

**A Teachers' Perspective of School-based
Human Papillomavirus Vaccination of
Girls in Kitui County: Knowledge,
Acceptability, Facilitators, Barriers &
Opportunities**

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Declaration:

I declare that this is my original work and has not, to the best of my knowledge, been presented anywhere else.

This dissertation is submitted in partial fulfillment for the award of Master of Science Degree in Tropical and Infectious Diseases at the University of Nairobi

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ABBREVIATIONS:

AMPATH	Academic Model Providing Access to Healthcare
ATLAS.ti®	<i>Archiv fuer Technik, Lebenswelt und Alltagssprache</i> . Text Interpretation. (Archive for technology, the life world and everyday language). A qualitative data analysis software
BCG	Bacille - Calmette Guerin
DPT	Diphtheria, Pertusis & Tetanus
DVI	Division of Vaccines & Immunization
FET	Fishers Exact Test
FGD	Focus Group Discussion
GAVI	Global Access to Vaccines and Immunization
HCW	Health Care Worker
HIV	Human Immunodeficiency Virus
HPV	Human papillomavirus
IQR	Interquartile Range
LICs	Low Income Countries
MOH:	Ministry of Health
PST	Primary School Teacher
SD	Standard Deviation
SPSS®	Statistical Package for the Social Sciences
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
USAID	United States Agency for International Development
USD	United States Dollar

ABSTRACT

Background

Cervical cancer is the leading cause of cancer-related morbidity and mortality among women in sub-Saharan Africa. Two effective Human papillomavirus vaccines are available as means of preventing the disease. School-based vaccination has been identified as a viable delivery method but there is need understand the local environment for optimal vaccine delivery and uptake among adolescent girls in schools.

Objective

To assess knowledge and acceptability of HPV vaccine in primary school teachers in Kitui County and explore the facilitators, barriers and opportunities presented by the HPV vaccination of class four girls.

Methods

This was a cross-sectional, mixed methods study conducted in Kitui Central Division of Kitui County where the Ministry of Health is administering the quadrivalent HPV vaccine to all class four girls. Self-administered questionnaires were filled by 339 primary school teachers and two focus group discussions with a total of 13 participants were held. We collected data on awareness, knowledge and acceptability of HPV vaccine as well as facilitators, barriers and opportunities presented by the project. Analysis was done using SPSS® (quantitative data) and ATLAS.ti® (qualitative data) testing associations using chi-square for categorical variables and t-test for numerical variables.

Results

Sixty percent of the respondents were female. The mean age was 40 years (standard deviation (SD) = 10.7). Nearly all were Christians (99%), 1% were Muslims. Most respondents (90%) were aware of the vaccination exercise. The average score on knowledge was 48% with women scoring significantly higher than men (50% vs 46%, $p=0.002$). The level of knowledge about HPV and cervical cancer among teachers was moderate (48%, SD = 10.9). Most teachers would recommend the vaccine to their daughter or close relative (89%). Teachers who would recommend the vaccine had more knowledge than those who would not (49% vs 40% $p=<0.001$). Nearly all teachers wanted to know more about HPV vaccine (98%). Most felt that the vaccine was safe (79%) and should be continued (93%). The main barriers reported by the teachers were insufficient information about the vaccine, poor accessibility of schools, absenteeism of school girls on vaccine days and fear of side effects.

Conclusion and Recommendations

Despite low to moderate levels of knowledge about HPV vaccine in the study population, vaccine acceptability is high. Nevertheless, knowledge and awareness had a significant effect on whether teachers would recommend the vaccine to their daughter or close relative or not. There is need to come up with cost-effective means of disseminating information on HPV vaccine among teachers, parents and pupils in our settings.

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1.0 BACKGROUND

Human Papillomaviruses (HPV) have been indubitably linked to the etiology of various cancers in humans, including oral, pharyngeal, anal and genital cancers (Syrjanen et al., 2011, Manzo-Merino et al., 2013, Bouvard et al., 2009, Parkin, 2006). Key among these is cervical cancer whose occurrence is attendant to persistent infection by oncogenic HPV serotypes in virtually all cases (Bosch et al., 1995, Clifford et al., 2003, Kumar et al., 2007, Munoz et al., 2003). Cervical cancer is the third commonest cancer and fourth leading cause of cancer deaths in women worldwide (Jemal et al., 2011). The developing world bears 77% of all new cases and 88% of global cervical cancer deaths (Forouzanfar et al., 2011, Ferlay et al., 2010).

While the developed world has significantly reduced cervical cancer burden through screening programs to detect precancerous lesions and early cervical cancer treatment, sub-Saharan Africa, and other medically underserved regions, has only achieved minimal access to these crucial preventive services (Gakidou et al., 2008, Hoque, 2013, Moodley et al., 2006, Rositch et al., 2012).

Moreover, the prevalence of HPV in sub-Saharan Africa has remained high (Watson-Jones et al., 2013, Smith et al., 2008, Forman et al., 2012). A recent systematic review recorded the prevalence of HPV in women with normal cytology as 33.7% in Eastern Africa as compared to a world average of 11.7% (Forman et al., 2012). The use of prophylactic vaccine to prevent oncogenic HPV genotypes infection will reduce the burden of cervical cancer.

Currently, there are two prophylactic vaccines that are safe and efficacious in preventing HPV infection. Bivalent HPV vaccine (Cervarix®, GlaxoSmithKline) protects against HPV 16 and 18

and quadrivalent HPV vaccine (Gardasil®, Merck) which prevents HPV 6, 11, 16 and 18. HPV 16 and 18 are the primary cause of 70% of all cervical cancers worldwide (Bosch et al., 1995, Clifford et al., 2003, Smith et al., 2007, Denny et al., 2014, Li et al., 2011). HPV 6 and 11 are present in over 90% of all anogenital warts (von Krogh, 2001)

HPV vaccination has been provided in many countries in the world with varying success and acceptability (Fisher et al., 2013, Marlow et al., 2009b, Sinka et al., 2013, Moodley et al., 2013, Hayashi et al., 2012, LaMontagne et al., 2011). Many studies in sub-Saharan Africa show high HPV vaccine acceptability (Watson-Jones et al., 2012a, Rositch et al., 2012, Poole et al., 2013, Remes et al., 2012, Ayissi et al., 2012, Perlman et al., 2014) but only one country, Rwanda, has been able to roll out a successful national program. This success was not without effort. It was preceded by a tidy investment in multi-sectoral involvement, planning, coordination, public health education and monitoring of progress and adverse effect surveillance coupled with ownership at the highest level of government and political goodwill (Binagwaho et al., 2012). To date six sub-Saharan countries - Cameroon, Kenya, Uganda, Lesotho, Tanzania and South Africa - have piloted delivery of HPV vaccine to adolescents girls using different approaches (Levin et al., 2013, Becker-Dreps et al., 2010, Katz et al., 2013, Perlman et al., 2014).

In order to achieve optimal HPV vaccine uptake cost effectively, countries have delivered these vaccines to adolescents through schools, health-facility and community outreach (Levin et al., 2013, Binagwaho et al., 2012, LaMontagne et al., 2011, Ayissi et al., 2012, Watson-Jones et al., 2012a, Hayashi et al., 2012). The school-based approach has been shown to achieve high vaccine uptake in sub-Saharan Africa (Watson-Jones et al., 2012a). Some countries have also opted to

combine school-based approach with one other strategy in order to broaden vaccine reach especially for girls who are not enrolled in school (Ladner et al., 2012, Perlman et al., 2014, Binagwaho et al., 2012). In a school-based approach, teachers play a pivotal role in HPV vaccine delivery. This includes giving permission for use of school premises, educating parents and pupils on the vaccine and organization of vaccine days. Teachers' knowledge and attitude towards the vaccine has been shown to significantly affect the success of school-based HPV vaccination programs (Salmon et al., 2004, Lindley et al., 2008). Disseminating the correct information about the vaccine is key in ensuring community support. Erosion of public trust due to concerns about vaccine safety and future fertility as well political and religious factors have slowed down vaccination in some countries like Rwanda and Cameroon (Binagwaho et al., 2011, Ouedraogo et al., 2011, Ayissi et al., 2012, Perlman et al., 2014) and even led to program suspension in others such as Japan (Gilmour et al., 2013) and India (Larson et al., 2010). Such incidents can be minimized by creating community awareness about the vaccine, cervical cancer and HPV.

For most sub-Saharan countries, cost has previously been cited as the biggest impediment to rolling out HPV vaccination on a national scale (Agosti and Goldie, 2007). However, in 2012, Global Alliance to Vaccine and Immunization (GAVI) announced a price of USD 4.50 for all GAVI-eligible countries down from USD 120 per dose (Youngblood, 2013). The GAVI alliance has offered support for national introduction of HPV vaccine for countries with demonstrated ability; or to co-fund demonstration projects for two years. The demonstration projects are to guide planning and implementation of nation-wide HPV vaccination programs that are expected to follow (GAVI Alliance, 2013a, GAVI Alliance, 2013b, GAVI Alliance, 2013c).

In May 2013, Kenya's Ministry of Health (MOH), with the support of GAVI Alliance, started a two-year HPV vaccination project in Kitui County for all 8455 girls in standard four in both public and private schools. This school-based delivery is supplemented by health facilities - an additional 166 ten year old girls not enrolled in school were also targeted for vaccination at health facilities and through community outreach (Nakato et al., 2012).

This study focused on Kitui Central Division, one of the 20 divisions of Kitui County. We assessed the knowledge of HPV vaccine and cervical cancer and the acceptability of HPV vaccination among primary school teachers in the Division. We also explored facilitators and barriers to the uptake and completion of HPV vaccination and opportunities presented by the project that can be used to mount other health promotion services.

2.0 LITERATURE REVIEW

2.1 INTRODUCTION

Human Papillomavirus (HPV) is a small non-enveloped virus with a circular, double-stranded DNA genome. There are over 120 HPV genotypes identified so far, many of which are associated with human several malignancies (zur Hausen, 2002, zur Hausen, 1996, Parkin and Bray, 2006, Ruttkay-Nedecky et al., 2013, de Villiers et al., 2004). More than 40 of these genotypes affect the anogenital region (Allan et al., 2008, Galani and Christodoulou, 2009). Depending on their ability to cause cancer, HPV genotypes are classified either as high risk (HPV-16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 66, 68) or low risk (HPV-6, 11, 40, 42, 43, 44, 54, 61, 72). The most important oncogenic genotypes are HPV 16, 18 which are the primary cause of up to 70% of all cervical cancers worldwide (Bosch et al., 1995, Clifford et al., 2003, Smith et al., 2007, Denny et al., 2014, Li et al., 2011).

HPV infection is the most common STI in the world. It affects both men and women and is asymptomatic in a majority of cases. Most infected persons unknowingly transmit the virus to their sexual partners. Transmission is largely through all manner of sexual contact and condoms are not fully protective. The risk of infection is increased by early age at coitarche, multiple sexual partners, and concomitant STDs. Following infection, 90% of the cases clear within two years on their own, 10% of the cases may develop cervical epithelial neoplasia and less than 1% develop cancer. For instance, out of 10,000 women who get infected with oncogenic HPV, 1000 will develop cervical dysplasia, 80 will develop carcinoma in situ and only 16 will develop invasive cervical cancer (Ruttkay-Nedecky et al., 2013, Kawana et al., 2012, Galani and Christodoulou, 2009).

Persistent HPV infection is also associated with vulvar, vaginal, penile, anal and oropharyngeal cancers. It also may cause recurrent respiratory papillomatosis and warts (CDC, 2013, Madsen et al., 2008, Lont et al., 2006).

2.2 EPIDEMIOLOGY OF HPV

Worldwide, HPV is prevalent in nearly 12% of all women in the general population. (Forman et al., 2012). In women with cervical cancer, HPV 16 is present in 50-75% and HPV 18 in 12-25% (Clifford et al., 2003). Low-risk HPV types 6 and 11 are present in 90% of all anogenital warts (von Krogh, 2001). The prevalence has a bimodal peak - in women approaching 25 years of age and those approaching 55 years (Galani and Christodoulou, 2009).

In sub-Saharan Africa, HPV prevalence in women without cervical pathology is two to three times the world average (Forman et al., 2012). On average, at least one in five women with normal cytology is infected with an oncogenic HPV genotype in the region. (Forman et al., 2012).

2.3 CARCINOGENESIS

HPV infects proliferating basal epithelial cells, as the basal cells progressively mature into epidermal cells to be shed off, the virus undergoes replication and copies are shed off with the epidermal cells.

In persistent HPV infections, part of the episomal viral DNA frequently integrates into the host genome coding for the viral oncoproteins E6 and E7 which inhibit the tumor suppressor genes p53 and RB, respectively. Inhibition of these two genes immortalizes the cells by preventing apoptosis. The oncoproteins work synergistically to promote malignant growth of cancer cells. The entire

process takes an average of 10 years but is highly variable (1 - 40 years.) (zur Hausen, 2002, Galani and Christodoulou, 2009).

2.4 CERVICAL CANCER

In 2008, there were 530,000 cases and 275,000 deaths from cervical cancer worldwide. Nearly 90% of these were in low-income countries (LICs) (Forman et al., 2012). It is the leading cause of cancer deaths in women in sub-Saharan Africa; Eastern Africa having the highest burden of the disease in the world with an age-standardized incidence ratio of 34.5 against an average of 9 per 100,000 in the developed world (Arbyn et al., 2011).

In 2012, Kenya had 4802 cases of cervical cancer 51% of whom died; representing an age-standardized incidence and mortality ratio of 40.1 and 21.8 per 100,000 persons respectively (Ferlay et al., 2013).

The heavy burden of disease in low income countries is due to poor access to preventive screening services. This is in contrast with the developed countries where early detection and treatment have been credited with reducing cervical cancer burden by up to 80% (Mathew and George, 2009, Louie et al., 2009, Denny et al., 2006, Khozaim et al., 2014). The prevalence of HPV infection is also much higher in LICs (Clifford et al., 2005). The situation is aggravated by high prevalence of HIV in LICs (UNAIDS, 2012), which increases the risk of developing cervical cancer six-fold (Wright et al., 1994). Moreover, most patients in LICs present late when the disease is too advanced to treat thus causing a higher mortality incidence ratio (Maranga et al., 2013, Ndlovu and Kambarami, 2003, Kidanto et al., 2002, Ibrahim et al., 2011).

There are several strategies of preventing cervical cancer. First is creation of awareness in the general population about the disease, its cause, risk factors, diagnosis and prevention measures. Second is screening by Pap smears or visual inspection with acetic acid or Lugol's iodine. Third is testing for presence of high-risk HPV DNA through hybridization techniques or polymerase chain reaction and the fourth mode of prevention, which is also the most recent, is through vaccination against HPV (Elfstrom et al., 2014).

Cervical cancer screening requires good infrastructure and skilled workers. Visual inspection yields variable results depending on the skill of the observer. Access to these preventive-screening services has been poor especially in developing countries where they are needed most (Elfstrom et al., 2014, Aminisani et al., 2013, Asonganyi et al., 2013). Initially HPV vaccination was prohibitively expensive but it is now available to GAVI-eligible countries at a subsidized cost (GAVI Alliance, 2013b). The most successful preventive strategies are those that combine two or more of these approaches (Saslow et al., 2012).

2.5 HPV VACCINES:

Currently, there are two vaccines licensed to prevent HPV infection. Cervarix® by GlaxoSmithKline which protects against serotypes 16 and 18 is given in three doses at month 0, 1 and 6; and Gardasil® by Merck & Co, which protects against HPV6, 11, 16 and 18 which is given at month 0, 2 and 6 (Draper et al., 2013, Han and Sin, 2013, Lehtinen et al., 2012, Paavonen et al., 2009, Paavonen et al., 2007, Villa et al., 2006, Siddiqui and Perry, 2006, Munoz et al., 2009, Dillner et al., 2010). Both vaccines contain virus-like particles which are 'empty' viral capsid and an envelope proteins but lack the HPV genome. They are unable to infect the vaccinated persons

but induce host antibodies against the L1 protein, a viral structural protein that mediates viral entry into a cell.

These vaccines offer a good opportunity to combat cervical cancer in a continent where preventive cervical cancer screening has been hampered by numerous limitations. Nevertheless, cervical cancer screening must be scaled up for the sake of those women who wouldn't benefit from the vaccine because they are already infected with HPV, and for those vaccinated, for early detection of the 30% of cervical cancers caused by other HPV serotypes such as HPV31, 33, 35, 39, 45, 51, 52, 56, 58 and 59 (Smith et al., 2007, Li et al., 2011, Clifford et al., 2003, de Sanjose et al., 2010). Some women may also not mount an effective immune response especially if they receive less than three doses or do not receive the vaccine at appropriate time intervals.

2.6 HPV VACCINE DELIVERY STRATEGIES AND CHALLENGES

HPV vaccines have proven to be cost-effective when offered to women before infection with HPV, especially in countries where screening strategies are sub-optimal (Fesenfeld et al., 2013, Bosze, 2013, WHO, 2009). In 2008, a population survey in 15-49 year old Kenyan women showed that 48% of them had their sexual debut before their 18th birthday and 11% before they were 15 years old (Kenya National Bureau of Statistics, 2010). This underpins the need to vaccinate girls at puberty (9-12yrs) before they are exposed to HPV at coitarche. Many HPV vaccination campaigns in sub-Saharan Africa and elsewhere in the world target school girls in a particular grade or age group, usually between 9 and 13 years (Moodley et al., 2013, Watson-Jones et al., 2012b, Binagwaho et al., 2012, Hayashi et al., 2012).

Adolescent vaccination is a relatively new practice in LICs and has presented formidable challenges. Reaching young girls is a challenge, especially where school enrolment or attendance

is low (Wigle et al., 2013). This is further complicated by the fact that three doses of the vaccine are required for complete immunization. HPV vaccine delivery challenges can be summarized as sociocultural and political barriers, inadequate health systems and logistical challenges (Wigle et al., 2013). Sociocultural barriers are largely due to lack of knowledge on HPV and the vaccine, concerns about HPV vaccine safety and stigma (Coleman et al., 2011, Wigle et al., 2013). Political challenges are due to lack of political will, involving and coordinating diverse stakeholders and competing health priorities (Wigle et al., 2013, Agosti and Goldie, 2007). Religion has also been shown to influence vaccine uptake in some settings (Marlow et al., 2009a, Marlow et al., 2009b). Health system challenges include poor infrastructure, inadequate human resources (Louie et al., 2009, Wigle et al., 2013), financing mechanisms, cost of vaccine delivery, reaching girls who are out of school (Wigle et al., 2013, Bingham et al., 2009) as well as transport and cold-chain logistics (Ladner et al., 2012, Wigle et al., 2013).

Kenya is faced with several of these challenges in vaccine delivery. Nevertheless, as of the year 2012, she had achieved and sustained immunization coverage of above 80% for childhood vaccines: BCG, three doses each for DPT, Hepatitis B vaccine, *Haemophilus influenzae* serotype b vaccine, Pneumococcal Conjugate Vaccine, Measles Vaccine and Oral Polio Vaccine (WHO, 2013). However, there has been no routine country-wide vaccination of adolescents so the strategies that have worked before may not guarantee similar results in this special group. In addition, health care facilities are stretched, health care workers are much fewer than required (Ministry of Health, c. 2011, Kiambati et al., 2013) and the introduction of the HPV vaccination is likely to cause further strain on the health system.

Although the introduction of free primary education in 2003 has increased school enrolment, from 62% in 2002 to 86% in 2006, there still is a significant population of girls not in school especially in nomadic communities where as many as 4 out of 5 girls may not be enrolled in school (World Bank, 2014, UNICEF, 2009). In the political scene, there's no overt high-powered support for the vaccine or negative political push against it.

To achieve optimal results, project planners and implementers should tap into proven strategies such as educating and engaging the public to create awareness and a sense of ownership (Wigle et al., 2013). Involvement of stakeholders and partners such as the ministry of education; to pool resources and mitigate some of the logistical challenges such as school timetabling and dose timing (Wigle et al., 2013, Perlman et al., 2014). Community Health workers should be used to reach out-of-school girls for vaccination at nearby facilities or schools (Wigle et al., 2013).

At the international level, efforts to obtain a vaccine that can be administered in a single dose and with minimal cold-chain requirements should continue. Strategies to reduce vaccine delivery costs are also required (WHO, 2009).

2.6 RATIONALE:

Cervical cancer is the leading cause of cancer deaths in women in Kenya (Ferlay et al., 2013). There is minimal access to cervical cancer screening services (Rositch et al., 2012, Gichangi et al., 2003, Sudenga et al., 2013) and diagnosis is usually made too late for meaningful intervention (Maranga et al., 2013, Ndlovu and Kambarami, 2003, Kidanto et al., 2002, Ibrahim et al., 2011). HPV vaccines offer women a means of preventing cervical cancer but these vaccines have hitherto remained inaccessible to most women in Kenya. In 2013, the MOH set out to vaccinate all standard four girls in Kitui County to use lessons learnt from the project as a demonstration on how to scale up HPV vaccination to the rest of the country. This initiative is the largest project of its kind in the country. It provides the best opportunity yet, to demonstrate how to effectively roll out a nationwide HPV vaccination program in Kenya. It is an opportunity to identify potential facilitators, barriers and challenges to school-based HPV vaccination and thus enable programmers to design optimal approaches for the rest of the country.

School-based vaccination has proven to be an effective vaccine delivery strategy (Remes et al., 2012, Moodley et al., 2013, Sinka et al., 2013, Hutubessy et al., 2012, Hayashi et al., 2012). In such strategies, teachers play a key role in disseminating information and communicating to parents and students about the vaccine. The teachers' knowledge and attitudes towards vaccination are likely to affect vaccine uptake and overall success of the program (Salmon et al., 2004, Lindley et al., 2008). Assessing teachers' knowledge and acceptance of HPV vaccine to identify any gaps that exist is useful to programmers in designing vaccination campaigns. Teachers are also well placed to identify facilitators and barriers of vaccine uptake and opportunities that can be used to mount other health promotion interventions during the vaccination campaign.

2.7 RESEARCH QUESTION:

1. What is the level of knowledge on Human papillomavirus vaccines among primary school teachers in Kitui County?
2. What is acceptability of HPV vaccine among primary school primary school teachers in Kitui County?
3. What are facilitator and barriers of the HPV vaccination project as viewed by primary school teachers in Kitui County?

2.8 STUDY OBJECTIVES

2.8.1 MAIN OBJECTIVE:

To assess the knowledge and acceptability of HPV vaccine among primary school teachers in Kitui Central division, and identify facilitators, barriers and opportunities presented by the project.

2.8.2 SPECIFIC OBJECTIVES:

- 1) To describe the implementation process of the HPV vaccination project in Kitui County
- 2) To assess the knowledge on HPV vaccine and cervical cancer among primary school teachers in Kitui Central Division.
- 3) To assess the acceptability of HPV vaccine among primary school teachers in Kitui Central Division
- 4) To identify facilitators, barriers and opportunities in HPV vaccination of adolescent girls in Kitui County as viewed by primary school teachers

3.0 METHODOLOGY:

3.1 STUDY DESIGN

This is a cross-sectional, mixed-methods approach, using both qualitative and quantitative techniques.

3.2 STUDY AREA AND POPULATION:

This study was conducted in Kitui Central Division in Kitui County where MOH embarked on a two-year HPV vaccination project in 2013. The County is a rural semi-arid region in lower Eastern part of Kenya. It covers 30,496km² and is sparsely populated with about one million inhabitants (33 people /km²); a majority of whom are poor - 63.5% (Commission on Revenue Allocation, 2011, Commission on Revenue Allocation, 2013). Its geographic, social and economic challenges mirror those of a majority of the rest of the country. In 2013, Kitui County had about 38,000 girls aged 9-13 years, 98% of these were enrolled in school. It had 8455 girls in standard four, 94% of whom are age 9-13 years, and 166 ten-year old girls not enrolled in school. Those not enrolled were targeted for vaccination at health care facilities and through outreach vaccination campaigns (Nakato et al., 2012). The county has about 1100 primary schools; 6% of these are private institutions. Altogether, the County is estimated to have 8600 primary school teachers, 58% of these are male (Kenya OpenData, c.2011).

Due to limited resources, Kitui Central division was selected to represent Kitui County. It has 80 primary schools 73 of which are public and 7 private. The division has about 685 primary school teachers (Kenya OpenData, c.2011).

Map showing the 47 Counties of Kenya



Source: Kenya OpenData <https://opendata.go.ke/facet/counties>

3.3 THE VACCINATION PROCESS

The HPV vaccination exercise is led by the Division of Reproductive Health, Ministry of Health supported by GAVI alliance and UNICEF. Implementation of the project was started in July 2013, and is expected to be complete by 2015.

The MOH launched this demonstration project so as to help design a national HPV vaccination campaign. The project objective is to reach 75% of all eligible girls in the County within 2 years. In order to qualify for support, GAVI alliance requires the country to demonstrate a DTP3 national coverage of at least 70% and delivery of a multi-dose vaccine to least 50% of the target population (9-13 year old girls in the case of HPV vaccine) in a district.

Data on vaccine acceptability, uptake, feasibility and cost is being gathered in order to inform the launch of a national vaccination campaign in 2015.

The project employs school-based and health facility-based delivery strategies. The County has a high school enrolment rate of 96% so most of the girls in the target age group can be reached through a school-based delivery approach. This is supplemented by reaching out to ten-year old girls not enrolled in school for vaccination at health facilities within the County. As at 2011, 166 ten year old girls were estimated to be out of school. Community health workers identify these girls, register them and refer them to a health facility for vaccination.

The girls are being given the quadrivalent Gardasil® vaccine (Merck) at 0, 2 and 6 months by intramuscular injection to the deltoid. The project has leveraged on existing DVI infrastructure for cold chain management, waste management, transport and logistics as well as surveillance and monitoring and evaluation.

Other activities key to vaccination campaigns are also underway. These are vaccine advocacy, community education and mobilization and coordination of teams drawn from diverse multidisciplinary backgrounds (Nakato et al., 2012).

3.4 SAMPLE SIZE CALCULATION:

Considering acceptability and knowledge on HPV vaccine as the key measures, the desired sample size of teachers was 325. This was powered to detect knowledge at 18% and acceptability of 94% with a 5% margin of error with a 95% level of confidence. A study on women in HIV-discordant cohort in Nairobi reported that 18% of the women had ever heard of HPV while 94% would accept to be vaccinated (Rositch et al., 2012).

$$n = \frac{\left(Z_{1-\alpha/2}\right)^2 [p(1-p)]}{(d)^2} \qquad \frac{1.96^2 \times (0.18 \times 0.82)}{0.05^2}$$

n = 227

$Z_{1-\alpha/2}$ = critical value associated with level of significance ($\alpha=5\%$)

p = estimate of proportion (of knowledge on HPV)

d = margin of error

n = sample size

Abbreviation	Acceptability	Knowledge
Z	1.96	1.96
D	96%	18%
P	90%	50%
N	60	227
Required Sample size assuming the Response Rate = 70%	86	325

3.5 SAMPLING METHOD:

Multistage sampling was done. Using a list of all schools in the division as a frame, (Kenya OpenData, c.2011), we stratified the schools into public and private institutions then selected 34 public and 3 private schools through systematic random sampling. All teachers in selected schools were invited to participate in the study.

3.6 INCLUSION CRITERIA:

- All primary school teachers in 37 selected schools were eligible.
- Only teachers who gave consent were included in the survey.

3.7 EXCLUSION CRITERIA:

- Any teacher under 18 years of age. (This may occur if where a person who has just completed secondary education is engaged as an untrained teacher)

3.8 STUDY MATERIALS:

This study required stationery (questionnaires and consent forms), a computer, a flash disk, internet and a voice recorder.

It was conducted by the Principal Investigator assisted by two research assistants.

We hired one car for ten days for mobility to selected schools during data collection and transporting of questionnaires in the evening for safe keeping.

3.9 PROCEDURES:

We approached teachers in staff-rooms, explained what the study was about and invited them to participate. Each was given a written consent to read through and an opportunity to ask any questions. Those who signed the consent were then issued with an anonymous questionnaire to fill

in privately. Filled questionnaires were collected each day and kept in a secure location by the Principal Investigator.

Fourteen of the 37 schools were randomly selected and requested to send either the head teacher, deputy head-teacher or teacher coordinating the HPV vaccination exercise, to one of two Focused Group Discussions (13 out of 14 attended). These were held on different days in a hotel meeting room in Kitui Town. The FGDs were conducted by the Principal Investigator while recording was done through voice-recording and note-taking by a research assistant.

The Principal Investigator trained the two research assistants on the study protocol and procedures a week before fieldwork.

3.10 MEASURES:

The following dependent variables were recorded for the purposes of this study:

- General knowledge on HPV and cervical cancer – this was done using true or false and multiple choice questions
- Acceptability of HPV vaccine among PSTs
- Teachers perception on the success of HPV vaccination project
- Views of Teachers on facilitators of, barriers to and opportunities presented by HPV vaccination of standard four girls

Independent variables: Age, Gender, Level of education, Institution type (public or private)

Confounder: Prior training on HPV vaccination

3.11 DATA COLLECTION:

Data was collected using self-administered questionnaires for primary school teachers in selected schools. The questionnaires were serialized and anonymous.

Focused group discussions were used to explore teachers' views on facilitators and barriers of the vaccination project. We held two FGDs on different days comprising of one teacher from each of 13 selected schools randomly separated into two groups. Recording was through note-taking and voice recording.

Data was collected by the Principal investigator with the help of two assistants.

A description of the process was sought from the Project Manager at MOH division of reproductive health through questionnaire by email and also from the government proposal to GAVI alliance requesting funding for the project (Nakato et al., 2012).

3.12 DATA MANAGEMENT AND ANALYSIS:

Filled questionnaires were collected every day, filed and stored in a hotel safe. At the end of fieldwork, they were stored in a cabinet under lock and key.

Data was stored in a password protected computer and a dedicated USB drive as a back-up under custody of the Principal investigator.

Data cleaning was done by checking the questionnaires for errors and frequency distribution and reading through the transcripts while listening to the audio recording.

After cleaning, quantitative data was entered into SPSS® and qualitative data loaded coded with ATLAS.ti® for analysis by the Principal investigator.

Univariate analysis was done by use of frequency distributions and proportions for categorical variables such as gender and descriptive statistics for continuous variables such as age and knowledge on HPV vaccine.

Bivariate analysis was done using Chi-square or Fishers Exact Test (where the expected count for any particular cell is less than 5) for categorical variables; and t-test for continuous outcome variables. This was done to assess any observed differences and to test the association of dependent variables and various socio-demographic characteristics. The level of significance for all tests was set at 0.05.

Qualitative data obtained from the interviews was grouped thematically using ATLAS.ti® and analyzed to identify the strength and pattern of subjects' views.

3.14 ETHICAL CONSIDERATIONS:

Ethical review was done by the KNH-UoN Ethics and Research Committee and the National Commission for Science, Technology and Innovation. Permissions to conduct the study were sought from Kitui County Commissioner, Kitui County Director of Education and head-teachers of selected schools.

This study bore minimal risk on the participants. It may have posed a risk of feeling embarrassed by some of the questions. The participants were not obligated to answer any question that they did not want to answer.

All 13 teachers who attended the FGDs were given KSh.1000/- to cater for transport and as a token of appreciation for their time. This was in consideration of the fact that many teachers had to travel significant distances across the division to the venue of the discussions.

4.0 RESULTS

4.1 Study Sample Characteristics

A total of 339 participants responded to the questionnaire. They were drawn from 37 primary schools, 34 public and 3 private schools. A total of 13 teachers participated in one of two FGDs.

Participants Characteristics

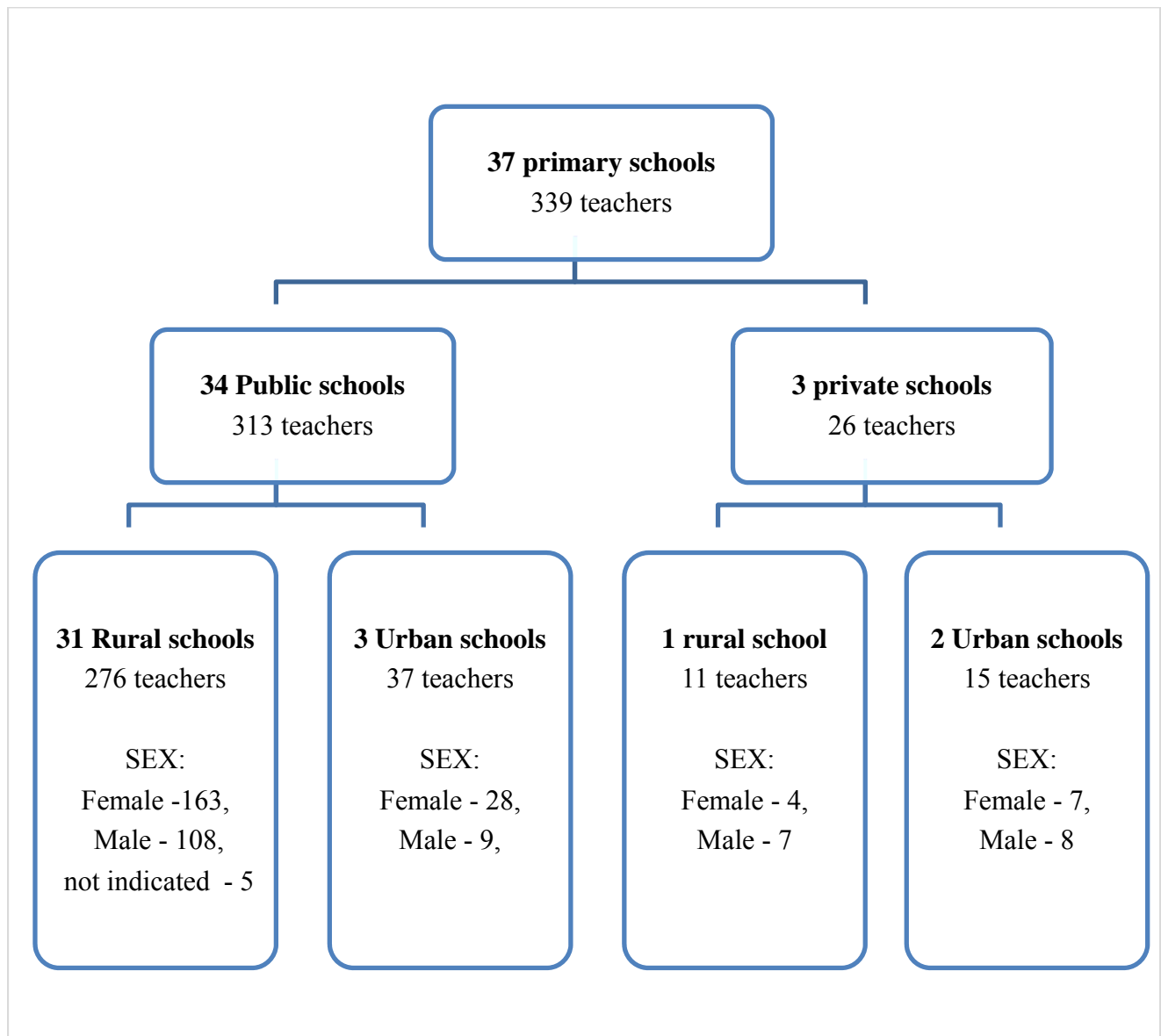


Figure 1 – Participants Characteristics

Table 1- Respondents' Demographic Characteristics

Characteristic		Public Schools	Private Schools	Total
School Location	Rural	276	11	287 (85%)
	Urban	37	15	52 (15%)
	Total	313 (92%)	26 (8%)	339
Sex	Female	191	11	202 (60%)
	Male	117	15	132 (40%)
	Total	308 (92%)	26 (8%)	334
Age	(Average in years)	41	28	40(SD = 10.7)
	Male teachers	43	29	41
	Female teachers	40	27	39
Age group	Less than 25 years	18	2	20 (7%)
	25 - 34 yrs	62	23	85 (28%)
	35 - 44 yrs	82	0	82 (27%)
	45 - 54 yrs	89	0	89 (29%)
	Over 55 yrs	31	0	31 (10%)
	Total	282 (92%)	25 (8%)	307
Level of Education	Secondary	61	0	61 (18%)
	Certificate	91	22	113 (34%)
	Diploma	86	4	90 (27%)
	Degree	69	0	69 (21%)
	Total	307 (92%)	26 (8%)	333
Designation	Head-teacher or Deputy HT	33	5	38 (11%)
	Teacher	280	21	301 (89%)
	Total	313 (92%)	26 (8%)	339
Years of Service	0-5 yrs	66	13	79 (24%)
	5-10 yrs	54	12	66 (20%)
	10-20yrs	60	1	61 (18%)
	Over 20 yrs	126	0	126 (38%)
	Total	306 (92%)	26 (8%)	332
Religion	Protestant	168	18	185 (55%)
	Catholic	142	8	150 (44%)
	Muslim	3	0	3 (1%)
	Total	313 (92%)	26 (8%)	339
Marital Status	Married	242	17	259 (77%)
	Single	61	8	69 (21%)
	Other	7	0	7 (2%)
	Total	310 (93%)	25 (7%)	335

Most of the respondents were working in rural public schools (81%, n=339). Sixty percent were female (Figure 1) and the average age was 40 years.

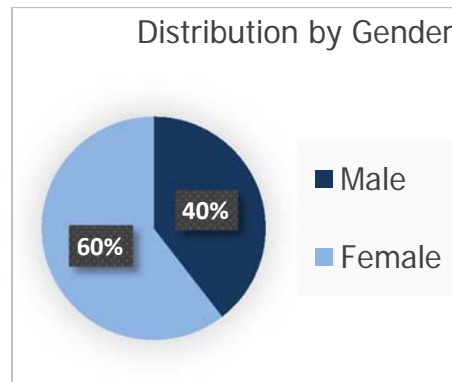


Figure 2 – Distribution by Sex

Teachers in private schools were 12 years younger on average than those in public schools – mean age of 28 years, (range 22-34) and mean age of 41 years (range 18-63) respectively ($p < 0.001$). (See figure 3 below). Male teachers were on average 2 years older than their female colleagues with a mean age of 41 and 39 years respectively. However the difference is not statistically significant ($p = 0.113$).

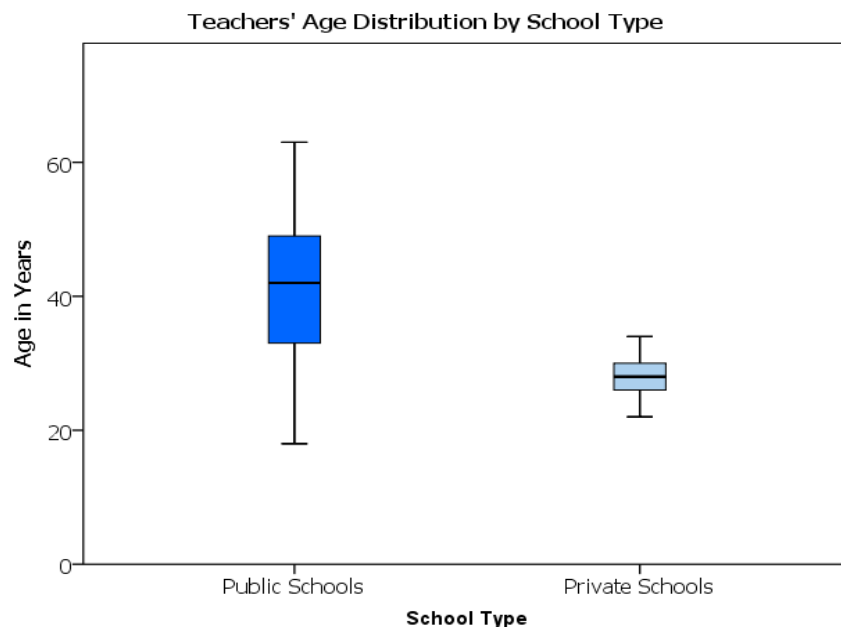


Figure 3 – Age Distribution by School type

Most of the teachers had attained at least certificate or diploma level of education. Most of the teachers in private schools had attained certificate level education as compared to teachers in public schools who were more likely to have a diploma.

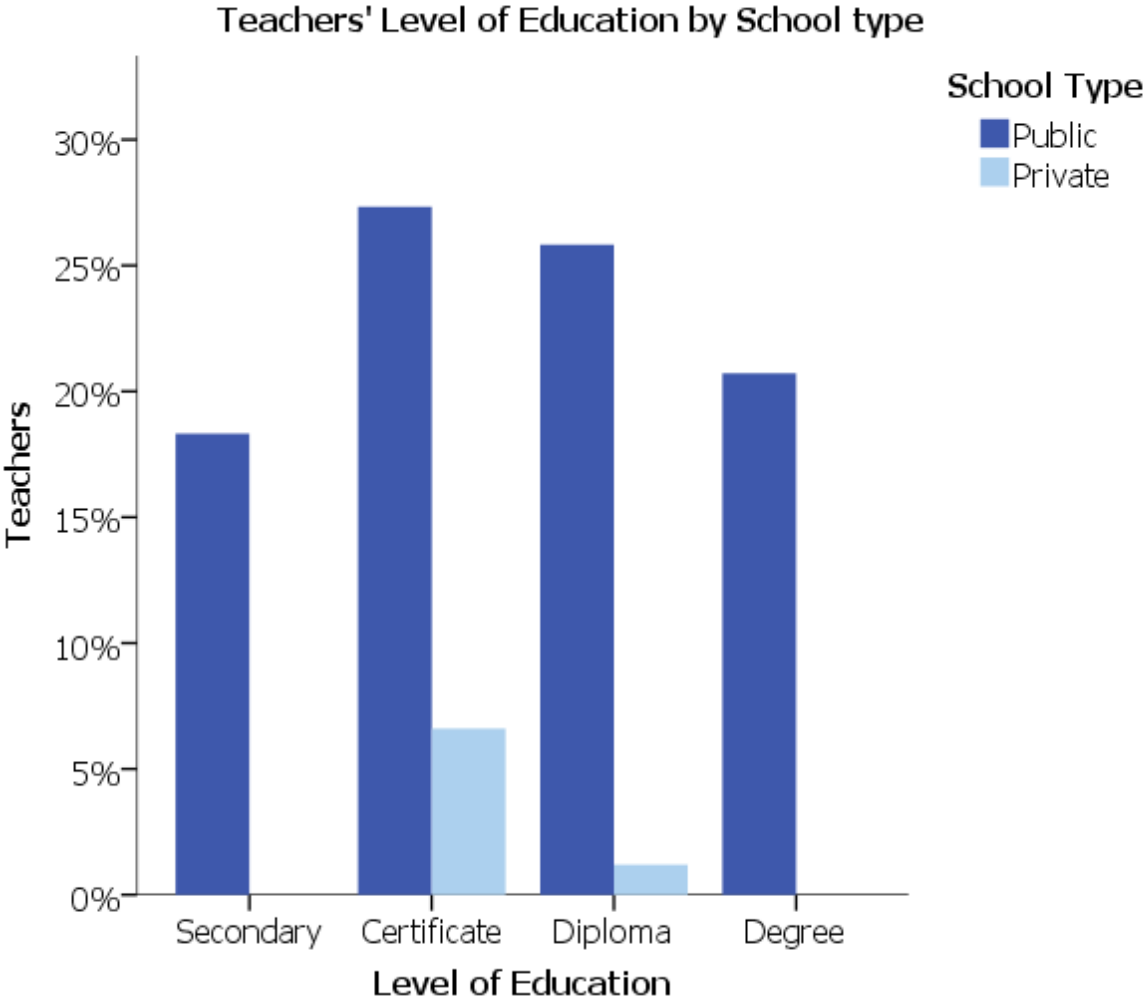


Figure 4 – Level of Education by School Type

Respondents from public schools were more likely to have served for 10 years or more whereas those from private institutions were likely to have served as teachers for under ten years.

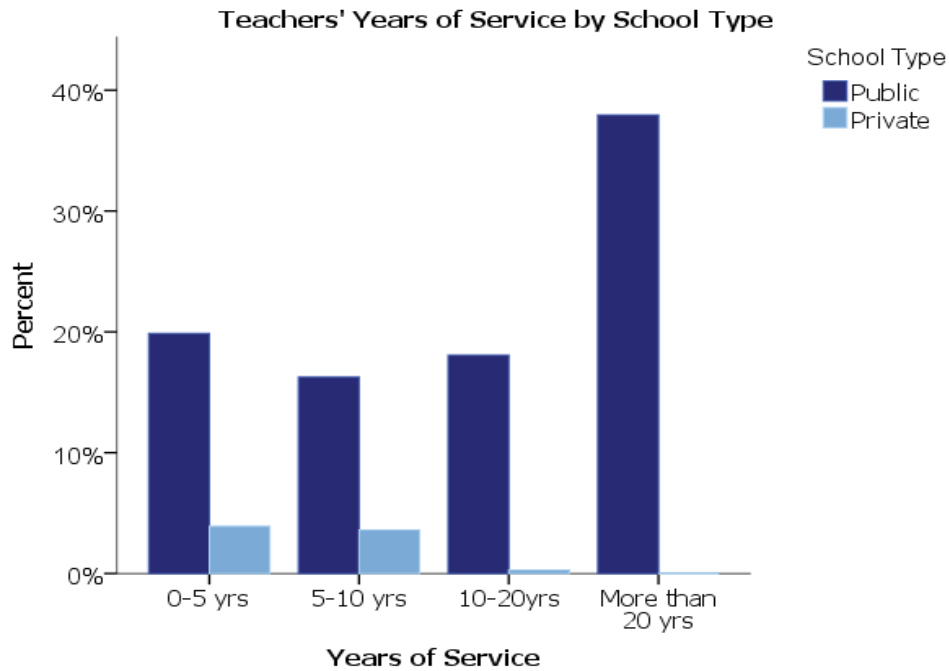


Figure 5 – Years of Service by School Type

The respondents in both public and private schools were more likely to be married (77%; n=335)

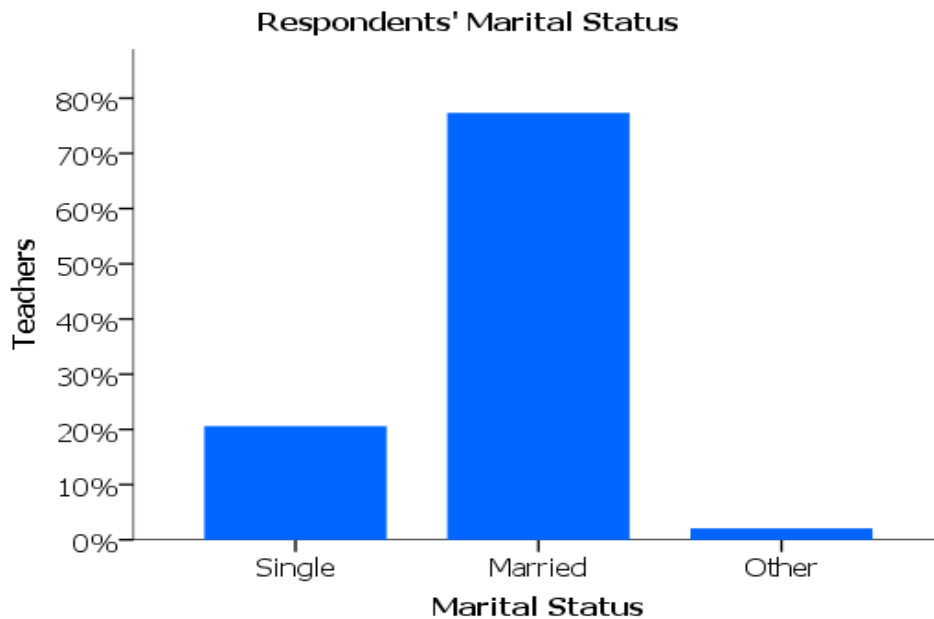


Figure 6 – Respondents' Marital Status

Nearly all the respondents were Christians with less than 1% being Muslims. Catholics formed 44% of the study population whereas Protestants were 55%. Three quarters of the Protestants belonged to either African Inland Church or the Anglican Church of Kenya.

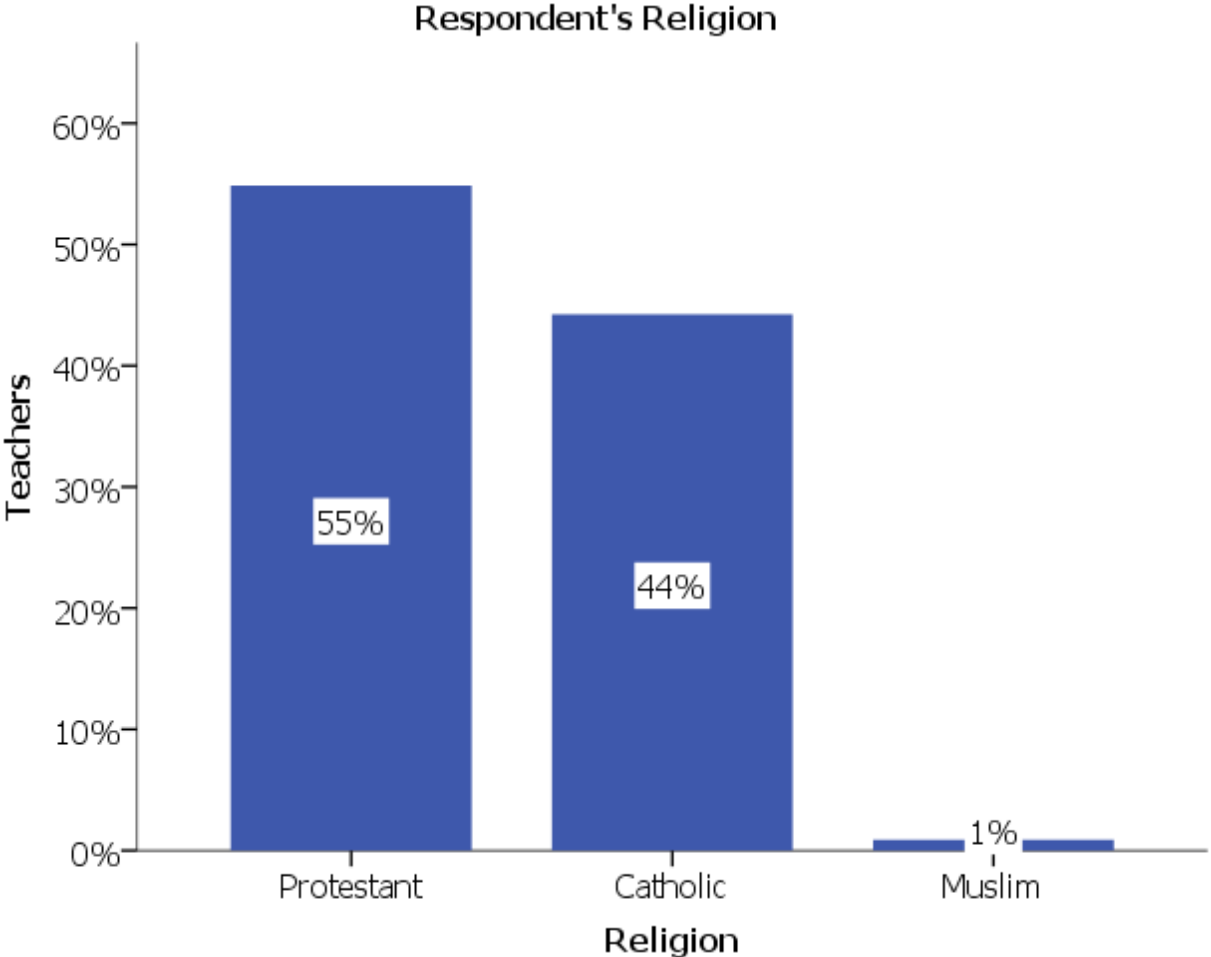


Figure 7 - Religion

4.2 Awareness:

Ninety percent of the teachers were aware that the government had launched the HPV vaccination campaign targeting all class four girls in Kitui County.

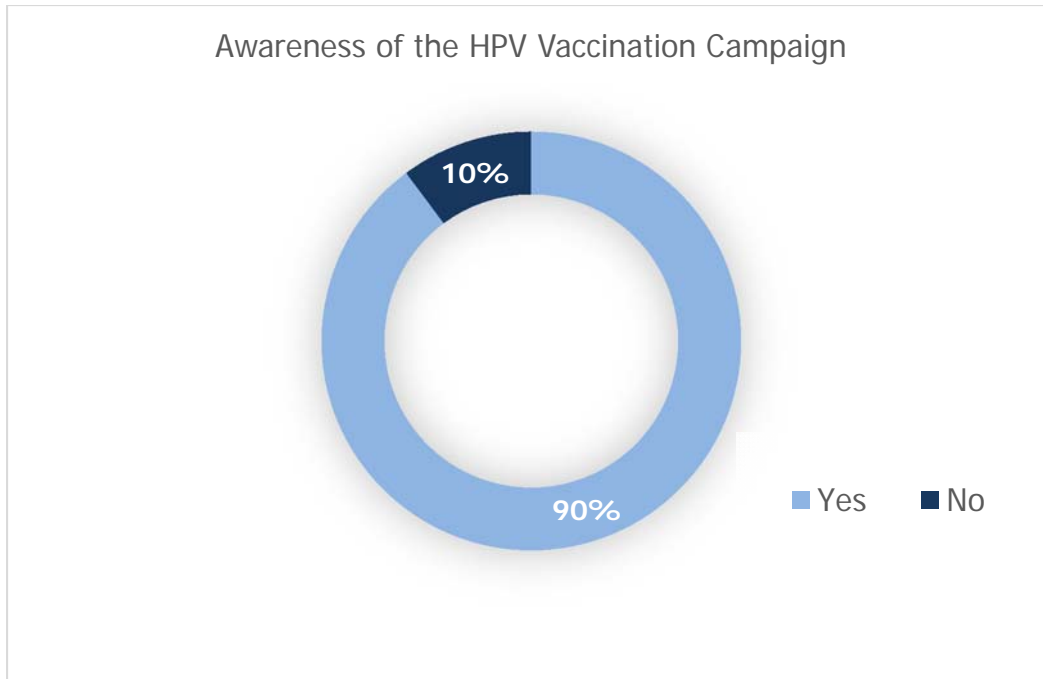


Figure 8 - Awareness

A majority of the respondents had heard of the campaign from ministry of Health officials (68%). Other sources included fellow teachers (30%), radio (13%), Ministry of Education Officials (11%), and Television (5%). Teachers in rural schools were more likely to be aware of the initiative than teachers in urban schools (91% vs 82%, $p = 0.047$).

Most of the respondents viewed MOH officials as the campaign leader and preferred that they lead any future campaigns (82%). A few suggested that Ministry of Education Officials (12%) or County Government officials (6%) should lead future campaigns.

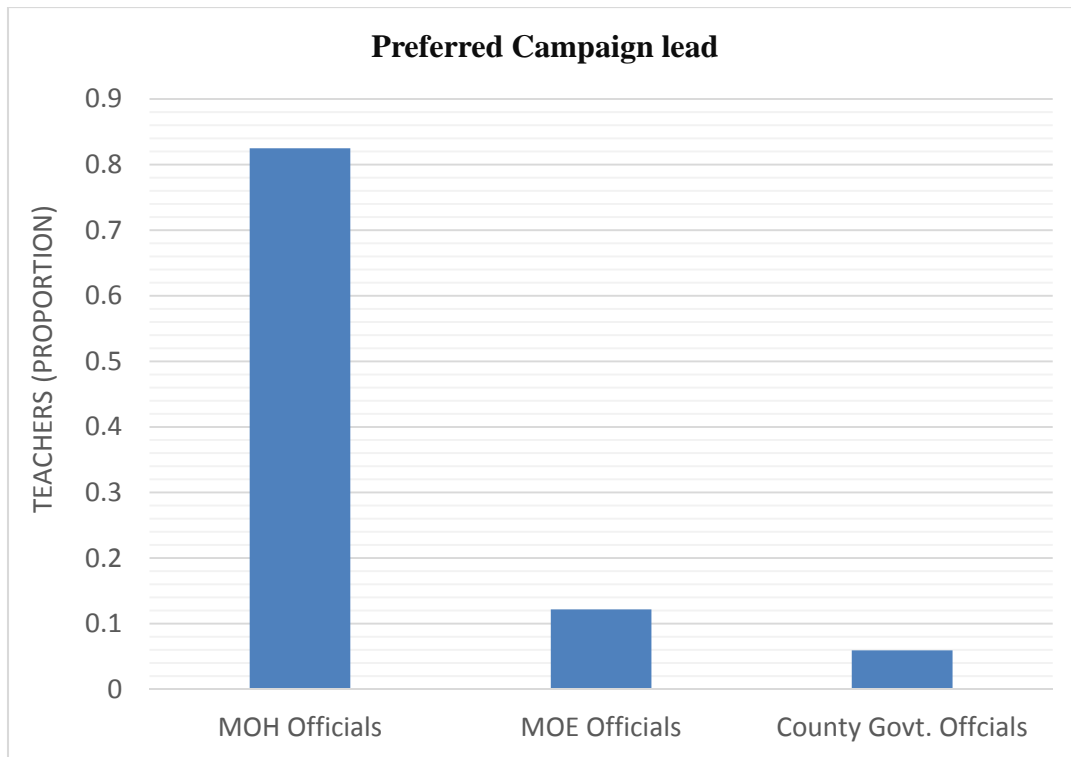


Figure 9 – Preferred Campaign Lead

4.3 Promotional Materials:

Over half of the respondents had seen some promotional material on HPV vaccine (56%; n= 191/329). Out of 184 who responded, half felt that the information contained in the promotional materials were not sufficient (51%) as compared to 45% who felt that the materials were adequate.

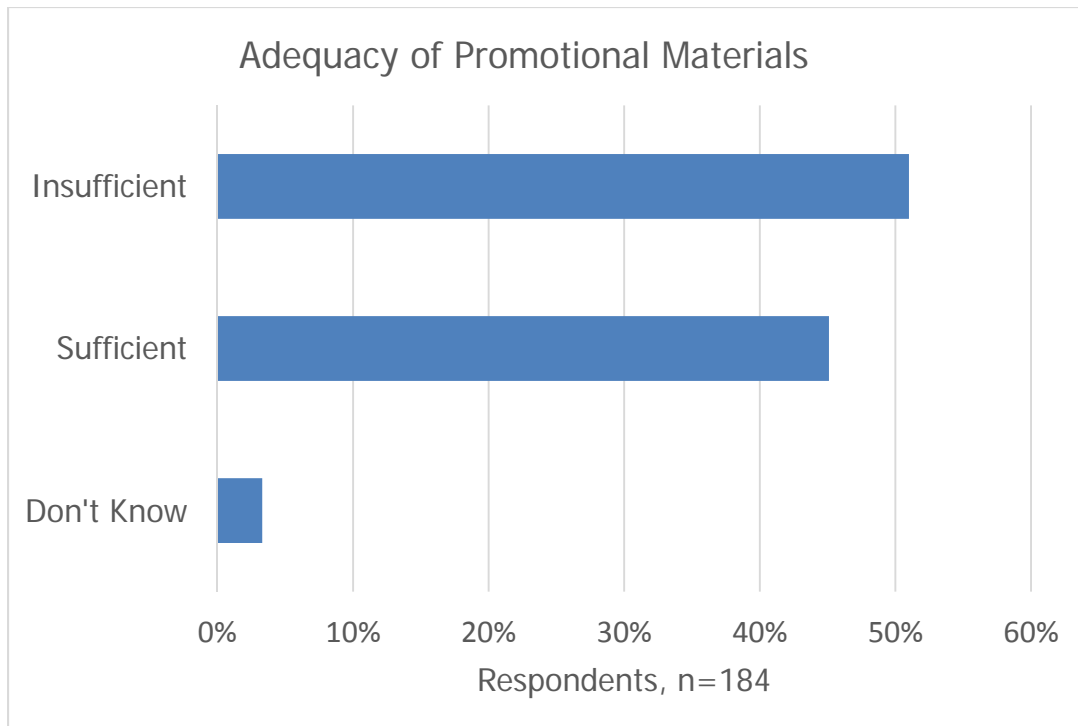


Figure 10 – Adequacy of Promotional Materials

4.4 Seminar attendance:

Less than 5% of the respondents had attended a seminar on HPV vaccine and these were more likely to be head teachers or their deputies ($p < 0.001$).

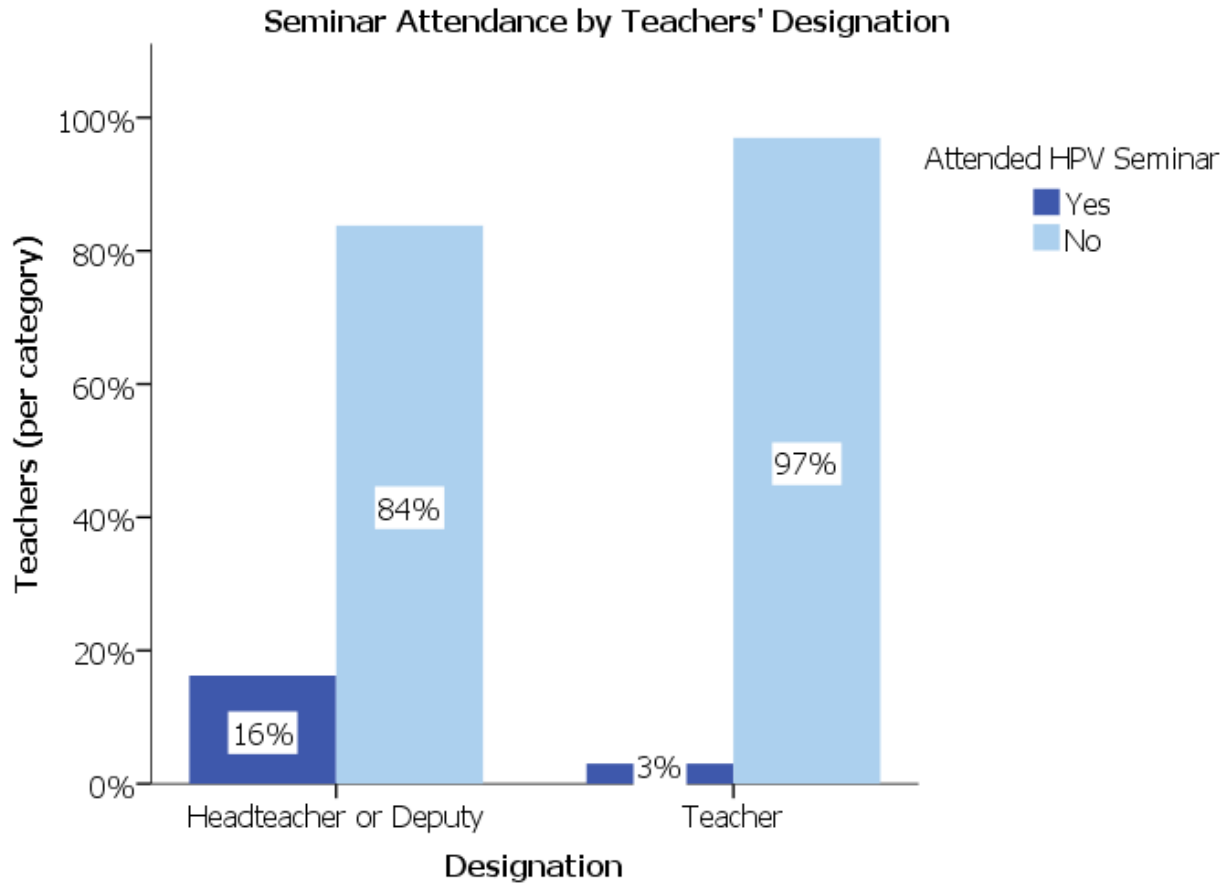


Figure 11 – Seminar Attendance

4.5 Knowledge on HPV vaccine and Cervical Cancer

Seventeen questions were used to assess teachers' knowledge on HPV vaccine and cervical cancer. These were in true/false format or multiple choice questions where the respondent was asked to select one or more correct statements.

Table on Questions and the Proportion of Correct Responses

Question	Correct Answer	Correct Responses (%)
HPV Vaccine Protects against HIV	NO	99
HPV Vaccine Protects against Breast Cancer	NO	98
HPV Vaccine Protects against Cervical Cancer	YES	95
Cervical cancer is a leading cause of cancer deaths in women	YES	84
HPV Causes Cervical Cancer	YES	83
HPV can be transmitted by aerosol/droplet	NO	80
Ever Heard about Pap smear	YES	70
Pap Smear is used for cervical cancer screening	YES	61
HPV can be transmitted through Sexual Contact	YES	58
There's no need for Pap Smear after HPV vaccine	NO	46
Nearly everyone infected with HPV is symptomatic	NO	26
HPV infects both men and women	YES	8
HPV can be transmitted through Physical Contact	YES	6
HPV Vaccine Protects against Vulvar Cancer	YES	5
HPV Vaccine Protects against Anal Cancer	YES	2
HPV Vaccine Protects against Warts	YES	1

Table 2 – Questions & Proportion of Correct Responses

This table compares respondents' knowledge and various characteristics.

Comparison of various groups by total knowledge score		
Average score		48.4 %
Standard deviation		10.9
Median		47.1%
Mode		47.1%
Range		12 – 82%
Sex	Men	46 % (SD = 12)
	Women	50 % (SD = 10)
	<i>p value (t-test)</i>	0.002
Type of School	Private schools	48.4 %
	Public Schools	48.7 %
	<i>p value (t-test)</i>	0.756
Location of School	Urban schools	48.2 %
	Rural schools	49.3 %
	<i>p value (t-test)</i>	0.499
Religion	Catholics	47.7 %
	Protestants	48.8 %
	<i>p value (t-test)</i>	0.34
Marital Status	Married	48.4 %
	Single	48.5 %
	<i>p value (t-test)</i>	0.953
Designation	Head teachers/ Deputies	47.8 %
	Teachers	48.4 %
	<i>p value (t-test)</i>	0.744
Association between knowledge and:		<i>p value:</i>
Age		0.496 (Pearson correlation)
Age groups		0.517 (ANOVA)
Years of service		0.386 (ANOVA)

Table 3 – Comparison of Total Knowledge score with other characteristics

Women had more knowledge on HPV and cervical cancer than men ($p = 0.002$). There was no significant difference in scores between teachers in public or private schools ($p = 0.756$) rural and urban schools ($p = 0.499$), Protestants and Catholics ($p = 0.034$), or between head teachers and

teachers ($p = 0.744$). Similarly, there was no significant association between knowledge and age, age group or years of service ($p = 0.496, 0.517$ and 0.386 respectively).

4.6 Acceptability:

Asked whether they would recommend the vaccine for their daughter or close relative, 89% of the respondents answered in the affirmative ($n = 302/339$).

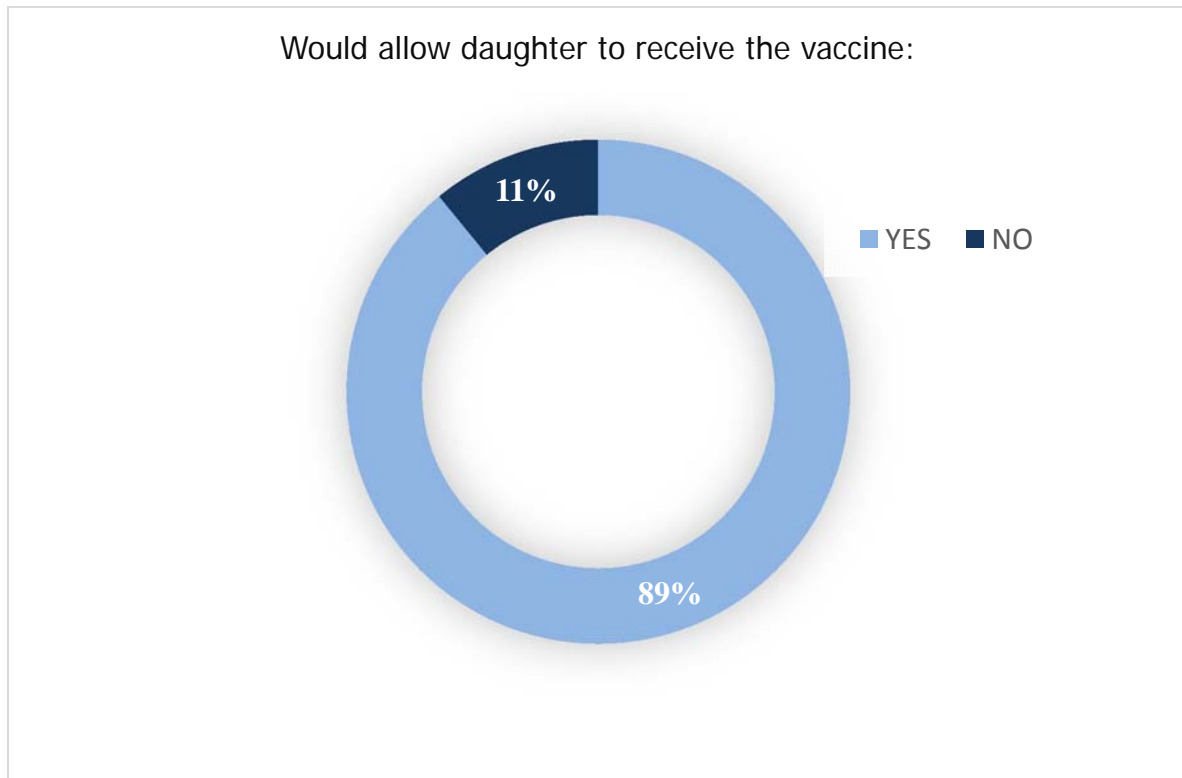


Figure 12 - Acceptability

Teachers in rural schools were more likely to accept the vaccine as compared to their counterparts in urban schools ($p = 0.01$).

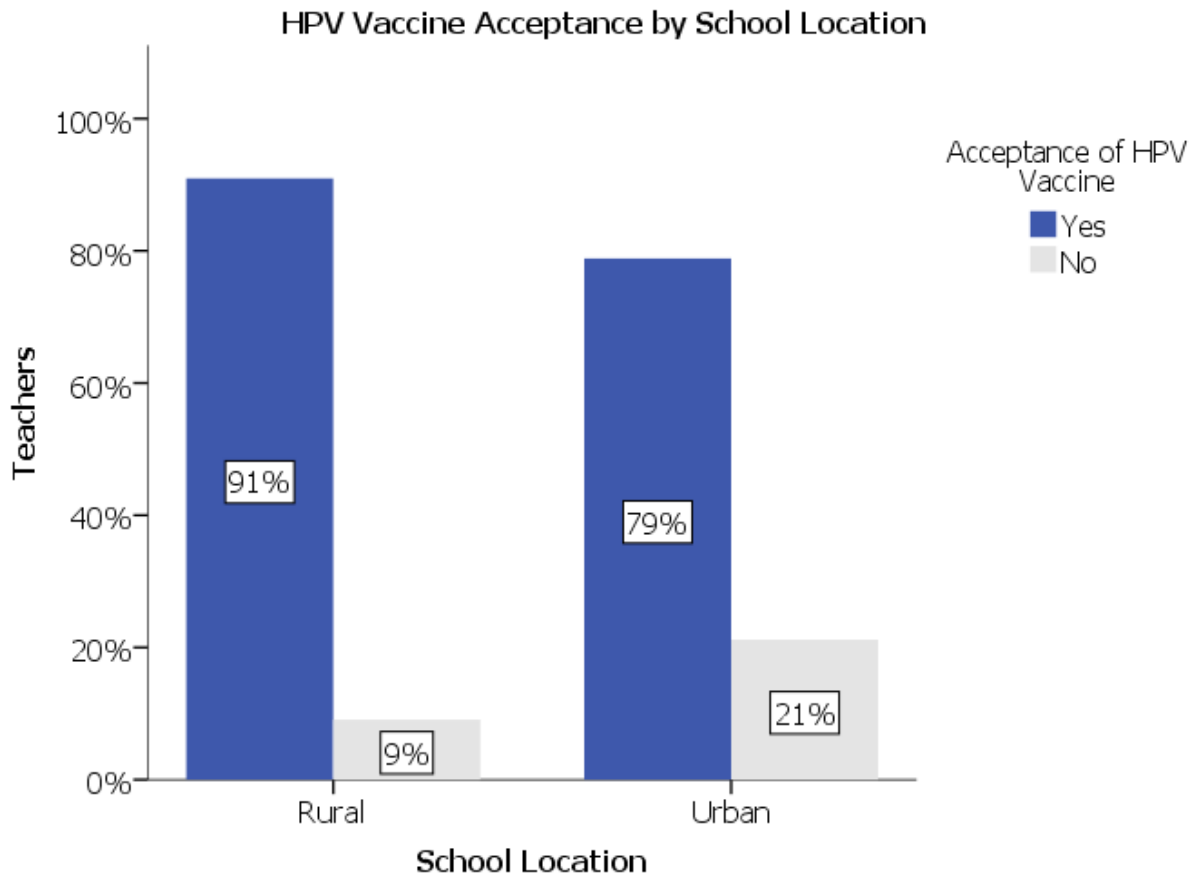


Figure 13 – Acceptability by School Location

Teachers who were aware of the initiative were more likely to accept the vaccine ($p = 0.016$, Fisher's Exact Test). Similarly, those who accepted the vaccine had, on average, more knowledge about it than those who declined (mean score of 49.4% and 39.7% respectively, $p < 0.001$).

There was no significant association between acceptability and the type of school (public or private), age, sex, level of education, length of service, religion, and marital status.

Association between Acceptability & Various Parameters

Parameter	<i>p value</i>
School Type (Public or private)	0.507 (FET*)
Age Group	0.092 (ANOVA)
Sex	0.228 (t-test)
Level of education	0.428 (ANOVA)
Designation (Head-teaches versus teachers)	0.404 (t-test)
Length of service	0.317 (ANOVA)
Religion (Catholic or Protestant)	0.464 (t-test)
Marital status (Single or married)	0.707(t-test)

Table 4 - Association between Acceptability & Various Parameters

** FET is Fishers Exact Test*

About 11% (37/339) of the respondents reported that they would not allow their daughter or close relative to receive the vaccine. The following reasons were given for this stand:

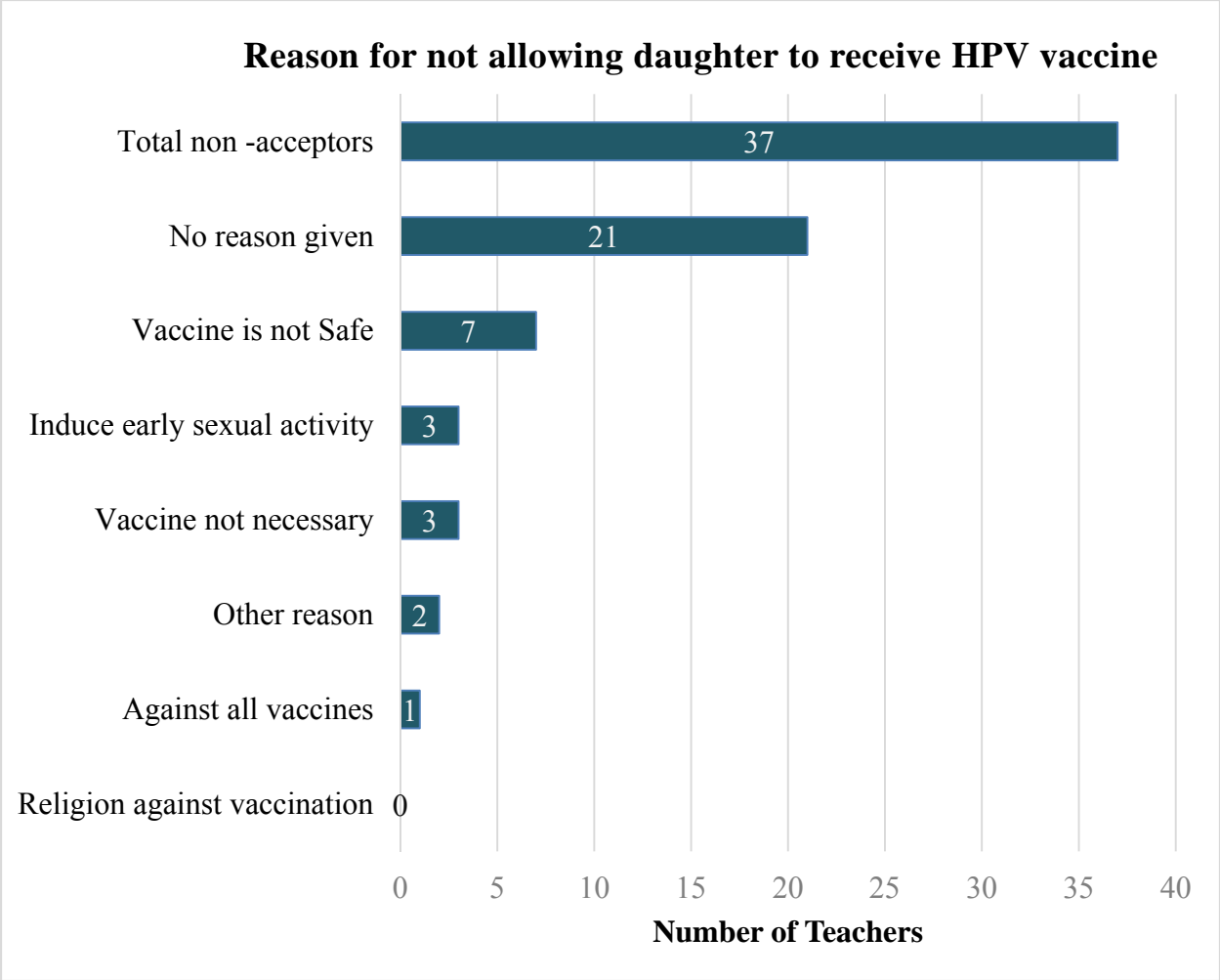


Figure 14 – Reasons for refusal

4.7 Level of disruption

Most of the respondents felt that the exercise only minimally disrupted the school activities (75%, n = 244/327). A fifth of the respondents felt there was no disruption at all, while 6% thought it caused a lot of disruption. Comparing teachers who thought there was at least some disruption (81%) and those that reported no disruption (19%), the latter were more likely to accept the vaccine.

Level of Disruption of School Activities by Vaccination Activities

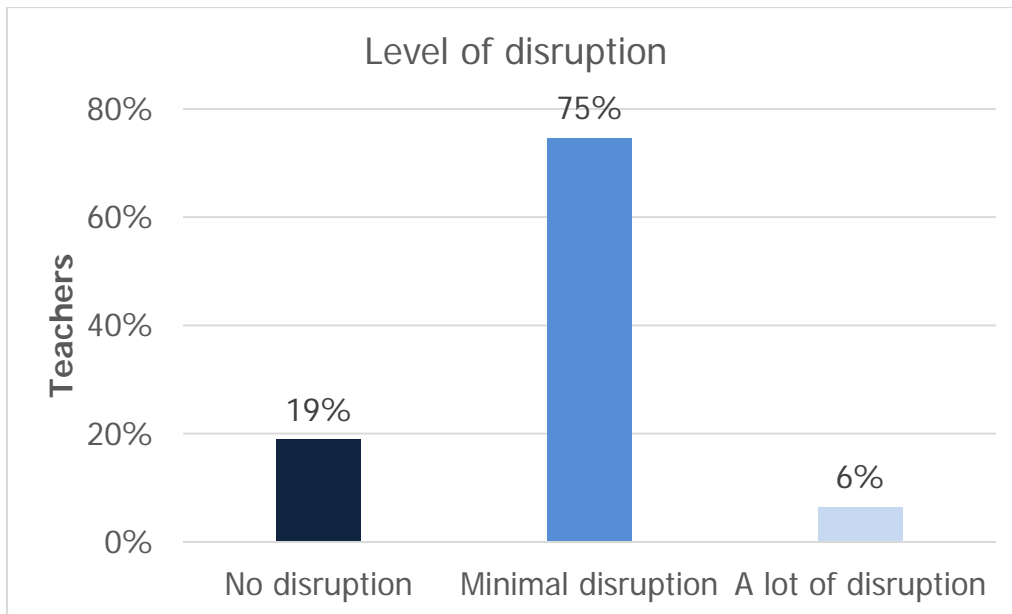


Figure 15 – Level of Disruption of school activities

4.8 Delivery system:

A majority of the respondents preferred school-based HPV vaccination (60%) as compared to health facility-based (37%) and community-based (13%). Some preferred two or three modes.

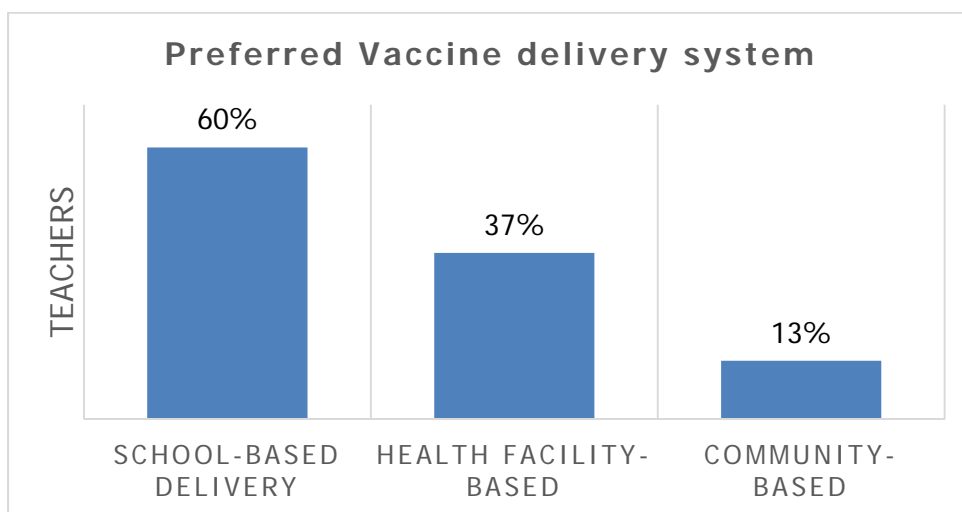


Figure 16 – Preferred Delivery System

4.9 Respondents' attitudes:

On a scale of 1-3 (agree, neutral and disagree), teachers gave the following responses:

Respondents' responses to various statements on a Likert Scale:

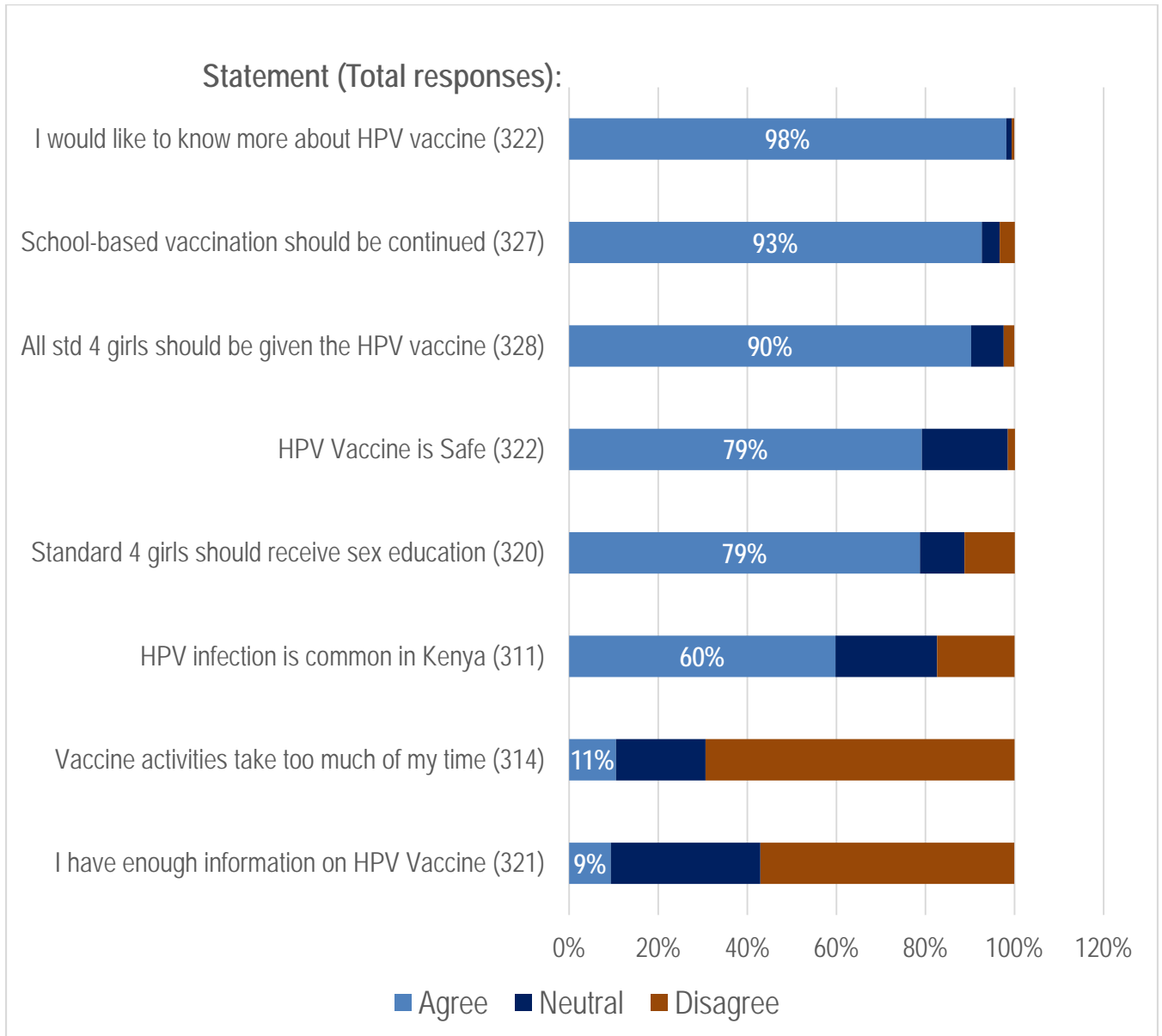


Figure 17 – Responses to Likert Questions

4.10 Success

Two thirds of the respondents felt that the vaccination initiative was successful (65%, n=301). Men were more likely to gauge the exercise as successful as compared to women (74% versus 60% $p = 0.01$). Teachers who said it was successful were also more likely to be aware of the vaccination exercise ($p < 0.001$), and to have accepted the vaccine ($p = 0.02$). There was no association with the knowledge score ($p = 0.442$).

4.11 Barriers to success:

Out of all respondents, 70 % (237/339) cited at least one barrier that hindered the success of the vaccination project. The most prominent of these was lack of awareness and information (45%), poor accessibility of the region (37%), pupil absenteeism (19%) and fear of side effects (11%).

Data from the County Education office shows that attrition in the targeted class four of 2013 was 6% by July 2014. In contrast, the current class four has increased by 2% in numbers as compared to class three of 2013. These changes in numbers may have been due to transfers, drop outs or repeating classes. Girls who transferred to a school within the County were able to complete the vaccine doses but not so among those who transferred out of the County.

Less prominent barriers included negative attitude towards the vaccine by some parents or teachers, religious/ cultural beliefs, refusal to be vaccinated by the girls or their parents, poor organization and planning, inadequate means of transport for MOH staff and dose delays past the expected vaccination dates (all under 10%).

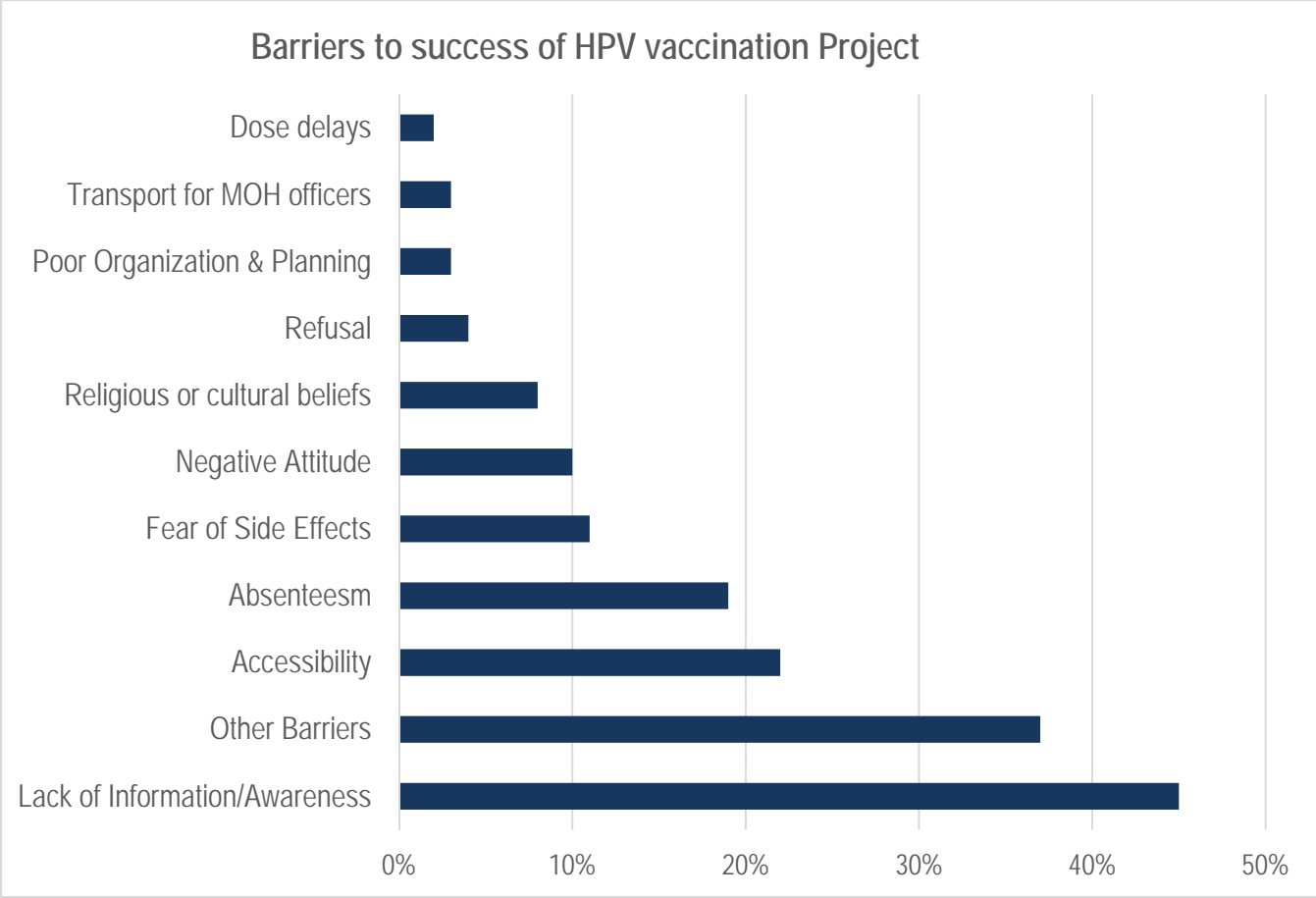


Figure 18 - Barriers

4.12 Improvement

Three quarters of the respondents suggested some improvement that they felt should be made on future HPV vaccination projects (258/339). The commonest suggestions were to increase awareness among teachers, parents and pupils; to disseminate more information on the vaccine and cervical cancer and to do community mobilization targeting parents through ‘barazas’, churches and other social gatherings.

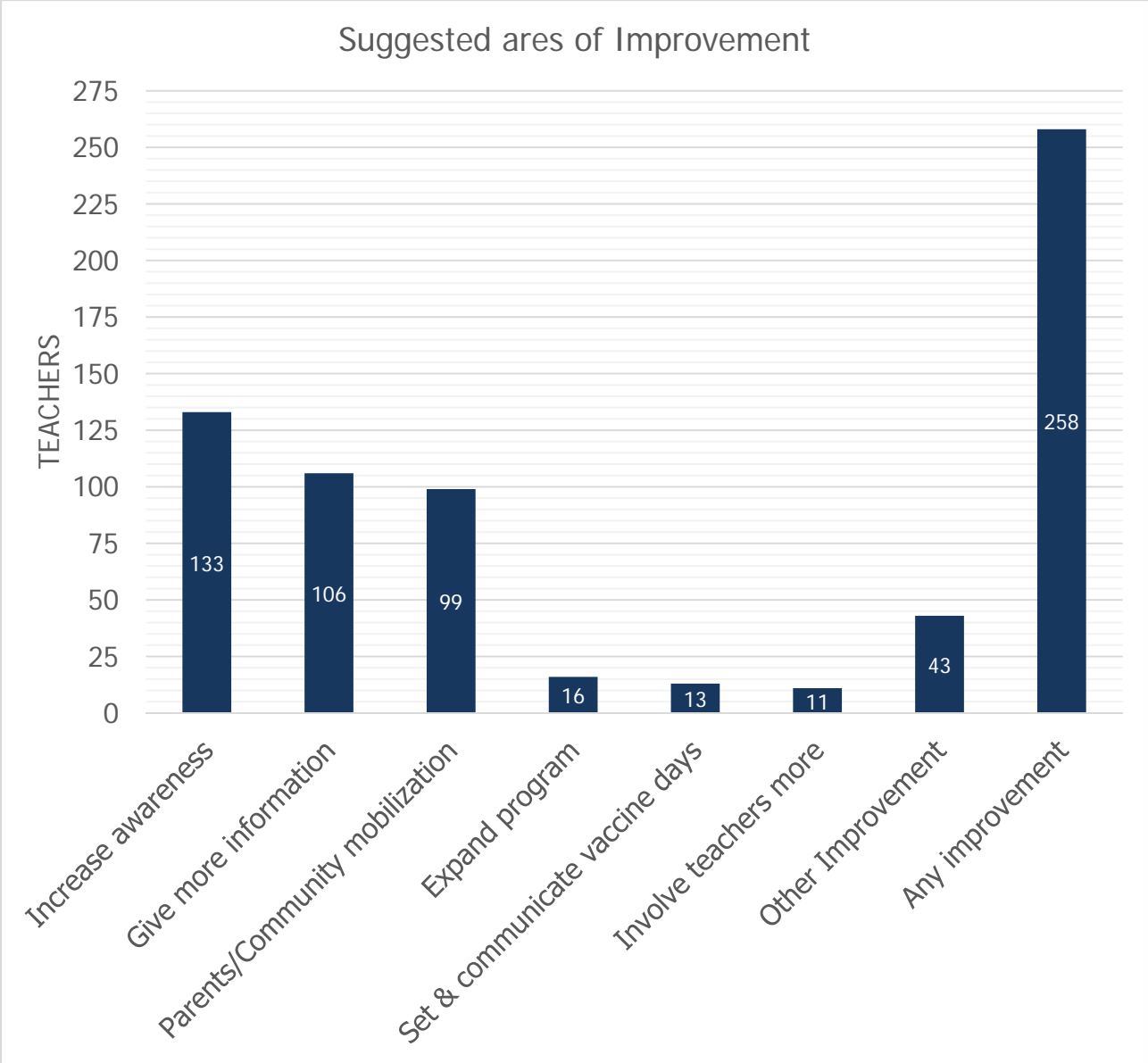


Figure 19- Suggested Improvements

4.13 Focus Group Discussions

We held two focus group discussions with a total of 13 teachers each different primary schools. The schools were randomly selected and asked to send either the head-teacher, deputy head-teacher or the teacher coordinating the HPV project in the school. Table 5 below shows the characteristics of the participants.

Characteristics of FGD Participants:

Detail	FGD 1	FGD 2	TOTAL
Number of participants	6	7	13
Male	2	4	6
Female	4	3	7
Head-teachers	0	3	3
Deputy Head teachers	2	1	3
Teachers	4	3	7

Table 5 - Characteristics of FGD Participants

Awareness:

All the participants were aware of the vaccine project but some did not know it was for Kitui County alone, they thought it was for the entire country. They also reported high levels of awareness among fellow teachers. They were notified mainly through health officials and head teachers. Other sources included posters and pamphlets and news reports on radio and newspapers. A few teachers reported that the short period between the announcement and actual vaccine administration was not sufficient to ‘absorb the information’.

Once they were made aware, teachers informed parents by sending verbal or written messages through the targeted girls and a few schools called the parents to a meeting to discuss the vaccine. One private school represented in the FGD informed parents through phone calls by the class four teacher.

Many suggested that parents and other community members should be informed about the vaccine through *barazas*, churches and other social gatherings before commencing the administration.

Acceptability

All participants would allow their daughters or close relatives to receive the vaccine. They reported high acceptability rates among teachers and parents. They also reported that some parents and teachers had reservations or had rejected the vaccine. They cited lack of enough information and fear of side effects as the main concerns. Many of those with reservations would accept the vaccine after getting more information on it:

‘There are some (parents) who could come and ask us about it, and we would explain to them why the vaccine is given, and then after explanation, they would accept that their children be given the vaccine.’

The participants did not identify any particular side effects that they feared the vaccine may cause. Only one school reported actual side effects where two girls felt dizzy. This safety profile reduced their fears for subsequent doses.

Another concern that was reported was fear among some parents and some teachers that the

vaccine was a contraceptive. This was reported by some of the participants but no one could identify the source of this concern. They reported that it is a fear that cuts across most vaccinations and one that could be allayed by proper information from health officials.

Vaccine uptake by the girls was high. None of the girls refused to take the vaccine though fear of injection and pain was widespread. A few girls were not given the vaccine because they were said to be 'too big' (14 years and above).

Knowledge on Cervical cancer and HPV vaccine:

Although the participants knew about the HPV vaccine prevents cervical cancer, they had very little information about HPV infection and cervical cancer. They appreciated that cervical cancer is an important disease that kills many women and that it can be prevented through regular screening by Pap smear but they had no information on HPV, its transmission, signs or symptoms.

'I thought it (HPV) may be inborn, the child maybe born with it, so it maybe still with the child as she grows up and emerge later...'

'I don't know how it (HPV infection) is passed from one person to another'

'I think from the word cervix, you may think it (HPV) infects the girls only because men don't have a cervix.'

Regarding sources of information, a few reported seeing pamphlets but the only information they could recall from the pamphlets was that the vaccine prevents cervical cancer and it should be given to class four girls. Another source of information was a meeting organized for head-teachers by the Ministry of Health officials. All participants felt that they did not have enough information on the subject and wanted to learn more.

‘All teachers should be given the same information. For instance in our district, only the head-teacher or two other teachers were called... They can come and give a seminar to all the teachers and all the parents...’

Level of disruption

The participants felt that the vaccination exercise did not disrupt school activities except for one school which hosted the launching ceremony and had to stop activities for one afternoon. The rest of the schools continued with their usual activities as the class four girls were vaccinated. The exercise took less than an hour in most schools.

Success

Most of the participants felt that vaccine administration was successful especially because all the girls in school were given the vaccine including follow up for those who had been absent on any of the vaccine days. A few said the event was not successful because they felt that there was need to establish if the vaccine had actually effected the desired immunity.

‘I’m indifferent because I don’t know whether the infection was prevented. The success was only in injecting the vaccine. The success of the prevention, I can’t tell.’

Some reported that the vaccine may not be successful because the second dose had been delayed for more than a month in some schools. They suggested that in future, vaccine administrators should stick to the vaccine dates.

Improvements:

All the participants suggested that the organizers should disseminate more information to all teachers, parents and the community as this would allay fears, rumours, and anxiety surrounding the vaccine.

'... As they do the campaign, during the awareness, it is important that they clear what is written in the papers. We don't know to what extent the information is true. So we should be presented with the facts.'

They suggested modes of disseminating information including seminars, posters, and pamphlets as well as local radio FM stations, churches and *barazas*.

Some suggested that cervical cancer screening of teachers and community members should be done as the vaccine is administered. One suggested that teachers should be vaccinated as well so as to confirm to the children and parents that the vaccine is safe.

A participant suggested the use of an oral vaccine because the girls were really afraid of the injection.

Barriers:

The participants reported that accessibility was a major issue due to poor road network and vastness of the County. They also observed that the vaccinators did not have adequate means of transport to traverse the County.

Most contented that lack of sufficient information was a hindrance to vaccine uptake. They all wanted to learn more about the vaccine and felt that the community should be sensitized on the issue.

Another barrier was absenteeism. The participants reported that most girls who missed the vaccine were either absent or had dropped out of school. They felt that if the planners been more organized to announce the vaccine days in advance and avoid dose delays, this problem would be reduced.

Some cited cultural and religious beliefs that were against vaccinations and fear of side effects as barriers too.

'We have some religions don't allow going to the hospital, so the government should come in and decide what to do with the parent.'

'...I had another case but not one of HPV vaccine. In my former school a child from 'Kavonokya' religion was sick. The mother had died of anemia and the child was so sick he couldn't concentrate [in class], we had to force the child to go to hospital. So for the benefit of the child we have to force. [vaccination].'

Consent

The participants felt that it was desirable for the parent and girl to give consent before vaccination. However, most felt that all girls should be vaccinated whether the parent/guardian agrees or not. Only two of the participants reported that they would not give the vaccine if both the child and parent declined. Many felt that since the vaccine had been sanctioned by the government, it was beneficial to the girls and should be given by all means including involving the security organs to enforce. A few cited a religion called '*Kavonokya*' whose followers do not take any form of modern medicine but have to be forced to allow their children to receive the regular vaccines.

5.0 DISCUSSION

The aim of this study was to assess the knowledge and acceptability of HPV vaccine among primary school teachers in Kitui County and explore the teachers' views on the facilitators and barriers of HPV vaccination in the County. We found high levels awareness (90%) and acceptability (89%) of HPV vaccine, and a moderate level of knowledge about the vaccine, HPV, and cervical cancer among primary school teachers (48%). The major barriers to the vaccination process were lack of sufficient information, poor accessibility of schools, absenteeism of the girls on vaccine days and fear of side effects.

Our findings on awareness of HPV vaccine concur with those from studies conducted after an awareness campaign in other parts of the world. Cates et al in North America reported that 91% of 696 parents of adolescent daughters had heard of the vaccine (Cates et al., 2010). Haesebaert et al in France similarly reported awareness of 91% in women with adolescent daughters and 76% in women aged 18-65 year (Haesebaert et al., 2012). Ayissi, et al in Cameroon found high levels of awareness of HPV vaccine among adolescent women after an education campaign. (Ayissi et al., 2012). These findings contrast with previous studies done in developing countries where awareness about vaccines has been low. In Ghana, 40% of women had heard about the vaccine (Coleman et al., 2011). In a qualitative study in Tanzania, none of the parents, teachers and girls interviewed knew of the vaccine (Remes et al., 2012). Similarly, in a previous study in women attending two hospitals in Kisumu, Kenya, none of the women had heard of the HPV vaccine (Becker-Dreps et al., 2010). The high level of awareness in our study population was most likely due to the ongoing campaign to vaccinate all class four girls in the County. Most of the respondents

in our study (68%) had heard of the vaccine from health care workers who were administering the vaccine.

Vaccine acceptability was assessed through willingness to allow the respondent's daughter to receive the HPV vaccine or to recommend it to a close relative. Our findings on acceptability are consistent with results from several studies in sub-Saharan Africa and other parts of the world showing high acceptability of the HPV vaccine or willingness to recommend it to a friend or relative. A study in the United Arab Emirates found that 80% of women would accept the vaccine and 87% would recommend it to their friends (Ortashi et al., 2014). In Argentina, 75% of women were willing to receive the vaccine (Arrossi et al., 2012). In Tanzania, nearly all adults interviewed in one study said they would allow their daughters to receive the vaccine (Remes et al., 2012). Different studies in Kenya and Ghana reported that 94% of women were willing to receive the vaccine (Rositch et al., 2012, Coleman et al., 2011). Similarly, acceptability of the vaccine in Uganda and Cameroon was reported in different studies as 86% (Ayissi et al., 2012, Galagan et al., 2013).

The level of knowledge found in this study is comparable to a similar study done in Cameroon following a HPV vaccination campaign (Ayissi et al., 2012). In both studies the respondents were aware of the significance of cervical cancer as a cause of cancer deaths in women and the importance of HPV vaccine in preventing cervical cancer. Only a minority of respondents knew that HPV infection is usually asymptomatic - 26% in our study and 19% in the Cameroonian study (Ayissi et al., 2012). In contrast, only 1% of the respondents in our study were aware that the vaccine also prevents warts as compared to 62% in Cameroon (Ayissi et al., 2012). In addition,

very few respondents in our study knew that HPV affects both men and women – 8% as compared to 58% in Cameroon (Ayissi et al., 2012) and 56% in Mali (Poole et al., 2013).

A recent study in Nairobi reported that 69% of women knew that Pap smear testing is used to screen for cervical cancer (Rositch et al., 2012). This findings are similar to what we found in our study (70%).

Our study also shows that more than half of the teachers (56%) do not know that screening by Pap smear is necessary even after one has received the HPV vaccine. The vaccine is a complement to cervical cancer screening and not a replacement. Currently available HPV vaccines cover two oncogenic HPV serotypes (HPV 16 and 18). They do not provide full protection against other oncogenic HPV serotypes which cause 30% of cervical cancer cases (Bosch et al., 1995, Clifford et al., 2003).

Our study also shows that women had more knowledge on HPV and cervical cancer than men (50% versus 46%, $p = 0.002$). This is likely due to the perception that HPV affects women only. This is similar to findings of a study among secondary school teachers in Malaysia where awareness of HPV vaccine was higher in female teachers than in males (54% versus 33%) (Ling et al., 2012).

Although a majority (65%) felt that the project was successful in vaccinating class four girls, key barriers were thought to have hindered the success. Notably, lack of awareness and insufficient information especially among teachers and parents were reported as major barriers. The need for

adequate information about cervical cancer, HPV and HPV vaccine has been stressed in previous studies. (Coleman et al., 2011, Remes et al., 2012, Poole et al., 2013).

Another key barrier was accessibility; Kitui County is vast with a poor road network with only 0.3% of roads tarmacked (Commission on Revenue Allocation, 2013). This situation is reflective of many areas in Kenya where HPV vaccination programmers will have to contend with poor infrastructure which poses a challenge in transporting vaccines and health personnel.

Pupil absenteeism on the vaccination days was another major barrier. This was also the case in Tanzania where absenteeism was identified as one of the major barriers of vaccine uptake (Watson-Jones et al., 2012a). This shows that good record keeping and tracking will be required to reach girls who may transfer or drop out of school before completing the three vaccine doses.

To the best of our knowledge, this is the only study done in our setting that assesses teachers' knowledge after the completion of an HPV vaccine awareness campaign. The strengths of this study are the choice of a population included both urban and rural schools the fairly large sample size and the opportunity to clarify key findings through focus group discussions.

Due to resource constraints, this study was conducted in one of 20 divisions in Kitui County. Although the selected division reflects the picture in other divisions, collecting data from selected schools across the entire County may have provided more insightful information especially on intra-County variations. Willingness to recommend the vaccine to a daughter or close relative was used as a marker for vaccine acceptability. This may not necessarily reflect the real picture on

uptake of the vaccine at the time of administration. We were also unable to include class four girls and their parents in the study which would have given a good indication of vaccine uptake. Research is needed to identify cost-effective ways of disseminating information on HPV vaccine and cervical cancer to teachers, parents, pupils and the community in resource-strapped settings.

6.0 CONCLUSION

This study highlights the gap in knowledge on cervical cancer and HPV vaccines reported by similar studies. It also shows that insufficient knowledge on HPV vaccine may reduce the willingness of teachers to allow their daughters to be vaccinated or recommend the vaccine to others. Our study underlines gaps that awareness campaigns need to seal. Key among these is addressing vaccine safety concerns and educating the community that HPV is an STI that affects both men and women. As the country prepares to launch a nation-wide HPV vaccination for adolescent girls, one of the key investments should be dissemination of information on HPV, HPV vaccine and cervical cancer.

The study also shows that teachers have embraced the school-based approach as a mode of giving adolescent girls the HPV vaccine. Future campaigns should leverage on this support by teachers.

7.0 RECOMMENDATIONS:

Strengthening of education campaigns is required so as to disseminate information about HPV vaccines and cervical cancer among, teachers, target girls, parents and the community at large.

This should employ community mobilization strategies such as targeting audiences in social and religious gatherings as well as mass media. Empowering some teachers to educate their colleagues, parents and targeted girls may a viable strategy to disseminate information on HPV vaccine and cervical cancer.

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Appendices

- I. Consent Information form - questionnaire
- II. Consent form - Questionnaire
- III. Questionnaire
- IV. Consent Information form - FGD
- V. Consent form - FGD
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- VII: Approval Letter - KNH-UoN ERC
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APPENDIX I: Information & Consent Form - Questionnaire

University of Nairobi Institute of Tropical and Infectious Diseases

Investigator: Dr. Moses Masika

Supervisors: Dr. Nelly Mugo and Prof. Javier Ogembo

STUDY TITLE: A teachers' perspective on School-based HPV Vaccination in Kitui County: Knowledge, Acceptability, Facilitators, Barriers and Opportunities

INFORMATION AND CONSENT FORM

Introduction & Purpose of Study:

This is a study being conducted by Dr. Moses Masika, a Masters student at the University of Nairobi Institute of Tropical and Infectious Diseases (UNITID). The aim is to assess the knowledge and acceptability of HPV Vaccine in primary school teachers in Kitui Central Division of Kitui County and the facilitators, barriers and opportunities presented by the project. It will involve approximately 240 teachers in 30 selected schools across the division.

Procedures:

If you accept to take part in this study, you will be asked to fill an anonymous questionnaire which will take 15-20 minutes of your time. Please do not write your name on the questionnaire.

Risk

Participating in this study bears minimal risk. Some of the questions may make you feel uncomfortable. You do not have to answer any question that you don't want to.

Benefits:

This study has no direct benefit to you as an individual. The study will identify knowledge gaps among primary school teachers on HPV vaccine and Cervical cancer; and the facilitators, barriers and opportunities presented by HPV vaccination of standard four girls. This information may help in designing future vaccine programs and thus benefit to the society at large.

Voluntary Participation and Right to Withdraw from the Study:

Participation in this study is voluntary, you may refuse to participate or withdraw at any point in time. There will be no consequences if you refuse to participate or pull out of the study.

Confidentiality:

No personal identification information will be collected so no one, including the researcher, will know how you answered your questions. Any report on this study will not include your name.

Ethical Approval:

To ensure that the study conforms with research ethics, it has been reviewed and approved by the Kenyatta National Hospital-University of Nairobi Ethical Review Committee. If you have any complaints about the study please contact the committee chairperson, Prof. Anastacia Guantai on 020 2726300 or make an appointment to see her at the University of Nairobi School of Pharmacy.

Contacts:

If you need to contact the investigator on any matter relating to the study please call 0737 770306 or email *mosmasika@students.uonbi.ac.ke*

Declaration:

I have read the above information and had the opportunity to ask questions to my satisfaction. I voluntarily consent to participate in the study.

APPENDIX II : Consent Form - Questionnaire

University of Nairobi Institute of Tropical and Infectious Diseases

Investigator: Dr. Moses Masika

Supervisors: Dr. Nelly Mugo and Prof. Javier Ogembo

**STUDY TITLE: A teachers' perspective on School-based HPV Vaccination in Kitui
County: Knowledge, Acceptability, Barriers and Opportunities**

STATEMENT OF CONSENT:

If you agree to participate in this study by filling in a questionnaire please sign below

I, _____, have read or have had read to me, the consent form for the above study and have discussed the study with _____. I understand that the following (check the box only if you fully understand and agree with each statement):

- The goal of this research is to study Knowledge, Acceptability, Barriers and Opportunities of HPV vaccination in Kitui County.
- Participation is completely voluntary and I can withdraw from the study at any point
- I am aware and give permission that the information I give shall be analysed and disseminated but my personal identification details shall not be recorded in any analysis or report in this study.

Name of Study Participant _____

Signature: _____ Date: _____

For Research Staff:

I, _____, have explained the nature and purpose of the above study to _____

Name of Research Staff: _____

Signature: _____ Date: _____

All study participants will be issued with a copy of this information and consent form

Appendix III - Questionnaire

QUESTIONNAIRE

STUDY TITLE: A teachers' perspective on School-based HPV Vaccination in Kitui County: Knowledge, Acceptability, Barriers and Opportunities

SCHOOL DETAILS:

1. Name of your school: _____

2. Type of Institution: Public Private

3. Location of School: Rural Urban

DEMOGRAPHICS:

Please fill in the following information about yourself:

4. What is your age? _____ Years. Date of Birth: _____ (Year)

5. Sex: Male Female

6. Position:

Head-teacher Deputy Head-teacher Teacher

Other (specify): _____

7. Level of education attained so far:

KCSE Certificate

Diploma Degree

8. Years of Service:

0- 5yrs 5-10 yrs 10-20 yrs More than 20 yrs

9. What is your religion?

Catholic Muslim

Protestant. Which denomination? _____

Other: _____

10. What is your marital status?

Single Married Divorced Other (Specify): _____

11. What is the estimated average age of girls in standard four in your school?

8 years or younger 9-11 years

12-14 years 15 years or older

12. Are you aware that all standard four girls in Kitui County are being offered a Human Papillomavirus (HPV) vaccine? Yes No

If YES, how did you hear about it? (Tick all that apply)

- from Fellow teachers On Radio
 from Education Officials On Television
 from Health Officials
 Other (specify): _____

13. Who lead the HPV vaccine awareness campaign in your area?

- Ministry of Health Officials
 Ministry of Education Officials
 County Government Officials
 Don't Know
 Other: _____

14. Who would you prefer to lead such an awareness campaign in the future?

- Ministry of Health Officials
 Ministry of Education Officials
 County Government Officials
 I don't know
 Other (specify): _____

15. Did your school participate in the HPV vaccine awareness campaign?

- YES NO I don't know

If YES, who was involved in the awareness activities? (Tick any/all that apply)

- Pupils
 Parents
 Teachers
 Head-teacher/ Deputy Head-teacher
 Other (specify): _____

16. (a) Did your school get any promotional materials (brochures, posters, pamphlets, etc) on HPV?

- YES NO I don't know

(b) If YES, what did the material contain? (*Tick any/all that apply*)

- Information on transmission of HPV
 Information on diseases caused by HPV
 Information on prevention of HPV
 Information on HPV vaccine
 Information on Cervical Cancer
 Don't Know
 Other (specify): _____

(c) Do you feel the content in these materials was sufficient?

- Sufficient Insufficient Don't Know
 Other (specify)_____

17. Did you attend any seminar or training on HPV Vaccine?

- YES NO Other (specify): _____

18. What diseases does HPV Vaccine protect against (tick any/all that apply).

- Cervical Cancer
 Anal Cancer Other (specify): _____
 Vulvar Cancer
 Warts
 HIV/AIDS
 Breast cancer

19. What is the mode of transmission of HPV? *(Tick any/all that apply)*

- Physical contact
- Aerosol/Air droplet
- Sexual intercourse
- Other (specify): _____

20. Which of the following persons can be infected by HPV?

- Male
- Female
- Both
- I don't know

21. Nearly everyone infected with HPV will have symptoms:

- True
- False
- Don't Know

22. Infection with HPV may lead to cervical cancer:

- True
- False
- Don't Know

23. Cervical cancer is a leading cause of cancer deaths in women in Kenya:

- True
- False
- I Don't Know

24. Have you heard about Pap smear test?

- Yes
- No
- Other (Specify): _____

25. What is a Pap Smear test used for?

- Testing sexually transmitted diseases (STDs)
- Treating Cervical Cancer
- Cervical cancer Screening

26. There is no need for Pap smear screening after receiving HPV vaccination

- True
- False
- Don't know

27. Would you allow your daughter or a close relative to get HPV Vaccination?

- YES
- NO
- I am not sure

If your answer is NO, please indicate why?

- I am against all Vaccinations
- The Vaccine is not safe
- The vaccine will make young girls start sexual activity early
- My religion does not allow vaccination
- The HPV vaccine is not necessary
- Other (specify): _____

28. What was the effect of vaccine- related activities on daily school/educational activities?

- No disruption Minimal disruption A lot of disruption
 Other (Specify): _____

29. Which of these delivery system do you think is appropriate for vaccine delivery

- Schools
 Health facilities/clinics
 Community (village market, churches)
 Other (Specify): _____

For the following section, please indicate whether you agree or disagree with the statement:

	Agree	Neutral	Disagree
30. All standard 4 girls should get the HPV Vaccine			
31. HPV Vaccine is safe			
32. HPV infection is common in Kenya			
33. I have enough information about HPV vaccine to guide my pupils			
34. I would like to know more about the HPV vaccine			
35. Standard 4 girls should get education about sex			
36. Vaccine-related activities eat too much of my teaching time			
37. School-based vaccination of children should be continued			

38. In your own view do you think HPV vaccination to standard four girls was successful in Kitui?

39. What in your opinion hindered the vaccination exercise in primary schools in Kitui?

40. What do you think can be done to improve the vaccination exercise in primary schools?

****END OF QUESTIONNAIRE . Thank you for your time****

APPENDIX IV : Invitation to Focus Group Discussion

University of Nairobi Institute of Tropical and Infectious Diseases

Investigator: Dr. Moses Masika

Supervisors: Dr. Nelly Mugo and Prof. Javier Ogembo

STUDY TITLE: A teachers' perspective on School-based HPV Vaccination in Kitui County: Knowledge, Acceptability, Barriers and Opportunities

Invitation to Participate in a Focus Group Discussion

Introduction & Purpose of Study:

This is a study being conducted by Dr. Moses Masika, a Masters student at the University of Nairobi Institute of Tropical and Infectious Diseases (UNITID). The aim is to assess the knowledge and acceptability of HPV Vaccine in primary school teachers in Kitui Central Division of Kitui County and the facilitators, barriers and opportunities presented by the project. It will involve approximately 240 teachers in 30 selected schools across the division.

Procedures:

I consent to take part in a focus group discussion about Primary school teachers' knowledge, and acceptability of HPV vaccine and facilitators, barriers and opportunities of HPV vaccination of standard four girls. I agree to share my ideas, opinions in full understanding that the discussion will be recorded

Risk

I understand that the discussion is held in confidence and my name shall not appear in the reports or publications hereafter.

Benefits:

I understand that this study has no direct benefit to me as an individual. The study will identify knowledge gaps among primary school teachers on HPV vaccine and Cervical cancer; and the facilitators, barriers and opportunities presented by HPV vaccination of standard four girls. This information may help in designing future vaccine programs and thus benefit to the society at large.

Compensation:

I understand that I shall receive KSh.1000 as a token for my transport and time

Voluntary Participation and Right to Withdraw from the Study:

I volunteer to participate in this study and I understand that I am free to leave the group at any time without suffering any negative consequences.

Ethical Approval:

I understand that this study has been reviewed and approved by the Kenyatta National Hospital-University of Nairobi Ethical Review Committee. If I have any complains about the study I can contact the committee chairperson, Prof. Anastacia Guantai on 020 2726300 or make an appointment to see her at the University of Nairobi School of Pharmacy.

Contacts:

If I need to contact the investigator on any matter relating to the study I can call 0737 770306 or email *mosmasika@students.uonbi.ac.ke*.

APPENDIX V : Consent Form - Focus Group Discussion

University of Nairobi Institute of Tropical and Infectious Diseases

Investigator: Dr. Moses Masika

Supervisors: Dr. Nelly Mugo and Prof. Javier Ogembo

STUDY TITLE: A teachers' perspective on School-based HPV Vaccination in Kitui County: Knowledge, Acceptability, Barriers and Opportunities

STATEMENT OF CONSENT:

If you agree to participate in this study by taking part in a focus group discussion please sign below

I, _____, have read or have had read to me, the consent form for the above study and have discussed the study with _____. I understand that the following (check the box only if you fully understand and agree with each statement):

- The goal of this research is to study Knowledge, Acceptability, Barriers and Opportunities of HPV vaccination in Kitui County.
- Participation is completely voluntary and I can withdraw from the study at any point
- I am aware and give permission that the information I give shall be recorded, analysed and disseminated but my personal identification details shall not be recorded in any analysis or report in this study.

Name of Study Participant _____

Signature: _____ Date: _____

For Research Staff:

I, _____, have explained the nature and purpose of the above study to _____

Name of Research Staff: _____

Signature: _____ Date: _____

All study participants will be issued with a copy of this information and consent form

APPENDIX VI: FGD Guide

Focus Group Discussion

STUDY TITLE: A teachers' perspective on School-based HPV Vaccination in Kitui County: Knowledge, Acceptability, Barriers and Opportunities

Date: _____ Time: _____

Venue: _____

Number of participants: Male: _____ Female: _____

Name of Note-taker: _____

1. Introduction:

Thank you everyone for coming.

My name is **Moses Masika**. I am a Masters Student at the University of Nairobi Institute of Tropical and Infectious Diseases (UNITID) and I will be facilitating this focus discussion.

My colleague, _____, shall be doing the recording and note taking.

The Purpose of this discussion is to explore facilitators, barriers and opportunities presented by HPV Vaccination of Standard four girls in Kitui County.

This discussion shall be recorded using a voice recorder and noted on paper also to ensure we capture everything that will be discussed. We shall keep it confidential as much as possible and we will not use your names in our reports. Our reports will only have quotes from the discussion. This discussion will take approximately 90 minutes. Your participation is voluntary and you are free to leave the discussion at anytime if you feel the need to do so.

Consent:

If you agree to participate, please sign the consent forms we have issued to you.

2. Ground Rules:

Before we start our discussion, I'd like us to agree on our ground rules:

(Group to suggest any ground rules they would like to have)

The following should be included:

1. Everyone should participate, there are no right or wrong answers, we are here to hear your opinions and get ideas from you.
2. Bring out all sides of any issue, both positive and negative
3. Confidentiality: 'Everything we discuss here should remain here'
4. One person talks at a time—avoid interruptions
5. Phones on silent mode and avoid attending to them until after the discussion

Ice breaker: What are the vaccines that you are aware of that are given to young girls?

1. Awareness:

(a) What do you know about the ongoing government initiative to offer HPV vaccine to all class 4 girls in Kitui county?

(b) What is the level awareness about the HPV vaccine in schools?

(c) What are the main sources of information on HPV Vaccine?

(d) Which information sources do you prefer?

2. Acceptability & Uptake

(a). Has the HPV Vaccine been accepted by teachers? What about parents and students?

(b). How is the uptake among the girls in school?

(c). Are there any drop outs (i.e. did not complete the vaccine?)

(d). What are the reasons for declining or dropping out?

3. Knowledge on HPV vaccine and cervical

(a). What do you know about HPV? Probe mode of transmission

(b). What are the consequences of HPV infection?
Probe for symptoms, warts, cervical cancer, other cancers?

(c). How can cervical cancer be prevented?

4. What is the average age of girls in standard four in this area?

Probe: Feeling on age-appropriateness for the vaccine.
Should younger or older girls in other grades be targeted?

5. Concerns and fears

What were you worried about concerning the HPV vaccine?

Probe: Do you have any safety concerns?
Did you witness any side-effects in the girls who were vaccinated?
What do you think about the age?
(Are standard four girls too young or too old to vaccinate)

6. What was the effect of vaccine-related activities on school activities?

Probe: Level of disruption

How was school activity disrupted

How can disruption (if any) be reduced?

7. Success

(a). According to you would you say the vaccine was successful, What are the factors that facilitated the success of the vaccination process?

(b). What are the factors that hindered the success of the vaccination process?

8. Opportunities

(a). Does this vaccination project provide a platform to offer other health promotion services?

Probes: Would this be a platform to offer health education?

Would this be an appropriate platform to offer sex education?

Deworming?

Any other health services?

9. Improvement

(a). Which areas would you recommend the programmers to improve?

Probe: How/ in what way?

10. Parental Consent:

What action should be taken if parents decline to vaccinate their daughter?

Probe: Nothing?

Vaccinate her anyway?

Summary and closing remarks.

Thank you very much for your time.

Appendix VII: Approval Letter - KNH-UoN



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355



KNH/UON-ERC
Email: uonknh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/127

Link: www.uonbi.ac.ke/activities/KNHUoN

8th May 2014

Moses Masika
W64/80460/2012
UNITID
University of Nairobi

Dear Moses

Research proposal: A Teachers' perspective on School-based HPV Vaccination in Kitui County: Knowledge, Acceptability, Facilitators, Barriers and Opportunities (P134/03/2014)

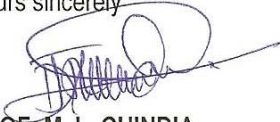
This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 8th May 2014 to 7th May 2015.

This approval is subject to compliance with the following requirements:

- a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- g) Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

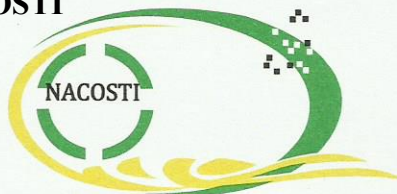
For more details consult the KNH/UoN ERC website www.uonbi.ac.ke/activities/KNHUoN.

Yours sincerely



PROF. M. L. CHINDIA
SECRETARY, KNH/UON-ERC

- c.c. The Principal, College of Health Sciences, UoN
 The Deputy Director CS, KNH
 The Chairperson, KNH/UoN-ERC
 The Assistant Director, Health Information, KNH
 The Director, UNITID, UoN
 Supervisors: Dr. Nelly Mugo, Javier Gordon Ogembo



**NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION**

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When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

30th June, 2014

NACOSTI/P/14/2734/1947

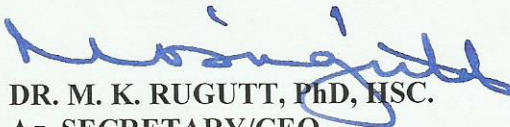
Dr. Moses Muia Masika
University of Nairobi
P.O.Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*A teachers perspective on school based HPV Vaccination in Kitui County. Knowledge, acceptability, facilitators, barriers and opportunities,*" I am pleased to inform you that you have been authorized to undertake research in **Kitui County** for a period ending **30th September, 2014.**

You are advised to report to **the Managers, Constituency Development Fund, the County Commissioner and the County Director of Education, Kitui County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


DR. M. K. RUGUTT, PhD, HSC.
Ag. SECRETARY/CEO

Copy to:

The Managers
Constituency Development Fund.

The County Commissioner
The County Director of Education
Kitui County.



MINISTRY OF EDUCATION, SCIENCE & TECHNOLOGY
State Department for Education

Telegrams "EDUCATION" Kitui
Telephone: Kitui 22759
Fax :04444-22103
E-Mail : cde.kitui@gmail.com



REPUBLIC OF KENYA

COUNTY EDUCATION OFFICE
KITUI COUNTY
P.O BOX 1557-90200
KITUI

When replying please quote;

Ref. No: KTIC/ED/RES/22/26

Date.09/07/2014

DR.MOSES MUIA MASIKA
UNIVERSITY OF NAIROBI
P.O BOX 30197- 00100
NAIROBI.

RE:RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "A teachers perspective on school based HPV vaccination in kitui county.knowledge,acceptability,facilitators,barriers and opportunities",I am pleased to inform you that authority has been granted.

You are advised to liaise with respective DEOs before embarking on the research project.

COUNTY DIRECTOR OF EDUCATION
KITUI
P. O. Box 1557, KITUI.

P.M.MAKITE
COUNTY DIRECTOR OF EDUCATION
KITUI COUNTY



Appendix X: Permit - County Commissioner

**OFFICE OF THE PRESIDENT
MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL
GOVERNMENT**



Fax – 04444 23260
Email – cckitui@gmail.com
When replying please quote

COUNTY COMMISSIONER
KITUI COUNTY
P O BOX 1-90200
KITUI

Ref. K.1526/111

9th July 2014

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION
DR. MOSES MUIA MASIKA

The above named is a student at the Nairobi University.

He is authorized by this office to carry out a research on “*A teachers perspective on school based HPV Vaccination in Kitui County. Knowledge, acceptability, facilitators, barriers and opportunities,*”.

Any assistance accorded to him in data collection will be highly appreciated.


E.N. MWACHIRO
FOR: COUNTY COMMISSIONER
KITUI COUNTY