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## HPV vaccine acceptability among Kenyan women

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### Abstract

As human papillomavirus (HPV) vaccines become available in less developed countries, understanding women's attitudes towards HPV vaccines can help guide approaches to immunization programs. We assessed knowledge and interest in prophylactic HPV vaccines among Kenyan women seeking women's health services (N=147). They knew little about cervical cancer or HPV vaccine. Most women (95%, 95% confidence interval [CI]: 92%, 99%), however, were willing to have their daughters vaccinated with a vaccine that would prevent cervical cancer, with preference for an inexpensive vaccine requiring fewer doses.

### Keywords

HPV; Vaccine; Africa; Kenya; Cervical cancer; Acceptability

## 1. Introduction

Of an estimated 493,000 new cases of cervical cancer diagnosed in the world each year, 80% occur in less developed countries [1]. East Africa has among the highest cervical cancer incidence and mortality rates in the world [2]. Kenyan women face a cervical cancer mortality rate that is approximately 14 times higher than that in the United States (35/100,000 women vs. 2.4/100,000 women annually) [2,3]. This high mortality rate is most likely attributable to a lack of cytology screening and early treatment programs, as well as relatively high HIV prevalence [4,5]. In this setting, new prophylactic HPV vaccines offer hope of preventing a large proportion of cervical cancer cases [6,7], because the potential protection from HPV vaccine can offer benefits when other preventive screening options are largely unavailable.

The World Health Organization (WHO) recommends that national immunization programs include routine HPV immunization in areas where cervical cancer incidence is high and introduction is programmatically feasible [8]. Vaccine demonstration projects may be needed in areas of the less developed world with a high incidence of cervical cancer, HIV,

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malaria, sexually transmitted infections, or malnutrition. To guide these future HPV immunization programs or demonstration projects in Africa, gathering data on acceptability of HPV vaccines among African women is an essential step. Messages for healthcare providers, public health educators, and community health workers can address these beliefs in order to potentially increase HPV vaccine uptake. Research on HPV vaccine acceptability among community members has focused on the industrialized world, with a small number of studies in Latin America [9] and Asia [10–14]. In addition, two qualitative studies in Uganda and South Africa offered preliminary assessments of national readiness for HPV vaccine introduction [15,16]. We studied HPV vaccine acceptability among women in Kisumu, Kenya, an African population with a high incidence of cervical cancer, but little or no prior research on HPV vaccine acceptability.

## 2. Methods

The study was conducted at Ober Kamoth Health Center and Port Florence Community Hospital, both located in a semi-urban region of Kisumu, Kenya. Ober Kamoth Health Center is a public health facility, while Port Florence Community Hospital is a private health facility. Female interviewers approached all women aged 15 to 49 years seeking maternal-child health or family planning services during a one month period in 2007 and invited them to participate in the study. All 147 women that interviewers approached (97 at Ober Kamoth Health Center and 50 at Port Florence Community Hospital) agreed to participate. In mid 2007, HPV vaccine was not yet available in Kenya, but the vaccine had already been licensed and recommended in the US [17]. Pap smear testing was available at both Ober Kamoth Health Center and Port Florence Community Hospital, although no educational campaigns to encourage cervical cancer screening existed in Kisumu or elsewhere in Kenya.

Interviewers administered questionnaires in English, Kiswahili, or Dhuluo, based on the participant's request. The questionnaire assessed willingness to get HPV vaccine for their daughters if it became available in Kisumu ("How likely would you be to vaccinate your daughter against HPV if it prevented cervical cancer? Assume the vaccine is free.") Five questions assessed willingness conditioned on whether the vaccine would prevent cervical cancer alone, genital warts alone, or both conditions, or that the vaccine would require one or three shots. Response options were "very likely", "likely", "neither likely nor unlikely", "unlikely", or "very unlikely". The questionnaire instructed women who did not have daughters to answer the question as if they did. We coded responses into two categories, "likely" and "unlikely" (with the response "neither likely nor unlikely" included in the "unlikely" category). The questionnaire also assessed socio-demographic factors, awareness of cancer, cervical cancer and cervical cancer screening, perceived access to cervical cancer screening, HPV vaccine awareness, and factors affecting willingness to vaccinate against HPV.

The primary outcome was willingness to vaccinate against HPV. We used McNemar's test to determine whether differences in responses to willingness questions were statistically significant. We used the Fisher's exact test to determine whether women recruited from the two different health facilities differed.

## 3. Results

### 3.1 Characteristics of the sample

The 147 women surveyed had a median age of 25 years (range 15 to 45). Eighty-three percent of women were married, and 90% reported a previous history of pregnancy. Thirty-six percent were currently using a form of contraception. Thirty-one percent had received schooling beyond the primary level. Seventy-five percent reported being Protestant. Only

6% reported having formal employment. Two of the women had ever smoked. Women from Ober Kamoth Health Center had a similar age, marital status, and contraception usage as women from Port Florence Community Hospital, however, they were less likely to have received schooling beyond the primary level (19% vs. 56%,  $p<0.001$ ), and were less likely to have formal employment (1% vs. 16%,  $p=0.001$ ).

### 3.2. Awareness of cervical cancer and screening

Awareness of cervical cancer and cervical cancer screening was limited. While 89% of women had heard of cancer, only 15% had heard of cervical cancer (Table). Nevertheless, women in the study were concerned about cervical cancer; 71% of women reported that if their daughters had cervical cancer it would be a “high threat”.

One woman had previously received cervical cancer screening. Among women who had heard of cervical cancer, 10% knew that cervical cancer screening was available at their health facilities.

### 3.3. Willingness to vaccinate against HPV

None of the women had heard of HPV vaccine before being in the study. Most women said that they were likely to have their daughters immunized with HPV vaccine if it became available in Kisumu and was free of charge. Ninety-five percent (95% CI: 92%, 99%) responded that they were likely to have their daughters immunized if the vaccine protected against cervical cancer, 94% (95% CI: 90%, 98%) were likely to have their daughters immunized if the vaccine protected against genital warts, and 95% (95% CI: 92%, 99%) were likely to have their daughters immunized if the vaccine protected against both cervical cancer and genital warts. Thus, willingness did not differ when the vaccine was described as preventing cervical cancer alone, or both cervical cancer and genital warts.

In response to willingness questions that varied the description of the dosing of HPV vaccination, 86% (95% CI: 80%, 91%) of women said that they would be interested in having their daughters receive HPV vaccine if only one shot was required. However, only 31% (95% CI: 23%, 38%) of women were interested in having their daughters receive HPV vaccines if three shots were required. The lower acceptability of a three dose vaccine regimen as compared to a one dose vaccine regimen was statistically significant ( $p<0.001$ ). Finally, among those who provided an amount, only 25% were willing to pay more than 100 Kenyan Shillings (2009 US\$ 1.32) for the complete series.

Women from Ober Kamoth Health Center as compared to the women from Port Florence Community Hospital were less likely to be interested in a vaccine which required three doses (23% vs. 47%,  $p=0.003$ ), and were less willing to pay more than 100 Kenyan Shillings for the complete series (15% vs. 55%,  $p<0.001$ ).

## 4. Discussion

East Africa has among the highest incidence of invasive cervical cancer in the world [2]. Highly effective prophylactic vaccines against HPV-16 and -18, the most common invasive cervical cancer-associated HPV infection types, are available and currently in use in other countries. In Kenya, HPV-16 and -18 were isolated in over 60% of women with invasive cervical carcinoma, suggesting that HPV vaccines could have a large impact [7]. Many prior efforts at cervical cancer prevention by cytological screening have been largely ineffective in the region, due to limited cytology and treatment services, lack of knowledge about cervical cancer screening, and implementation and cost barriers [18]. However, successful universal immunization programs do exist, using various strategies such as expanded

programs for immunization (EPI) and national vaccine days. HPV immunization may thus be a uniquely effective intervention for the prevention of most cervical cancer in Africa.

Awareness of cervical cancer, cervical cancer screening, and HPV vaccine was very low among women in this African country, much lower than previously reported elsewhere in less-developed countries [9,10]. Despite this low awareness level, most women in the study were interested in having their daughters immunized against HPV infection. This willingness to vaccinate is strikingly similar to women in both urban and rural regions of China, where awareness of cervical cancer and HPV vaccine are relatively higher [10]. Women in our study were interested in vaccines that offered protection against cervical cancer alone, as well as a vaccine that offered protection against both cervical cancer and genital warts. We also found that women strongly preferred a vaccine that would require only one dose as compared to a vaccine that would require three doses. These results reported among women in Kisumu, Kenya were striking, and echo findings of low coverage of the third dose of the HPV vaccine series in the United States [19].

Surveyed women were not willing to pay much for HPV vaccine; among those who provided an amount, three-quarters were unwilling to pay more than US\$1.32 for having their daughters receive the HPV vaccine series. At the time of the study, the cost of either the quadrivalent HPV vaccine (Gardasil®) or the bivalent HPV vaccine (Cervarix®) approached US\$400 [20,21]. While alternative financing of HPV vaccine for developing world populations may allow the costs to be notably lower in several countries [22], even these lower costs are likely to constitute a large proportion of Kenya's annual per capita health care expenditure, which was \$95 in 2005 [23]. Kenyan women's lack of willingness to pay an amount that approaches the current cost for HPV vaccine highlights the importance of international agencies to assist with the cost of HPV vaccine in less developed countries, or the need for lower-cost vaccines.

The study's strengths include the presentation of early data on an African population that has a high incidence of invasive cervical cancer, but that has been the subject of little or no prior research on HPV vaccine acceptability. The study's limitations include the use of a small sample from two health facilities, which may not be generalizable to the Kenyan population as a whole. However, the women surveyed had similar educational attainment [24], contraceptive use [25], and smoking prevalence [25] as women in nationally-representative Kenyan data. Another limitation is that many of the women interviewed had never heard of cervical cancer. Since so few women were aware of cervical cancer (22), we were unable to determine whether willingness to pay and willingness to receive three doses differed notably between women who were and who were not aware of cervical cancer. The low awareness of cervical cancer found in this study brings to light potential educational challenges for introduction of HPV vaccine in the region.

While larger studies of acceptability are required, this initial study among women from East Africa shows that while women are interested in having their daughters receive HPV vaccine, cost and multiple dosage requirements may present barriers to successful implementation of an effective HPV immunization program in this region. The introduction of HPV prophylactic vaccines will likely also require an education campaign that includes basic information on cervical cancer and the role of screening and HPV vaccines in order to achieve optimal prevention.

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Table

Understanding of Cervical Cancer and Willingness to Vaccinate against HPV in Kenyan Women (N=147)

<b>CANCER AND CERVICAL CANCER</b>		<b>N (%)</b>
Have you ever heard of cancer?	Yes	130 (89%)
Have you ever heard of cervical cancer?	Yes	22 (15%)
If your daughter had cervical cancer, how serious a threat to her health would it be?	High threat	101* (71%)
	Moderate threat	37 (26%)
	Low threat	4 (3%)
<b>CERVICAL CANCER SCREENING AND AVAILABILITY OF HEALTH FACILITIES</b>		
Do you know of any method of screening for cervical cancer?	Yes	0 (0%) <sup>†</sup>
Have you ever been screened for cervical cancer?	Yes	1 (5%) <sup>†</sup>
How long did it take you to reach this health facility?	Less than 1 hour	91* (65%)
	1 to 3 hours	40 (28%)
	Unsure	10 (7%)
Is cervical cancer screening available at this health facility?	Yes	2 (10%) <sup>†</sup>
<b>WILLINGNESS TO VACCINATE</b>		
Have you ever heard of the HPV vaccine before today?	Yes	0 (0%)
<i>How likely would you be to vaccinate your daughter against HPV if...</i>		
...it prevented cervical cancer? (Assume the vaccine is free).	Likely	139* (95%)
	Unlikely	7 (5%)
...it prevented genital warts? (Assume the vaccine is free).	Likely	136* (94%)
	Unlikely	9 (6%)
...it prevented both cervical cancer and genital warts? (Assume the vaccine is free).	Likely	139* (95%)
	Unlikely	7 (5%)
...it requires three shots?	Likely	45* (31%)
	Unlikely	101 (69%)
...it requires only one shot?	Likely	124* (86%)
	Unlikely	21 (14%)
What is the most you would pay out of pocket to get your adolescent daughter vaccinated against HPV?	100 Kenyan Shillings or less (US\$1.32)	91* (75%) <sup>§</sup>
	101–500 Kenyan Shillings (US\$1.32–\$6.61)	24 (20%)

CANCER AND CERVICAL CANCER		N (%)
	Will pay what is asked	7 (6%)
	Unsure	23

\* Numbers do not add up to 147 due to missing responses.

† Among those who had previously heard of cervical cancer.

§ Percentages among those who provided an amount.