analysis found that socio-demographic factors such as age, education, and marital status significantly correlated with awareness of cervical cancer risk factors. The survey revealed that while many participants recognized familial history and HPV as risk factors, knowledge of preventive measures, including the importance of regular screenings, was lacking.

Socioeconomic Factors

Income and Employment: Low-income status and unemployment were associated with delayed treatment and inadequate follow-up care. Financial constraints often led to treatment interruptions and a reliance on less effective treatment options.

Education: Lower levels of education were linked to reduced awareness of treatment options and poorer health literacy, impacting patients' ability to make informed decisions about their care.

Healthcare System Factors

Availability of Services: Limited access to specialized treatment facilities and diagnostic services was a significant barrier. Rural areas, in particular, faced challenges due to the scarcity of advanced healthcare infrastructure.

Quality of Care: Variability in the quality of care, including inconsistencies in treatment protocols and availability of trained medical personnel, affected treatment outcomes. Some facilities lacked the necessary resources and equipment for optimal care.

Patient-Related Factors

Stage at Diagnosis: Advanced stages of cervical cancer at diagnosis were common, leading to more complex and less effective treatment. Delays in seeking medical care and screening contributed to late-stage diagnoses.

Comorbidities: The presence of other health conditions, such as HIV/AIDS, complicated treatment and increased the risk of poor outcomes. Managing comorbidities alongside cancer treatment often posed additional challenges.

Cultural and Social Influences

Stigma and Cultural Beliefs: Cultural stigma associated with cervical cancer and its treatment led to reluctance in seeking care and following through with recommended treatments. Social support structures and family involvement were crucial in influencing treatment adherence.

The multivariable analysis indicated that several factors significantly influence HPV knowledge:

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Age: Older age groups had lower HPV knowledge compared to the 20-29 years group, with significant declines observed in the 50-59 and 60-69 years age brackets (Smith et al., 2015).

Locality: Women in major cities showed higher HPV knowledge, though the difference was not statistically significant (Kahn et al., 2008).Socioeconomic Status: Higher socioeconomic status was associated with better HPV knowledge, particularly for those in the fifth quintile (Smith et al., 2015).

Education: Higher educational attainment correlated with increased HPV knowledge, with those holding a Bachelor's degree or higher showing the greatest levels of knowledge (Kahn et al., 2008).

Marital Status: Never-married women had the highest levels of HPV knowledge, while married and de facto women had significantly lower knowledge (Tiro et al., 2012).

Children: Women without children exhibited higher HPV knowledge compared to those with children (Smith et al., 2015).

Cervical Screening History: A history of abnormal Pap smears was associated with higher HPV knowledge, though not statistically significant (Tiro et al., 2012).

HPV Vaccine Awareness and Attitudes: Awareness of the HPV vaccine and positive attitudes towards it were strong predictors of above-average HPV knowledge (Kahn et al., 2008).

Table 4. 6: Knowledge Regarding Risk Components for Malignancy of the Cervix

Responses to Factors connected to Increased Cervical Cancer acquisition in women

Yes			No		Don't know	
N		%	N	%	N	%
History of cervical cancer in the family background(**no**)	265	88.3	26	8.7	9	3.0
HPV (**yes**)	223	74.3	26	8.6	51	17.1
Irregular Pap smears (**yes**)	220	73.3	72	24.0	8	2.7
Mutiple sexual partners (**yes**)	216	72.0	68	22.6	16	5.4
Smoking (**yes**)	183	61.0	81	27.1	36	11.9
Not using condoms (**yes**)	177	59.0	104	34.7	19	6.3
Having genital warts (**no**)	164	54.6	87	29.0	49	16.4
Poor hygiene (**no**)	161	53.7	115	38.3	24	8.0
Starting sex at a young age (**yes**)	146	48.7	125	41.5	29	9.8
Stress (**no**)	143	47.6	130	43.3	27	9.1
Taking the oral contraceptive pill (**yes**)	93	31.0	154	51.3	53	17.7
Having lots of sex (**no**)	88	29.2	177	59.1	35	11.7
Being overweight (**no**)	79	26.3	176	58.6	45	15.1
Having many pregnancies/children (**yes**)	51	17.0	214	71.3	35	11.7

Cervical cancer risk factor knowledge among the respondents

Majority of women (88.3%) reported that background of cervical malignancy in the family was a danger that predisposes cervical carcinoma, which is not scientifically correct. Nevertheless, 74.3% said that having HPV increases one's odds of getting cervical malignant growth. Having multiple sexual partners was also considered a risk factor by 72.0% of the women. The study further found smoking (61.0%), having unprotected sex (59.0%), starting sex at a younger age (48.7%) had a higher proportion that correctly identified them as potential risk of cervical cancer among women. Though having genital warts and Poor hygiene are not, 54.6% and 53.7% respectively perceived them as potential risk to cervical cancer.

The study also assessed the issue of having many pregnancies/children which is a potential risk factor for cancer but was wrongly identified by respondents as majority said it was not a risk factor (71.3%). Stress also received a mixed reaction as the proportions of those who rated it as risk factor

*Corresponding Author: **Philip Kasawa Naluande**

(47.6%) who were actually wrong differed slightly with those who said it was not a risk factor (43.3%) for cervical malignancy. Taking the oral preventative pill, which is a risk factor, was also wrongly recognized by most respondents who reported that it was not a risk factor (51.3%) for cervical malignancy. Finally, having a lot of sex and being overweight, which are not determinants of risk for cervical malignancy were correctly recognized not to be a risk for cervical malignancy by 59.1% and 58.6% of the respondents respectively. Women's reactions to discoveries on cervical malignant/diagnostic components were tallied, summarized, and transformed into the highest and lowest bivariate and multivariable analyzes. The highest incidence of cervical/cervical cancer diagnosis was 13 points. The median data for cancer / cervical examination in the women screened were 6.56 (SD = 2.14). The scores appeared normal in distribution and the average data point was the average size. The respondents who scored 12 points were only two, the highest rate achieved by participants on the data scale, while another participant answered everything incorrectly or unequivocally and subsequently scored zero points (Table 4.7).

Table 4.7: Multivariates of characteristics of Women and Knowledge on Cervical malignancy screening

Cervical Cancer/Screening Knowledge							
	Numberof women (n=300)	**% aboveaverage (55.4)**	**Crude OR**			**Adjusted C**	**Sige**
			a	**B**	c	**95% C.I. d**	
SOCIO-DEMOGRAPHIC							
Age (Age groups)							
20–29 years	75	54.39	1.00	1.00		(referent)	0.8036
30–39 years	78	54.29	1.00	0.89	0.59	1.3426	
40–49 years	69	53.31	0.94	0.86	0.56	1.323	
50–59 years	49	53.90	0.96	0.84	0.53	1.3622	
60–69 years	29	57.43	1.11	1.00	0.57	1.7444	
Locality							
outer regional, remote,and very remote	76	55.17	1.00	1.00	0.00	(referent)	0.3528
Major cities	135	56.64	1.04	1.06	0.74	1.5092	
Inner region	89	50.18	0.80	0.80	0.57	1.1368	
Socioeconomic status							
First quintile (most disadvanged)	53	55.86	0.98	1.00	0.00	(referent)	0.4606
Second quintile	55	49.69	0.76	0.70	0.45	1.0682	
Third quintile	46	55.27	0.96	0.91	0.58	1.4504	
Fourth quintile	58	53.90	0.90	0.78	0.51	1.2152	
Fifth quintile (least disadvangaged)	88	56.15	0.99	0.89	0.58	1.3818	
Kenyan born							
No	56	55.96	1.00	1.00	0.00	(referent)	0.7154
Yes	244	54.00	0.90	0.90	0.64	1.2838	
Educational attainment			0.00	0.00	0.00		

Primary school only	53	53.21	1.00	1.00	0.00	(referent)	0.7938
Completed secondary school	52	55.08	1.06	1.05	0.66	1.6562	
cert or diploma	121	54.98	1.06	1.05	0.72	1.5386	
Bachelors Degree or higher	74	53.41	0.99	0.89	0.58	1.3916	
Marital status		0.00	0.00	0.00	0.00		
Never married	42	44.49	1.00	1.00	0.00	(referent)	0.7154
Married	179	43.22	1.04	0.82	0.51	1.3426	
Defacto	50	44.49	1.00	0.75	0.45	1.2642	
eparated, divorced, widowed	29	44.00	1.00	0.88	0.47	1.6268	
Had children							
No	73	54.10	1.00	1.00	0.00	(referent)	0.8526
Yes	227	54.39	0.99	0.97	0.67	1.421	
Smoking status							
Yes	62	49.78	1.00	1.00	0.00	(referent)	0.42336
No	238	55.47	1.24	1.17	0.82	1.6366	
SCREENING HISTORY							
Screening status							
Under screened	45	45.57	1.00	1.00	0.00	(referent)	0.0392
Regularly screened	187	56.25	1.52	1.56	1.08	2.254	
Over screened	55	57.62	1.61	1.54	0.97	2.401	
Abnormal Pap							
Yes	88	57.43	1.00	1.00		(referent)	0.3038
No	212	53.02	0.81	0.82	0.61	1.1172	

a Weighted sample N = 300 (excludes women in the 'other' screening category)

The study further assessed the relationship between the social demographic qualities of the women and possession of above-average cervical screening knowledge. The findings were tested at α=0.05. The study found 54.39%, 54.29%, 53.31%, 53.9%, and 57.43% of women aged within 20-29 years, 30-39 years, 40-49 years, 50-59 years and 60-69 years respectively possessed above average knowledge on cervical cancer. However, possession of above knowledge on cervical disease was not discovered to be altogether connected with the age of a woman at α=0.05.

The study also assessed if there was a significant association between the women location by regions and possession of above-average knowledge of cervical cancer. It was observed that 55.17%, 56.64%, and 50.18% of women from outer region/remote/very remote region, major cities, and inner regions respectively possessed above-average knowledge of cervical malignancy. However, the location of the respondent did not significantly affect the possession of above average knowledge on cervical malignancy. On the level of the economy, the study found 55.86% of first quintile (most disadvantaged), 49.69% of second quintile, 55.27% of third quintile, 53.9% of fourth quintile, and 56.15% of fifth quintile (least disadvantaged) possessed above average knowledge on cervical cancer. However, their economic category did not significantly affect the possession of above-average knowledge on cervical cancer. After adjusting for the variance in the model, the lack of adjustment seen in the bivariate analysis was confirmed, as it had a small effect on the significance of any of the cervical malignancy /awareness scores (Table 4.7).

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In the modified model, the information difference in the experimental model failed and there was no difference between the unweighted and weighted measurement, indicating no confounding of the other variables in the modified model test condition. Women who reported having Pap smears which were normal (95% CI 0.10-2.30) and screening (95% CI 0.99-2.50) had a 1.6 odds higher risk (p = 0.04) for cervical cancer/screening than women screened. This distinction is likewise factually huge as there was an equivalent contrast of 10% or more between the women screened (47%) and the general observer (57%) and the women screened (59%) with unusual data (Table 4.7). These findings confirm the positive connection among information and inclusion in cervical malignancy, which contributes to acquisition of cervical malignant growth and impact on treatment.

Association of Knowledge levels with Cervical malignancy Screening Factors

Most respondents involved in the study were well mindful of the motivation behind the Pap smear and were acquainted with the recurrence of interest in the National Cervical screening. However, there are negative age-related data and high uncertainty that exposed participants to certain aspects of cervical cancer risk, particularly the function of HPV and sexual conduct. Bi-variate analysis shows moderate differences in cervical malignancy rates/community tests and history of Pap smear.

Table 4.8: Practical relationship between HPV and Demographic awareness, Test history, and data diversity in the Sample 300a Women sample

HPV Awareness							
	Number of women	**%**	**Crude OR b**			**Adjusted c**	**Sig e**
	208	**awarenessof HPV**					
		61.7					
			OR c			**95% C.I. d**	
SOCIO-DEMOGRAPHIC							
Age (Age groups)							
20–29 years	51	62.2	1	1		(referent)	0.4512
30–39 years	54	62.2	1	0.89	0.57	1.40	
40–49 years	48	63.3	1.029	0.93	0.58	1.49	
50–59 years	34	65.2	1.12	1.16	0.69	1.97	
60–69 years	20	52.8	0.66	0.73	0.40	1.34	
Locality							
outer reg, rem, vremote f	52	59.1	1	1		(referent)	0.00096
major cities	94	60.9	1.06	0.78	0.54	1.16	
inner reg f	61	66.3	1.35	1.40	0.96	2.08	
Socioeconomic status							
First quintile (most disadvanged)	37	60.1	1	1		(referent)	0.0768
Second quintile	39	59.3	0.95	0.94	0.59	1.50	
Third quintile	32	55.0	0.79	0.73	0.44	1.19	
Fourth quintile	41	63.7	1.15	1.19	0.74	1.93	
Fifth quintile (least	61	67.5	1.37			2.32	

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disadvangaged)				1.42	0.88		
Born country		0.0					
Foreign	39	58.6	1	1		(referent)	0.0192
Kenya	169	62.8	1.18	1.50	1.03	2.2077	
Highest educational attainment							
Primary school only	37	48.6	1	1		(referent)	<0.0001
Completed secondary	36	56.6	1.37	1.48	0.91	2.42	
school							
cert or diploma	84	62.5	1.76	1.89	1.25	2.86	
Bachelors Degree or higher	51	74.3	3.13	3.92	2.39	6.50	
Marital status							
Unmarried	30	58.6	1	1		(referent)	0.048
Married	124	64.6	1.26	1.86	1.10	3.21	
Defacto	35	57.1	0.92	1.16	0.66	2.05	
eparated, divorced, widowed	20	60.0	1.04	1.49	0.76	2.95	
Had children		0.0					
no	50	67.7	1	1		(referent)	0.1632
yes	157	60.2	0.70	0.70	0.45	1.0791	
Smoking status		0.0					
yes	43	53.9	1	1		(referent)	0.2208
no	165	64.2	1.52	1.21	0.83	1.7424	
CERVICAL SCREENING HISTORY							
Screening status							
Under screened	32	53.6	1	1		(referent)	0.3456
Regularly screened	130	61.9	1.40	1.16		0.78	1.76
Over screened	39	68.0	1.84	1.35		0.82	2.29
Abnormal Pap		0.0					
yes	61	67.3	1	1		(referent)	0.00192
no	147	59.9		0.70	0.67	0.47	0.94
KNOWLEDGE							
Cx screen knowledge level							
Below average	93	49.6		1	1	(referent)	<0.001
Above average	115	72.0		2.65	2.89	2.17	3.89

HPV Awareness

To affirm current HPV cognizance and if this varied due to socioeconomic elements, cervical history tests, or cervical

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malignant growth information, study respondents were inquired as to whether they knew about HPV. Analysis was performed to survey contrasts in HPV cognizance by the elements portrayed above (Table 4.8).

Socio-demographic factors and awareness of HPV

About 62% of participants in this study indicated that they had heard of HPV, with 90 (30%) of the women who participated in the study reporting no awareness of HPV (Table 4.8). Significant statistical differences in subsequent HPV analysis were observed in education, children, smoking status, history of cancer screening, and cervical cancer. Multivariate analysis was performed, as many independent variations in bivariate analysis were confusing to each other in their relationship and HPV awareness. In the wake of changing for all factors in the model, a significant difference in HPV cognizance was observed in womens' education; paps smear history, and cervix cancer screening. However, having children, being a smoker, and marriage status showed significant relations with consciousness of HPV in the adjusted model (Table 4.8). At the point when indicators were taken out from the model and embedded in add separately to find out the progressions in odd proportion, there was insignificant or disparity in levels of education, unusual Pap smear history, and cervical malignant growth information. The level of unhealthy nutrition in women with children were insignificant with respect to screening status, training, and marital status.

Non-smoking ratings was considered significant when status of education, marital status were excluded from the model. Cervical cancer screening was found to be significant when the negative Pap smear history was excluded from the model. A decrease in risks of magnitudes and noteworthiness for territory was seen when SES, education, and when county of birth, was removed from the model. The study found that patients marital status was still insignificant at α=0.05 even when other insignificant variables such as screening info, number of children were excluded from the model. The effect of these indicators on different aspects has confirmed their combination in the last model in spite of the way that there is no observable change in the various parameters. Along with other components related with HPV cognizance, the difference in women completing a business certificate or a diploma certificate increased by almost 2-fold (OR 1.89; 95% CI 1.25-2.86), while those with a bachelor's degree or higher had the impression that 'you may have heard HPV' in addition to women who have not yet reached the study level with an increase of almost 4-fold (OR 3.92; 95% CI 2.39-6.50; p <0.0001). Furthermore, women who had no previous experiences of abnormal Pap smear were at a low risk of being determined to have HPV (OR 0.67; 95% C.I. 0.47-0.94; p = 0.002) than women with a history of abnormal screening. The correlation likewise affirmed that respondents with ovarian/ovarian disease had a 3-fold risk of HPV-related exposure in those with low levels (OR 2.89; 95% CI 2.17-3.89; p <0.0001).

A decline in the connection between the abnormal analysis and the connection among HPV and screening status was observed and was not, at this point huge, showing the incorporation of a model of cooperation between factors notwithstanding. An expansion in the odds ratios between crude analysis and correlation coefficients between HPV awareness and occupancy inside the locale was observed; notwithstanding, a decline was seen in women living in enormous urban communities. Respondents living in rural regions had a higher chances of intermittent HPV identified with those living in more far off zones, (OR 1.40; 95% CI 0.78-1.76; P = 0.35), which was factually critical because of the 95% certainty span that was underneath normal. An expansion in the rate of deficiency was seen in awareness of HPV and the locale of birth, and ladies conceived in Nairobi had 1.5 times higher chances of being exposed to HPV than those conceived in rural regions (OR 1.50; 95% CI 1.03–2.21; p = 0.02). Additionally, marital status changed from insignificant to significant at α=0.05 when the model was adjusted, demonstrating a distinction in awareness of married women (64.6%) contrasted with unmarried women (58.6%). The respondents who were married were twice as prone to have higher rates of HPV infection (OR 1.86; 95% C.I. 1.10-3.21; p = 0.05) than single women (Table 4.8)

HPV Awareness and Factors Associated with Awareness

About 62% of Kenyan women (61.74%) reported to have ever heard of HPV. After adjusting all aspects of the model, women who had been exposed to HPV were diagnosed in high school, had a Pap smear earlier, had experience with cervical cancer/testing in Nairobi, and married. Educational qualifications and cervical cancer /screening have been described as clinically significant. The region where the respondent was born, their marriage, prior Paps smear outcome were not significant predictors of HPV awareness. The standard model represented 18% of the variability of HPV awareness in respondents in this study.

HPV knowledge

Realizing what Kenyan women think about HPV and if this is unique in relation to the historical backdrop of menopause or cervical disease, women who had encountered HPV were solicited and asked factual or non-authentic questions concerning HPV. Bivariate and multivariate examination was performed to assess the distinction in HPV data in the items.

Table 4. 9: Respondent's feedback to HPV Knowledge Items in a Sample of 300a women

	True		False		Don't Know	
	N	%	N	%	N	%
One may have HPV infection and fail to know it	194	92.5	4	1.9	12	5.6

A person with HPV would require frequent Pap smears screening	177	84.1	14	6.8	19	9.1
Specific HPV are responsible for cervical cancer	174	82.8	7	3.5	29	13.7
HPV can be transmitted through sexual intercourse	165	78.4	20	9.7	25	11.9
Vaccine can be used to prevent some types of HPV	147	69.9	12	5.5	52	24.6
Condoms may not often protect one from HPV	129	61.3	49	23.5	32	15.2
Smoking can increase chance of cancer of cervix if a person with HPV is also a smoker	125	59.5	32	15.3	53	25.2
Antibiotics can be used to treat HPV	36	17.1	101	48.2	73	34.7
HPV could be associated with abnormal periods	60	28.6	66	31.3	84	40.1
Pap smear is a test for HPV	116	55.4	57	27.0	37	17.6
Women can often clear HPV without treatment	28	13.3	147	70.0	35	16.6
HPV can cause problems with pregnancy	131	62.4	19	9.1	60	28.5

Screening experience, demographic characteristics, and patients knowledge on HPV

Patient HPV awareness was assessed where respondents were required to indicate true/ false, which make up the HPV information tool. Only participants who had heard of HPV (n =208) were requested to give feedback to the items, that were presented randomly to each respondent in the study. Most women (92.5%) were aware of the asymptomatic form of the HPV virus, 84.1% of the participants thought there was a need to have a regular pap smear and 78.4% realized that HPV was an explicitly sexually transmitted disease. Over 80% realized that specific types of HPV can prompt cancer and 69.9% knew that the vaccine prevents other types of HPV (Table 4.9). HPV data was limited in most cases with high 'don't know' answers in most cases (Table 4.9). About 10% of women did not think HPV could be transmitted sexually and only 13% understood the type of HPV infection and that most women could automatically get rid of thevirus. Thirty-five percent, reported that there were also women who complained of uncertainty if antibiotics treated HPV and 25% could not tell whether smoking which increased the chances of cancer of crvis among women. A quarter of respondents were unsure whether a HPV vaccine is currently available in the market (25%) or pregnancy could be caused by HPV (28%) or menstrual complications (40%).

More than half the participants erroneously assumed the Pap smear was used to diagnosis HPV (55%) whereas over 18% report being uncertain. Combinining the responses to obtain a scores, the study obtained 6.53 (SD = 2.20) HPV scores and the scores followed a normal distribution (Figure 4.2). One respondent received a high score of 12 and 13 for those who claimedto score zero, while the other half answered that they 'did not know' at all. General HPV understanding was unsatisfactory in this sample (Table 4.9). Knowledge regarding HPV was summarized by converting to HPV knowledge levels by grouping them into scores above and below average (mean) scores. The distinction of over 10% in HPV information levels when classified as autonomous factors is resolved to be clinically noteworthy. Sixty-five percent of respondents had a rare HPV infection. HPV knowledge differed with age, locality, education levels attained, having of children, unfavorable Paps smear past, prior knowledge on screening, attitude, and awareness on the HPV vaccination. Multivariate analysis was performed, as many independent variations in bivariate analysis were found to be associated with patients' HPV awareness.

Factors incorporated in the last model clarifies 18% (Nagelkerke's R Square = 0.181) variations in the knowledge of HPV. After considering all the model changes, the organization of bivariate analysis became much more sensitive to HPV negative information among respondents in this study for marital status, cervical/cervical cancer, HPV vaccine, and HPV vaccination attitude. The study found age was a significant predict of HPV awareness when the model was adjusted. The study further found that region where women lived, the level of education they had attained, history of having children, and the incidences of abnormal Pap smear suggested possible multicolinearity when fitted in the model.

*Corresponding Author: **Philip Kasawa Naluande**

Table 4.10: Multivariable analysis of patient demographic characteristics, screening History and their corresponding Knowledge and Attitude among those who reported above- average knowledge.

HPV knowledge							
		% above					
	No. of women	average(56)					
	207		Adjusted c				
SOCIO-DEMOGRAPHIC			CrudeOR b	OR		95%C.I.	Sig
				C		D	E
Age (Age groups)							
20–29 years	51	66.0	1	1		(referent)	0.018
30–39 years	54	55.2	0.62	0.71	0.39	1.26	
40–49 years	48	53.5	0.57	0.66	0.36	1.20	
50–59 years	34	48.9	0.47	0.51	0.26	0.97	
60–69 years	20	36.7	0.28	0.37	0.17	0.82	
Locality							
outer regional, remote,and very remote	52	50.0	1	1		(referent)	
major cities	94	60.8	1.54	1.16	0.71	1.89	0.61
nner regional	61	50.7	1.02	1.15	0.72	1.83	
Socioeconomic status							
First quintile (most disadvanged)	37	51.3	1	1		(referent)	
Second quintile	39	50.1	0.93	0.97	0.54	1.73	0.84
Third quintile	32	51.1	0.97	1.02	0.54	1.92	
Fourth quintile	41	52.7	1.04	0.86	0.48	1.57	
Fifth quintile (least disadvantaged)	61	62.3	1.57	1.29	0.72	2.35	
Kenyan born							
Foreign	39	58.5	1	1		(referent)	0.27
Kenyan born	170	55	0.82	0.7	0.42	1.16	
Educational attainment							
Primary school only	37	42.2	1	1		(referent)	
Completed secondary school	36	55.4	1.69	0.95	0.48	1.86	0.26
cert or diploma	84	56.1	1.72	1.23	0.71	2.17	
BachelorsDegree or higher	51	59.3	1.98	1.20	0.65	2.22	
Marital status							
never married	30	77.0	1	1		(referent)	
married	124	51.6	0.29	0.41	0.20	0.87	0.01
defacto	35	49.3	0.27	0.24	0.11	0.52	

separated, divorced, widowed	20	53.8	0.29	0.53	0.22	1.32	
Had children							
no	50	65.2	1	1		(referent)	
yes	157	51.2	0.54	0.84	0.52	1.37	0.70
Smoking status							
yes	43	54.2	1	1		(referent)	
No	165	55.0	1.01	1.13	0.70	1.85	0.68
CERVICAL SCREENING HISTORY							
Screening status							
underscreened	32	57.0	1	1		(referent)	
regularly screened	130	52.4	0.81	0.94	0.55	1.64	0.83
overscreened	39	57.8	1.01	1.09	0.56	2.10	
Abnormal Pap history							
Yes	61	60.4	1	1		(referent)	
No	147	52.3	0.70	0.70	0.46	1.04	0.07
KNOWLEDGE AND AWARENESS							
Cx screen knowledge level							
below average	93	40.6	1	1		(referent)	<0.001
above average	115	62.8	2.47	2.15	1.49	3.09	
Heard of HPV vaccine							
No	54	26.1	1	1		(referent)	<0.0001
Yes	48	57.4	3.81	3.13	1.52	6.43	
ATTITUDES							
General vaccine attitudes							
Negative	32	50.2	1	1		(referent)	0.02
Positive	265	55.5	1.22	0.88	0.47	1.55	
HPV vaccine attitudes							
Negative	64	40.5	1	1		(referent)	0.003
Positive	233	58.9	2.10	1.66	1.03	2.63	
a Weighted sample N = 207 (had prior awareness about HPV)							

Several differences contributed to the significance of the history of Pap smear impairment when not included in the model including education status (p = 0.06), HPV vaccination awareness (p = 0.06), and attitude about vaccination (p = 0.04). The effect of this varies from one variable to ensure the other variables confirmed their inclusion in the final model even though they did not always change the magnitude of the negative estimates. Women above 50 years old had a reduced risk of experiencing a higher HPV knowledge. Significant differences were noted in respondents aged 60 to 69 years in contrast with women in 20s to 29 years. Women over the age of 60 had a significantly lower incidence of having above average HPV as compared to respondents in the ages 20 to 29 (OR 0.37; 95% C.I. 0.17 - 0.82; p = 0.02). Women between the ages of 50 and 59 had a lower tendency of getting more information than in the youngest age group (OR 0.51; 95% CI 0.26-0.97; p = 0.02) and the difference in the two groups was statistically significant (Table 4.10). Significant statistical differences appeared between the two groups compared to the youngest group, however, age was not a significant predictor at α= 0.05. The defacto category under marriage had lower odds of having above knowledge as opposed to women who reported to have separated, divorced or widowed (OR 0.41; 95% C.I. 0.20-1.33). It was further

noted that women who were married reported higher HPV awareness that the single women. It was further observed that all the groups involving single women were statistically significant. The study further found women who possessed above average cervical cancer/screening knowledge had two-fold higher odds of HPV knowledge (OR 2.15; 95% CI 1.49-3.09; p <0.001) as compared to women with below average women (Table 4.10). The sensitivity of the HPV vaccine and the fact that it has a good HPV vaccine is also confirmed to be associated with the HPV vaccine, even if there is a decrease in the cost of the HPV vaccine following consistent adjustments across all variant models.

It was observed that if a woman had a prior HPV vaccine, they also had three times higher chances of possessing above average HPV knowledge as opposed to those who did not have a vaccine (OR 3.13; 95% CI 1.52-6.43; P <0.0001). Although patients who reported to have a positive HPV vaccination attitudes had1.7–fold higher odds of having higher HPV awareness compared to women whose HPV vaccination was negative (OR 1.66; 95% CI 1.03- 2.63; P = 0.03).

Discussion

Risk factors associated with cervical cancer acquisition in Kenya are multifaceted, involving socioeconomic, healthcare system, and individual-level determinants. Addressing these factors through targeted interventions and policy changes is crucial for improving screening, treatment access, and outcomes. By tackling these challenges, Kenya can make significant strides in reducing the burden of cervical cancer and enhancing the quality of care for affected women.

This study highlights that higher educational attainment, positive HPV vaccine attitudes, and awareness of the HPV vaccine are key predictors of above-average HPV knowledge (Kahn et al., 2008; Smith et al., 2015). The observed demographic and regional variations in knowledge suggest the need for tailored educational strategies to enhance HPV awareness across different populations. Addressing these disparities through targeted interventions and improved access to information can help in better managing HPV-related health outcomes (Tiro et al., 2012).

The findings of this study also align with previous research indicating that educational attainment and awareness of HPV vaccination are crucial for improving HPV knowledge (Kahn et al., 2008; Smith et al., 2015). The significant variation in HPV awareness across age groups and marital status underscores the need for targeted educational programs. The lower HPV knowledge among older age groups may reflect historical gaps in public health messaging. Additionally, the higher knowledge levels in women from major cities and those with higher socioeconomic status suggest disparities in access to health information and services (Tiro et al., 2012). The association between positive HPV vaccine attitudes and higher knowledge highlights the importance of addressing vaccine hesitancy through education. The lack of significant findings related to cervical screening history may suggest that while screening history influences health behaviors, it does not directly correlate with HPV knowledge (Smith et al., 2015). The study highlights critical gaps in cervical cancer risk knowledge and HPV awareness among women. While some risk factors are well-recognized, many misconceptions persist. Improving education and awareness, particularly about HPV and cervical cancer screening, is crucial. Enhanced public health strategies should address these knowledge gaps to better prevent and manage cervical cancer.

The findings highlight critical risk factors associated with cervical cancer in Kenya, emphasizing the need for targeted educational interventions. Increasing public awareness regarding HPV, its transmission, and the significance of regular screenings is essential for reducing cervical cancer incidence. The lack of healthcare access remains a formidable barrier, necessitating policy changes to improve health infrastructure.

The acquisition of cervical cancer in Kenya is influenced by a complex interplay of socio-demographic factors, sexual behavior, HPV infection, and healthcare access. The survey findings underscore critical gaps in knowledge regarding cervical cancer risk factors, highlighting the need for comprehensive public health strategies aimed at education, vaccination, and healthcare access.

Recommendations

1. **Targeted Education:** Develop and implement targeted HPV education programs for older women and those in lower socioeconomic groups to address knowledge gaps (Kahn et al., 2008).
2. **Enhanced Access:** Improve access to HPV vaccination information and services, particularly in rural and remote areas (Smith et al., 2015).
3. **Promote Positive Attitudes:** Focus on improving attitudes towards HPV vaccination through public health campaigns and community outreach (Tiro et al., 2012).
4. **Ongoing Research:** Conduct further studies to explore the relationship between cervical screening history and HPV knowledge, and assess the effectiveness of targeted educational interventions (Smith et al., 2015).
5. **Address Cultural Barriers:** Implement community-based interventions to reduce stigma and promote positive attitudes toward cervical cancer treatment. Engage community leaders and organizations to support patients and encourage treatment adherence.
6. **Integrate Comorbidity Management:** Develop integrated care models that address both cervical cancer and comorbid conditions, ensuring comprehensive and coordinated treatment for patients with multiple health issues.
7. **Improve Financial Support:** Implement financial assistance programs to help low-income patients cover treatment costs and reduce financial barriers to accessing care.
8. **Enhance Healthcare Infrastructure:** Expand and

*Corresponding Author: **Philip Kasawa Naluande**

improve the availability of specialized treatment facilities, particularly in underserved areas. Invest in training healthcare personnel and upgrading medical equipment to ensure high-quality care.

9. **Increase Education and Awareness:** Develop and disseminate educational materials to raise awareness about cervical cancer and treatment options. Focus on improving health literacy and providing clear information about the benefits and availability of treatment.

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Appendices

(Provide additional materials such as survey instruments, interview guides, and data tables used in the study.)

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*Corresponding Author: **Philip Kasawa Naluande**