# *Awareness, Acceptability and Uptake of Human Papilloma Virus Vaccine Among Cameroonian School-Attending Female Adolescents*

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**Journal of Community Health**
The Publication for Health Promotion and Disease Prevention

ISSN 0094-5145

J Community Health
DOI 10.1007/s10900-012-9554-z

Springer

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ORIGINAL PAPER

# Awareness, Acceptability and Uptake of Human Papilloma Virus Vaccine Among Cameroonian School-Attending Female Adolescents

**Claudine Akono Ayissi · Richard G. Wamai · Geofrey O. Oduwo · Stacey Perlman · Edith Welty · Thomas Welty · Simon Manga · Javier Gordon Ogembo**



**Abstract** The purpose of this study is to assess awareness, knowledge and beliefs about HPV, cervical cancer HPV vaccine and willingness to vaccinate among adolescent females aged 12–26 years at clinics and schools in the North West Region of Cameroon where the Cameroon Baptist Convention Health Services (CBCHS) conducted a sensitization and education campaign. A questionnaire survey was administered among female adolescents in schools and clinics. Descriptive statistics including frequencies, percentages and proportions were generated for independent variables and bivariate analyses (Chi square test) were used to assess the relationship between independent and outcome variables. Data were analyzed using SAS Version 9.2. Out of a sample of 650 adolescent girls 553 willingly participated in this anonymous survey. Awareness of HPV (86.8%), cervical cancer (82.3%), and prevention of HPV infections through vaccination (75.9%) was significantly higher than in previous studies conducted in Cameroon and other developing countries. Higher perceptions of risk were associated with being sexually active ($p = 0.0013$), age ($p = 0.0031$) and level of education ($p = 0.0274$). Age and educational level were associated with HPV knowledge ($p = 0.007$ and $p = 0.0008$), respectively. The mean level of interest in HPV vaccination was 4.0 (SD = 1.27), which is above the mean. Our data indicate high awareness about HPV, cervical cancer and HPV vaccine among adolescents, and interest in receiving the vaccine and learning about the disease. CBCHS' community education strategy effectively raised acceptability and generated demand for HPV vaccine, making it a potential model for HPV immunization in Cameroon and other developing countries.

**Keywords** HPV · Cervical cancer · Attitudes · Vaccine · Adolescents · Cameroon

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## Introduction

In contrast to developed countries, cervical cancer in developing countries affects younger women [1–4] and is the leading cause of years of life lost to cancer [5]. The disease is the second leading cause of cancer mortality in developing countries where 86% of the deaths occur [6] and only 5% of the women have access to screening for pre-cancerous lesions [7]. The disease is primarily caused by persistent infection with human papilloma virus (HPV) [8].

Cervical cancer is preventable through generating awareness on ways to prevent HPV infections, screening, early detection of the disease, and administration of either

Published online: 17 March 2012

of the two vaccines for HPV genotypes 16 and 18 (Gardasil® 2006 and Cervarix ® 2007) [5, 9]. HPV types 16 and 18 cause 70% of cervical cancers worldwide [6]. Gardasil has the added advantage of preventing HPV types 6 and 11, which cause genital warts [10]. These vaccines are widely used in developed countries for females aged 9–26 years [6, 11] and have several benefits, including possible cross-protection against other "high-risk" HPV genotypes, cost-effectiveness and minimal adverse side effects [1, 4, 12, 13]. But, access to HPV vaccines is limited in many sub-Saharan African countries including Cameroon [1, 4, 12, 13] mainly due to their cost [5]. In addition, despite the availability of cost-effective cervical cancer screening strategies [5, 14, 15], screening remains low [1, 3, 4, 16, 17].

In Cameroon, cervical cancer accounts for 23.3% of all cancers affecting women [6] and 31.7% among women aged 50 years and above [18] with urban prevalence estimated at 40 per 100,000 women [19]. Current estimates indicate that each year, 1,500 Cameroonian women are diagnosed with cervical cancer and about 1,000 die from the disease [6]. The high rate of cervical cancer in Cameroon is due to demographic and socio-economic variables such as age, education, smoking, income, sexual behavior, high parity, low levels of cancer screening and high rates of human immuno-deficiency virus (HIV) infections [2, 20–25]. Previous studies found high levels of risky sexual behavior, high prevalence of cervical cancer, and virtually no knowledge of the relationship between cervical cancer and HPV among older women and health care workers in Cameroon [19, 26, 27].

As part of the National Cancer Control Plan [26], in 2009 Cameroon approved Gardasil® as a preventive measure against HPV infections and to reduce high cervical cancer incidence [6]. In 2010, AXIOS Health Care Development's Gardasil® Access Program partnered in the fight against cervical cancer with the Cameroon Baptist Convention Health Services (CBCHS) through a donation of Gardasil® vaccine from Merck Pharmaceuticals to immunize 6,400 girls in Cameroon, prioritizing girls aged 9–13 years, but permitting vaccination of girls up to age 26 [27]. CBCHS is a non-governmental organization with about 80 health care facilities across the country. In support of the government initiatives, CBCHS integrated immunization, cervical cancer screening and education of the public on cervical cancer, HPV, and HPV vaccine. Because of Cameroon's high prevalence of HIV seropositivity, which places the population at a higher risk of developing cervical cancer [24], Cameroon's National Fight Against Cancer program recommends screening at 25 years of age, even though the World Health Organization has recommended that screening be commenced at age 30 [28].

To gauge the readiness and to prepare adolescents for vaccination, the CBCHS, through a team of six trained nurses from the CBCHS Women's Health Program, conducted sensitization and education for girls and their parents or guardians at several CBCHS clinics, schools, churches and community gatherings [27]. The nurses offered HPV vaccination for girls aged 9–13 who consented and whose parents or guardians gave informed consent. These nurses stressed the importance of getting the 3-dose series of Gardasil® (given at 1, 2, and 6 months) in order to gain optimal immunization. They also offered physical check ups and comprehensive sexual and reproductive health services, particularly focusing on how to prevent sexually transmitted infections (STIs) and teenage pregnancies.

Although previous studies have shown that parents and health care workers are willing to accept and/or recommend vaccination for young girls, the attitudes and the knowledge regarding the vaccine among girls has not been evaluated in Cameroon [26, 27]. The aim of this study was to measure the effectiveness of the CBCHS sensitization campaign and to gauge the level of awareness about HPV, cervical cancer and HPV vaccine acceptability among girls aged 12–26 years attending schools and clinics associated with the CBCHS. Improved understanding of adolescent knowledge of HPV, cervical cancer, and factors that influence acceptance of HPV vaccination will help health officials to provide appropriate and useful information to parents, providers and adolescents prior to implementing HPV vaccination programs. The results from the study can also be used to inform public health officials on the effectiveness of the educational intervention implemented by the CBCHS to the community living in the region before delivery of the donated vaccines.

## Materials and Methods

We conducted a cross-sectional study on school-attending female adolescents ranging from 12–26 years of age between January and February 2011 in five schools and on girls attending CBCHS clinics located in the Bui Division, North West Region of Cameroon. Three schools were chosen because they had previously worked closely with the CBCHS in conducting a survey on HIV and other STIs. The remaining two schools were randomly chosen based on their proximity to the other previously chosen schools. Prior to the survey, the CBCHS sensitized adolescents, their parents, and the communities about HPV, cervical cancer, HPV vaccine and the importance of screening women aged 25 years and over after which it launched the HPV vaccination campaign. The strategy used during the

sensitization campaign included the distribution of brochures and posters to schools, churches, and communities, as well as having the CBCHS nurses give talks in such venues and to adolescents attending clinics. Before educating young girls about HPV, cervical cancer and HPV vaccine, the nurses first offered sensitization and education to the key leaders in the community, school principals and teachers. All the boys in the schools were included in the sensitization session, but were excluded in the vaccination campaign, because WHO has not yet recommended HPV vaccination for boys in resource-poor settings. There was no bias in the vaccination process: any girl who was not present during the information session would be informed before being vaccinated.

A questionnaire translated in both English and French was self-administered. The questionnaire consisted of 23 questions divided into three main sections. The first section asked questions related to demographic information about the participants, sexual history, knowledge, awareness and beliefs about cervical cancer, source of information and cervical cancer status. The second section focused on the adolescents' knowledge of HPV infections and HPV vaccines. The third section asked questions pertaining to participants' knowledge of cervical cancer incidence, risks of HPV infections and their willingness to have more information about HPV and get vaccinated based on the standardized Likert's scale [29].

Data were analyzed using SAS Version 9.2 (Cary, NC, USA). Descriptive statistics including frequencies, percentages and proportions were generated for independent variables such as age, sex, sexual activity, level of education, number of people in the household and other socio-demographic characteristics. Bivariate analyses (Chi square test) were used to assess the relationship between independent and outcome variables. HPV knowledge, perceived risk, perceived shame, interest in HPV education and obtaining HPV vaccine were considered outcome variables. Outcome variables were also used as independent variables in some instances and were compared to socio-demographic characteristics of the family and also the sexual behaviors of the adolescents (i.e. sexually active, number of sexual partners and use of condoms during sexual intercourse). Multivariate analysis (logistic regression) was done to ascertain the relationship between socio-demographic characteristics of the family (age, sex, sexual activity, level of education, number of people in the household), risk factors (perceived risk, perceived shame, interest in HPV education and obtaining HPV vaccine), knowledge and attitude of the adolescents on HPV vaccination.

Institutional Review Board (IRB) approval was obtained from both CBCHS and Northeastern University ethics boards.

## Results

A sample of 650 adolescent girls was initially targeted for the research out of which a total number of 553 willingly participated in the survey. Among the 97 missing participants, 10 girls were absent from the schools during the time of the survey while the rest withdrew from participating in the study.

**Table 1** Socio-demographic characteristics of the surveyed adolescent girls

| Socio-demographic characteristics of the sampled population | % number of females (n = 553) |
|---|---|
| Mean Age | |
| Age group | 17.2 |
| ≤14 years | 16.5 (91) |
| 15–17 years | 36.5 (202) |
| 18–20 years | 36 (199) |
| 21–23 years | 9 (50) |
| 24–26 years | 2 (11) |
| Education level | |
| Not attending school | 1 (6) |
| Primary | 0.9 (5) |
| Secondary | 64 (359) |
| High school | 33 (183) |
| Family members living in the households | |
| Mother | 77.8 (403) |
| Father | 59.9 (331) |
| Stepmother | 9.6 (53) |
| Stepfather | 2.5 (14) |
| Brother | 66.9 (370) |
| Sister | 66.5 (368) |
| Aunt | 15.4 (85) |
| Uncle | 12.7 (70) |
| Cousin | 15.6 (86) |
| Grandmother | 12.7 (70) |
| Number of girls who completed the vaccines | |
| Yes | 34.2 (189) |
| No | 65.8 (364) |
| Number of girls living in household with adolescents who have completed HPV vaccines | 21.9 (121) |
| Sexual History | |
| Have had sex | 32.9 (183) |
| Have had sex in the last 6 months | 56.6 (103) |
| Use of protection during sexual intercourse | |
| Use condom | 65.4 (119) |

n- is the total number of girls surveyed and the number in brackets represent the number used for percent calculation

## Demographic Characteristics of the Sample

The socio-demographic characteristics of the study population are indicated in Table 1. The mean age of the females participating in the survey was 17.2 years. Among the 553 adolescents surveyed, 99% were in various levels of schooling; 0.9% were in primary school, 64% in secondary, 33% in high school and 1% were not attending school. A significant number of adolescents (32.9%) surveyed had already engaged in sexual intercourse with the average number of lifetime sexual partners being two. However, only 65.4% of the sexually active adolescents reported using condoms while engaging in sexual intercourse. The majority of adolescents lived with their mother (77.8%), brother (66.9%), sister (66.5%) and father (59.9%) in their households. At least 34.2% of the respondents had been vaccinated against HPV infections.

## Awareness and Knowledge of HPV and Cervical Cancer

There was high awareness and knowledge about HPV, cervical cancer, and HPV vaccine as shown in Fig. 1. Of all the participants in the study, 82.3% were aware that certain HPV genotypes are the main cause of cervical cancer, an abnormal Pap test result may indicate an HPV infection (75.6%), everyone can be infected with HPV (83.5%) and use of vaccine is important in preventing HPV infections (75.9%). The majority of the respondents (62.9%) heard about HPV from a nurse. Other major sources include teachers (14.2%), the public media (television, radio, and magazines) (13.5%), and mother (10.4%). Only 52% of the respondents had heard of genital warts. In the case of genital warts, 46.8% of the adolescents heard about the disease from a nurse/healthcare advisor (16.3%), followed by a teacher (12.4%), media (radio, TV, newspaper, magazine, etc.) (8.2%), mother (7.1%), friend (3.5%) and father (2.1%).

Despite this high awareness about the disease and its cause, there were still some misconceptions about how the virus causes cellular changes that can progress to cervical cancer (Fig. 1). Among the respondents, only 28.6% were aware that most HPV infections clear on their own and only 19% correctly answered that a person usually has no symptoms when infected with HPV, while 43.2% did not know that HPV infects both sexes.

## Understanding HPV Vaccine and Willingness to Vaccinate

As shown in Table 2, there was a positive attitude towards HPV vaccine, as most adolescents would recommend (33.1%) or strongly recommend (45.6%) that girls of ages 9–13 years be vaccinated against HPV infections. A similar degree of HPV vaccine recommendation would also be extended to their relatives and friends, with 32.7% and 41.2% agreeing and strongly agreeing, respectively, that they would recommend the vaccine. Additionally, the majority of participants agreed (34%) or strongly agreed (47.6%) that their parents would fully support them were they to be immunized against HPV. Despite recognizing their limited knowledge about HPV vaccine, with 28.2% and 31.1% strongly disagreeing or disagreeing, respectively,

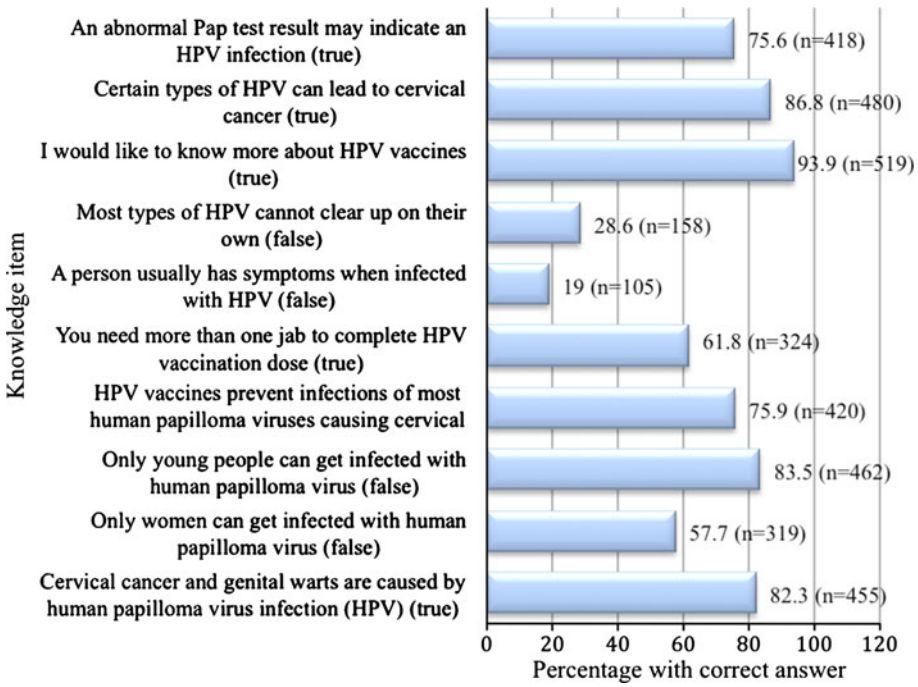


**Fig. 1** Knowledge and awareness of HPV, cervical cancer and HPV vaccines among adolescent girls in North West Region of Cameroon

**Table 2** Understanding HPV, cervical cancer, vaccine and willingness to vaccinate

| Response question | Percent responses | | | | |
|---|---|---|---|---|---|
| | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
| Having multiple sexual partners makes one susceptible to get HPV infection | 9.6 (n = 53) | 6.5 (n = 36) | 6.1 (n = 34) | 19.9 (n = 110) | 60.6 (n = 335) |
| I will be ashamed if I am diagnosed with HPV | 12.3 (n = 68) | 11.6 (n = 64) | 12.7 (n = 70) | 31.3 (n = 173) | 33.1 (n = 183) |
| It is better for all females of ages 9–13 years old to get vaccinated against HPV infection | 7.4 (n = 41) | 7.6 (n = 42) | 7.1 (n = 39) | 33.1 (n = 183) | 45.6 (n = 253) |
| I feel I know enough information about HPV vaccines | 28.2 (n = 156) | 31.1 (n = 172) | 13.7 (n = 76) | 15.9 (n = 88) | 11.4 (n = 63) |
| I would recommend getting HPV vaccination to my friends and relatives | 8.9 (n = 49) | 8.5 (n = 47) | 7.8 (n = 43) | 32.7 (n = 181) | 41.2 (n = 228) |
| I think HPV vaccine is safe | 9 (n = 50) | 9 (n = 50) | 11.2 (n = 62) | 32.5 (n = 180) | 35.4 (n = 196) |
| My parents are happy for me to get vaccinated against HPV | 5.8 (n = 32) | 5.2 (n = 29) | 6.7 (n = 37) | 34 (n = 188) | 47.6 (n = 263) |
| Most of my friends and relatives have been vaccinated against HPV | 17.5 (n = 97) | 28.2 (n = 156) | 21.5 (n = 119) | 19.5 (n = 108) | 13.6 (n = 75) |
| I have been vaccinated once against HPV and I will not come back again for my next dose | 47.6 (n = 263) | 30.6 (n = 169) | 4.9 (n = 27) | 8.5 (n = 47) | 9.8 (n = 54) |
| I have been vaccinated against HPV and I completed all the doses | 31.1 (n = 172) | 45.6 (n = 252) | 7.4 (n = 41) | 15.2 (n = 84) | 19 (n = 105) |
| I have never been vaccinated against HPV and I would like to get vaccinated | 8.5 (n = 47) | 8.9 (n = 49) | 7.4 (n = 41) | 29.5 (n = 163) | 46.8 (n = 259) |
| Cervical cancer is the leading cause of death of women worldwide | 10.1 (n = 56) | 9 (n = 50) | 12.5 (n = 69) | 24.8 (n = 137) | 46.1 (n = 255) |
| I am not afraid of cervical cancer as I am of HIV | 41.6 (n = 230) | 13.4 (n = 74) | 12.5 (n = 69) | 16.5 (n = 91) | 19.5 (n = 108) |
| I will inform my sexual partner if I am diagnosed with HPV infection | 7.2 (n = 40) | 7.1 (n = 39) | 9 (n = 50) | 35.4 (n = 196) | 42.9 (n = 237) |
| HPV vaccine is very cheap and available in most Cameroonian hospitals or pharmacies | 15.2 (n = 84) | 7.6 (n = 42) | 18.3 (n = 101) | 25.5 (n = 141) | 35.3 (n = 195) |

* n is the total number of respondents

with the statement that they know enough information about HPV vaccines, the majority (67.9%) still think that HPV vaccine is safe.

When the adolescents who were not vaccinated were asked about their willingness to be vaccinated against HPV infections, 29.5 and 46.8% agreed or strongly agreed, respectively, to be vaccinated, suggesting a willingness to accept vaccination. A high proportion of respondents (75.9%) understood that HPV vaccine prevents cervical cancer. On the contrary, 31.3 and 33.1% stated that they would be ashamed or be very ashamed, respectively, if diagnosed with HPV infections.

## Interest in HPV Education, Vaccine and Predictors of Knowledge and Perceived Shame

Age and level of education were found to be associated with HPV knowledge with p value of 0.0007 and 0.0008, respectively (Table 3). The majority of respondents were quite knowledgeable about HPV, with 66.5% achieving a knowledge score above the mean (Table 2). There was also a modest uptake of vaccine 34% (n = 189) among the girls participating in the study. However, when bivariate analysis was done comparing socio-demographic characteristics of the sample and other risk factors with uptake of HPV vaccine, none of the factors were found to predict uptake of HPV vaccine. Of the participants, 95% (n = 526) were interested in learning more about HPV. Bivariate analysis revealed that adolescents attending primary school reported greater interest in HPV education (Table 3). Age of the adolescent ($p = 0.0244$, school-attending ($p = 0.022$), primary level of education of the adolescents ($p = 0.0062$) and perceived shame ($p < 0.0001$) emerged as unique predictors for interest in learning more about HPV as shown in Table 3.

**Table 3** Bivariate analysis of the predictor variables and HPV knowledge, perceived risk, and interest in HPV education

| Variables | HPV knowledge | | *p* value |
|---|---|---|---|
| | Good knowledge | Poor knowledge | |
| Age | | | |
| >17 | 210 (38.0%) | 50 (9.0%) | 0.0007 |
| ≤17 | 266 (48.1%) | 27 (4.9%) | |
| Level of education | | | |
| Primary school | 4 (0.7%) | 1 (0.2%) | 0.0008 |
| Secondary school | 323 (59.1%) | 36 (6.6%) | |
| Polytechnic/college | 143 (26.1%) | 40 (7.3%) | |
| Predictor variables | Perceived risk | | *p* value |
| | Yes | No | |
| Age | | | |
| >17 | 33 (6.0%) | 227 (41.1%) | 0.0001 |
| ≤17 | 11 (2.0%) | 282 (51.0%) | |
| Sexually active | | | |
| Yes | 44 (8.0%) | 138 (25.2%) | < 0.0001 |
| No | 0 (0.0%) | 365 (66.7%) | |
| Use protection | | | |
| Yes | 32 (9.0%) | 87 (24.5%) | < 0.0001 |
| No | 11 (3.1%) | 225 (63.4%) | |
| | Interest in HPV education | | |
| | Yes | No | |
| Age | | | |
| >17 | 253 (45.8%) | 7 (1.3%) | 0.0244 |
| ≤17 | 273 (49.4%) | 20 (3.6%) | |
| School-attending girls | | | |
| Yes | 523 (94.8%) | 26 (4.7%) | 0.0220 |
| No | 2 (0.4%) | 1 (0.2%) | |
| Level of education | | | |
| Primary school | 4 (0.7%) | 1 (0.2%) | 0.0062 |
| Secondary school | 336 (61.3%) | 23 (4.2%) | |
| Polytechnic/college | 181 (33.1%) | 2 (0.4%) | |
| Perceived shame | | | |
| Yes | 463 (83.7%) | 16 (2.9%) | <0.0001 |
| No | 63 (11.4%) | 11 (2.0%) | |

Both sexual activity and level of education were independent predictors of perceived risk. Across the sample, the mean level of perceived shame was just above the midpoint of the scale (mean = 3.61; SD = 1.37). Level of education, number of people living in the household and HPV awareness emerged as independent variables of perceived shame. However, it was noted that across the sample, the mean level of interest in HPV vaccination was 4.0 (SD = 1.27), which is above the mean indicating that most adolescents are willing and interested in receiving the HPV vaccine. However, when multivariate modeling (logistic regression analysis) was done, none of the factors had an association with knowledge and attitude of the adolescents on HPV vaccine.

### Cervical Cancer Screening

Since participation in our study was limited to ages 12–26, only a few older participants would be eligible for cancer screening. However, among the adolescents surveyed, 5.1% (n = 28) stated that they had been screened for cervical cancer. Of these 28, five had been tested once, four had been tested twice, eight had been tested three times and two had been tested four times. Of those who stated they had been tested, 53.6% reported that they had abnormal results, while only 3.5% stated they had normal results. A total of 42.9% of the participants did not disclose their results. A significant number of girls (n = 525) did not respond whether or not they ever had a cervical cancer-screening test.

## Discussion

Prophylactic HPV vaccines and early detection of cervical lesions through screening are key components for cervical cancer prevention. Frequent Pap smear screening in developed countries has resulted in marked decreases in cervical cancer incidence and mortality [4]. However, the massive infrastructure needed for population-based Pap smear screening is generally not available in developing countries [29]. Therefore, many resource-limited countries have successfully used visual inspection with acetic acid (VIA) or Lugol's iodine (VILI) [30], and a few countries have enhanced VIA and/or VILI with photographic methods [31–33]. A large study in India has recently shown HPV DNA testing to be highly effective in reducing cervical cancer incidence and mortality [30]. Accordingly, a survey performed by a group of Cameroonian gynecologists [16, 19] and studies performed in other African countries [17, 20, 34–36] have shown VIA to be a reliable and affordable cervical cancer screening method.

Because of the limited reach of screening methods in developing countries and the unnecessary need to screen women who are less than 25–30 years of age, it is critical to strive for primary prevention of HPV infection among adolescents through education on HPV, HPV vaccine, and cervical cancer, along with education on how to prevent HPV acquisition by avoiding risky sexual behavior. The CBCHS project described in this study demonstrates that this strategy is feasible in the North West Region of Cameroon through a community-based approach.

While data about HPV vaccine delivery, uptake and acceptability among parents and adolescent girls are

readily available in most developed countries, such data are only available for a few sub-Saharan African countries for parents including Kenya [37], Botswana [38], Nigeria [39], Cameroon[19, 27], Ghana [40], South Africa [41], Uganda [42] and Zimbabwe [43], mostly as pilot studies. In fact, to the best of our knowledge, there is no literature reporting on awareness about HPV, cervical cancer and acceptability of HPV vaccine among school-attending adolescents in sub-Saharan Africa. Programs to prevent cervical cancer through vaccination cannot work without first sensitizing all stakeholders with widespread communication and education [1, 5, 17, 41, 44].

Our survey indicates not only a need for this type of prevention program, but also confirms that high level of awareness about HPV, cervical cancer, HPV vaccine and willingness to be immunized among adolescents is attainable through a community-based sensitization program such as the one organized by the CBCHS. We report high awareness about HPV (82.3%), cervical cancer (80.3%) and acceptability of HPV vaccine (76.3%) among adolescent girls (majority school-attending) surveyed in the North West region of Cameroon. The high knowledge and awareness was found to be better than those previously reported in developed countries such as Canada [45], Finland [46], Italy [47] and the USA [48]. In these countries, there was no prior direct educational intervention targeting female adolescents. There was also high uptake of HPV vaccine (34%) in our study, but participants relied mainly on low cost of vaccination from the donated vaccine offered by CBCHS.

In addition to high levels of awareness, there were high levels of interest in the HPV vaccine and high levels of willingness to be vaccinated. Most (76.3%) of the respondents agreed or strongly agreed that they would like to be vaccinated, and 73.9% agreed or strongly agreed to recommend the vaccine to friends and relatives. Leveraging this, in combination with increased knowledge and awareness about HPV, cervical cancer and HPV vaccine, through a community-based approach demonstrates the potential this type of program has to increase acceptability and uptake of HPV vaccine.

Despite the high awareness about HPV, cervical cancer and HPV vaccine, most of the participants still had no knowledge about how viral infection causes cellular changes that can progress to cervical cancer or the fact that that most HPV infections clear on their own. Additionally, only 19% knew that women usually have no symptoms when infected with HPV or that HPV infects both sexes. This suggests that there is still great need for education. Furthermore, the low understanding of how HPV is spread and the mechanism by which it causes cervical cancer and other types of cancers corresponds with the high percentage of respondents who feel they do not have enough information about HPV vaccines (59.3%). With an unclear understanding about the causes of cervical cancer, adolescents are less likely to know how to protect themselves from contracting the virus.

We did not expect that many, if any, study participants had been screened for cervical cancer, since only those over 25 were eligible for screening under CBCHS policy, and study participation was limited to ages 12–26 years. The study revealed that 28 (5.1%) of participants stated they had been screened for cervical cancer, and 53.6% of these 28 reported they had had abnormal results.

Since the CBCHS screening program focuses on women of age 25 and older, but includes younger women with gynecologic complaints, most of the adolescents who stated they had been screened may have requested evaluation for gynecologic symptoms, rather than for a purely preventive, routine screening. Alternatively, they might have misunderstood the question or might have thought that testing for sexually transmitted infections or other gynecologic complaints included cervical cancer screening. The number of times an adolescent received cervical cancer screening may also be influenced by age, health status, sexual activity and education as shown by the regression analysis.

Nurses are often the first point of contact with patients and play a critical role in promoting and delivering immunization programs across the world through educating, mobilizing, screening and administering vaccines [49–53]. Our survey, which found that nurses were the primary source of information for adolescents to hear about cervical cancer (62.9%), further supports that nurses can play an essential role in communicating with adolescents about reproductive health concerns such as cervical cancer and sex education. Utilizing nurses as a mode of communication in a community-based HPV sensitization campaign is an important way to engage adolescents as part of an overall means to educate and sensitize all stakeholders in the efforts to prevent cervical cancer.

This research is not without limitations. First, the unexpected high awareness and knowledge about HPV, cervical cancer and HPV vaccine may not be representative of the overall youth population in the Northwest region or elsewhere in the country as more than half of the schools surveyed were sensitized prior to the vaccination campaign. The focus on population surrounding CBCHS facilities likely was reflected in the higher awareness and knowledge than adolescents living in other areas of Cameroon. Our convenience sample of participants were female students who happened to be aged 12–26, and did not include younger girls aged 9–11 or adolescent boys.

**Acknowledgments** We thank the CBCHS for their support during the data collection fieldwork and the parents and school head teachers for allowing us to enroll their students in the study.

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