

2 **Assessing the Effectiveness of a Community-Based Sensitization**
3 **Strategy in Creating Awareness About HPV, Cervical Cancer**
4 **and HPV Vaccine Among Parents in North West Cameroon**

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10 **Abstract** In 2010, the Cameroon Baptist Convention Health
11 Services (CBCHS) received a donation of HPV vaccine
12 (Gardasil®) to immunize girls of ages 9–13 years in the North
13 West Region of Cameroon. We evaluated the effectiveness of
14 the CBCHS campaign program in sensitizing parents/guard-
15 ians to encourage HPV vaccine uptake, identified factors that
16 influence parents' decisions to vaccinate girls, and examined
17 the uptake of cervical cancer screening among mothers. We
18 conducted a cross-sectional survey in four healthcare facilities
19 run by CBCHS, churches and other social settings. A total of
20 350 questionnaires were distributed and 317 were used for the
21 analysis. There were high levels of awareness about cervical
22 cancer, HPV and HPV vaccine. 75.5% understood HPV is
23 sexually transmitted and 90.3% were aware of the use of vac-
24 cine as a preventive measure. Effectiveness of the vaccine
25 (31.8%) and side effects/safety (18.4%) were the major barriers
26 for parents to vaccinate their daughters. Bivariate analysis

further revealed that the level of education ($p = 0.0006$), 27
income level ($p = 0.0044$) and perceived risks ($p = 0.0044$) 28
are additional factors influencing parents' decisions to vacci- 29
nate girls. 35.3% of women had sought a cervical cancer 30
screening, significantly higher than the general estimated rate 31
of screening (<10%) in other parts of Cameroon and sub- 32
Saharan Africa. These results support the viability of a com- 33
munity-tailored sensitization strategy to increase awareness 34
among the targeted audience of parents/guardians, who are 35
critical decision-makers for vaccine delivery to children. 36

Keywords Human papilloma virus · Cervical cancer · 38
Vaccine · Awareness · Parents · Cameroon 39

Introduction 40

Awareness of cervical cancer, the human papillomavirus 41
(HPV) and the HPV vaccine is critical among parents of 42
female adolescents, considering they are the main decision- 43
makers when it comes to the health of their children [1–4]. 44
Additionally, increased awareness about cervical cancer 45
among parents is important for bringing further attention to 46
early cancer screening for mothers and, later, for their 47
daughters when the girls are old enough to benefit from 48
screening [1, 5–8]. Studies have shown that awareness about 49
HPV, cervical cancer and HPV vaccines is influenced by a 50
variety of social, cultural, political and economic factors, thus 51
making it necessary to use community-tailored approaches for 52
cancer prevention outreach [9–12]. To date, access to HPV 53
vaccines in lower income countries has been limited due to the 54
high cost of US \$360 for a full dose [9, 14, 15]. With indica- 55
tions that the GAVI Alliance may soon subsidize HPV vac- 56
cines for low-income countries at US \$5 per dose [13, 14], 57
many countries are beginning to explore ways of designing 58

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59 effective delivery strategies that address the potential chal-
60 lenges [15–18].

61 Persistent infection with “high-risk” HPV types (HPV
62 16, 18) can cause cervical, oropharyngeal, and anogenital
63 cancers [19, 20]. Gardasil® and Cervarix™ are the two
64 available HPV vaccines in the market against infections
65 from HPV genotypes 16 and 18 [6, 9, 13, 21–23]. Gardasil
66 further protects against HPV types 6 and 11 “low-risk”
67 oncogenic HPV types, which are generally benign but can
68 lead to low-grade cervical cell changes, genital warts, and
69 respiratory papillomatosis [24–26]. HPV vaccine is most
70 effective when administered in three doses before a female
71 becomes sexually active [1]. The vaccines have multiple
72 benefits such as possible cross-protection against other
73 HPV genotypes, cost-effectiveness and minimal adverse
74 effects [9, 21, 22, 27–29].

75 Vaccinating all eligible females against HPV, especially
76 in developing countries where 83% of new global cervical
77 cancer cases occur annually [30], and only 5% of women at
78 risk are screened for infections [31], is important as a
79 means of curbing future increases in HPV and cervical
80 cancer incidences. Inaccessibility to these vaccines in
81 developing countries is of concern considering that cervical
82 cancer is the leading cause of cancer mortality among
83 women worldwide, with the highest global incidences
84 occurring in sub-Saharan Africa [32]. Furthermore, about
85 21.3% of the female population in this region are estimated
86 to harbor high risk HPV genotypes known for causing
87 cervical cancer at any given time [31].

88 In Cameroon, studies have estimated that cervical cancer
89 accounts for 31.74% of all cancers among women aged
90 50 years and above, [17] with urban prevalence estimated
91 at 40/100,000 women [33]. Although, there is no available
92 data on the HPV burden in the general population, current
93 estimates indicate that every year about 1,500 women are
94 diagnosed with cervical cancer and 1,000 die from the
95 disease [31]. Furthermore, it is estimated that cervical
96 cancer ranks as the second most frequent cancer among
97 women between 15 and 44 years of age in the country [31].
98 Recently, Cameroon started a vaccination program through
99 the Cameroon Baptist Convention Health Services
100 (CBCHS) which was awarded a donation of enough
101 Gardasil® vaccine to fully immunize 6,400 Cameroonian
102 girls, prioritizing those aged 9–13 years. In order to ensure
103 success of HPV vaccination efforts as part of strategies
104 addressing cervical cancer disease burden in Cameroon, it
105 is imperative that there is a high level of awareness among
106 parents about cervical cancer, HPV and the HPV vaccine.

107 Before commencing, in March 2010, CBCHS launched
108 a campaign in the targeted rural North West Region of
109 Cameroon aimed at sensitizing the community about the
110 need for vaccinating adolescent females and conducting
111 cervical cancer screening among older women to prevent

high-risk HPV infections. As part of the campaign strategy,
at least six trained health workers visited schools, clinics,
churches, and communities, sharing information about
HPV and cervical cancer, and encouraging them to
understand the risks of HPV. The sensitization campaign
was also done through the local media using both radio and
television as a means of reaching a large audience. After
sensitization program, young girls, most of whom were age
9–13 years, whose parents consented received three doses
of donated HPV vaccine. CBCHS also offered compre-
hensive sexual and reproductive health services that are
critical for women at their six stationary health facilities
and through a mobile clinic.

This study had three aims: (1) to measure the effectiveness
of the CBCHS sensitization program in educating the parents
on HPV, cervical cancer and HPV vaccines; (2) to identify
factors influencing parents’ decisions to vaccinate their
daughters upon sensitization; and (3) to examine the level of
cervical cancer screening in rural parts of Cameroon. The
results provide better baseline information for the adminis-
trative and operational planning of a small-scale HPV vac-
cination and cervical cancer screening campaign program, with
potential for the lessons learned to be utilized in organizing a
wide-scale immunization program.

Materials and Methods

We conducted a cross-sectional survey on parents/guardians
living in the North West Region of Cameroon using a self-
administered questionnaire. The survey was conducted in both
English and French between January and February 2011. First,
a pre-test study was performed on 40 women at the CBCHS
facility in Yaoundé, Cameroon to verify the comprehensibility
of the questions. Parents were randomly approached among
those who sought medical services at the CBCHS health
facilities in Bamenda, Banson, Mbingo and Etoug-ebe, and also
in churches and other social settings. In these communities an
educational campaign about HPV, cervical cancer and use of
vaccination as a control measure had been initiated by the
CBCHS prior to the survey. The educational sensitization
campaign was implemented in schools targeting female ado-
lescents and their parents/guardians. The sensitization cam-
paigns were also conducted through the local media using both
radio and television reaching thousands of people in the local
community.

A consent letter was given to each parent/guardian
explaining the purpose of the survey and terms of confi-
dentiality as well as informing them of their rights to
participate or withdraw from the study at any point. Illit-
erate parents were assisted by peer educators in order to
ensure that they understood the objectives of the study
and their rights. They were also assisted in reading and

162 completing the questionnaire by the investigators con-
163 ducting the survey.

164 The survey consisted of 25 questions, which were
165 divided into three sections: (1) basic demographic infor-
166 mation, economic status and social circumstances; (2)
167 sexual history; (3) knowledge of cervical cancer, HPV and
168 the preventive vaccine.

169 Statistical Analysis

170 Statistical analysis was done using SAS 9.2 (SAS Institute
171 Inc., Cary, NC, US). Univariate analysis was performed to
172 look at the characteristics of the population. Bivariate
173 analyses (correlation and Chi-square tests) were used to
174 determine significant association between various factors
175 and awareness, knowledge and beliefs about HPV, cervical
176 cancer and prophylactic HPV vaccines among parents/
177 guardians. Factors with a p value of ≤ 0.05 were further
178 explored in a multivariate model using logistic regression.

179 Results

180 Demographic Characteristics of the Sample

181 A total of 350 questionnaires were distributed of which 317
182 (94 males and 228 females) were returned and used for the
183 analysis. Data on demographics, education, income and
184 health insurance status are presented in Table 1. The data
185 show that 68.2% of parents were married and a large
186 majority (72.8%) was earning less than US\$108 per month.
187 The educational background of the respondents was
188 diverse: 39.2% had completed primary school, 25.5%
189 secondary school, 13.4% high school, 11.9% professional
190 college education, 3.3% completed university and 3.3%
191 affirmed to have another form of education. Only 18.1% of
192 the parents have health insurance with an average contri-
193 bution of US \$6 per month.

194 Sexual Behavior, and Awareness and Knowledge 195 of Cervical Cancer, Genital Warts and HPV

196 Responses concerning sexual history show that 68.5% have
197 had a sexual partner, with an average of three lifetime
198 sexual partners, mode being one partner and range being
199 between one and 30 (Table 1). Of the 65.6% who noted
200 they have had sex in the last 6 months, 36.5% had used a
201 condom during sexual intercourse. Participants justified
202 low levels of condom use through their marital status, trust
203 in their sexual partner, lack of knowledge about condoms

Table 1 Demographic characteristics of the parents $n = 337$

Demographic characteristics	Frequency	Percent
Gender		
Male	94	27.9
Female	228	67.7
Not specified	15	4.4
Total	337	100.0
Age group		
15–25	52	15.4
26–35	135	40.1
36–45	90	26.7
46–55	37	11.0
56–65	10	3.0
66–75	3	0.9
75+	1	0.0
Not specified	9	2.9
Total	337	100.0
Marital status		
Single	45	13.4
Married	230	68.2
Divorced	12	3.6
Widowed	30	8.9
Living with partner	10	3.0
Not specified	9	2.9
Total	337	100.0
Education level		
Primary	132	39.2
Secondary	86	25.5
High school	45	13.4
Professional college education	40	11.9
University	11	3.3
Other	11	3.3
Not specified	12	3.4
Total	337	100.0
Income per month (USD)		
<108	177	72.8
<200	40	16.5
201–400	14	5.8
401–600	3	1.2
600–800	2	0.8
>801	2	0.8
Not specified	5	2.1
Total	243	100.0
Health insurance		
With health insurance	61	18.1
Without health insurance	266	81.9
Total	337	100

207 and misconceptions that condom use is unsafe or may
 208 cause cancer. Additional reasons included dislike of the use
 209 of condoms and the notion that not using protection dem-
 210 onstrates a sense of love. Those who used condoms noted
 211 they did so for family planning and to avoid HIV/AIDS and
 212 other sexually transmitted infections (STIs). Understanding
 213 perceptions of condom use is important as it may reduce
 214 the risk to acquire genital HPV and HPV-related diseases
 215 by up to 70% [34, 35].

216 A significant proportion of respondents (80.7%) had heard
 217 of cervical cancer before the survey, indicating sensitization
 218 campaign conducted by the CBCHS was effective in edu-
 219 cating the population. The main sources of information were
 220 further identified to be nurses (47.1%) and doctors (18.8%),
 221 respectively. An additional 5.9% learned about cervical can-
 222 cer through teachers affiliated with the CBCHS's sensitization
 223 program and vaccination campaign. Awareness of genital
 224 warts, on the other hand, was relatively low with 31.1% of
 225 parents having heard of this STI. Participants obtained their
 226 information about genital warts mainly through teachers
 227 (35.2%), followed by nurses (23.8%). Doctors had an insig-
 228 nificant role with only 1% of the respondents citing them as a
 229 source of information.

230 Findings concerning HPV knowledge are presented in
 231 (Fig. 1). These results demonstrate that similar to cervical
 232 cancer, parents were familiar with HPV as an STI (75.5%).
 233 Similarly, a large proportion (79.9%) associated cervical
 234 cancer and genital warts with HPV infection and
 235 acknowledged that not only young people can get infected
 236 with HPV (88.8%). A large number of respondents rec-
 237 ognized the importance of condom use (65.9%), Pap smear
 238 screening (83.5%), and more education about HPV

vaccines (96.7%) as tools necessary for preventing HPV 239
 240 infections and disease progression. However, knowledge
 241 surrounding the characteristics of HPV infection was
 242 comparatively low. While 47.1% of parents knew that HPV
 243 infection does not develop symptoms only 32.5% under-
 244 stood that most HPV infections clear on their own. Addi-
 245 tionally, 50.8% recognized that both men and women are
 246 susceptible to HPV infections.

Level of Screening Among Mothers of Adolescents 247

248 Among 228 female participants, 35.3% have had a cervical
 249 cancer-screening test while 40.3% of those screened have
 250 only been tested once, 16.8% have been tested twice, 5%
 251 have been tested three times and 0.8% have been tested
 252 four times. From these screenings, a considerable number
 253 (20.2%) of the parents tested had abnormal results while
 254 74.8% had normal results. Reasons cited for receiving a
 255 cervical cancer-screening test included: advice from health
 256 professionals, advice from family members, self-initiative
 257 to know their cancer status, pregnancy and HIV/AIDS.

Understanding HPV, Cervical Cancer, Vaccine 258
 and Willingness to Vaccinate 259

260 Most parents had a good understanding about HPV trans-
 261 mission, the need for young girls to be vaccinated against
 262 HPV infection, and HPV vaccine safety and were also
 263 willing to recommend their daughters, friends and relatives
 264 for vaccination as shown in Table 2. A large proportion of
 265 parents knew about the mode of HPV transmission, with
 266 44.8% strongly agreeing and 32.0% agreeing that having

Fig. 1 HPV knowledge among parents/guardians who had heard of HPV (n = 337)

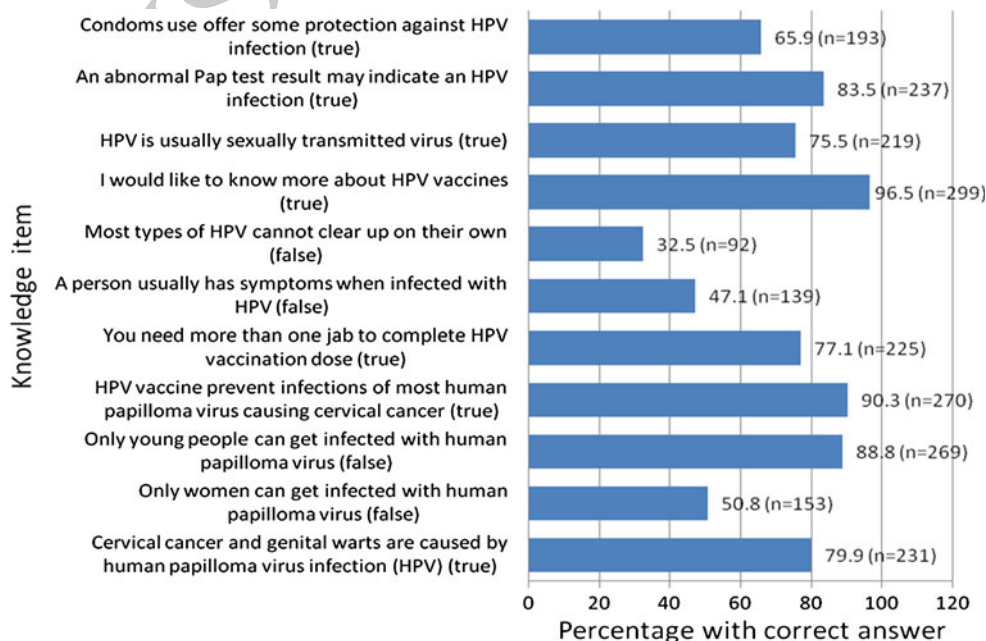


Table 2 Understanding HPV, cervical cancer, vaccine and willingness to vaccinate

Response question	% With correct answer				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Having multiple sexual partners makes one susceptible to get HPV infection	4.2 (n = 14)	2.1 (n = 7)	5.3 (n = 18)	32.0 (n = 108)	44.8 (n = 151)
I will be ashamed if I am diagnosed with HPV	9.8 (n = 33)	37.1 (n = 125)	12.5 (n = 42)	21.7 (n = 73)	5.6 (n = 19)
It is better for my daughters to get vaccinated against HPV infection.	1.8 (n = 6)	1.2 (n = 4)	8.9 (n = 30)	49.9 (n = 168)	27.0 (n = 91)
I feel I know enough information about HPV vaccines.	22.8 (n = 77)	28.8 (n = 97)	9.8 (n = 33)	24.0 (n = 81)	3.0 (n = 10)
I would recommend getting HPV vaccination to my children, friends and relatives	3.0 (n = 10)	1.8 (n = 6)	6.8 (n = 23)	58.5 (n = 197)	20.5 (n = 69)
I think HPV vaccine is safe	1.8 (n = 6)	1.8 (n = 6)	10.7 (n = 36)	54.0 (n = 182)	21.1 (n = 71)
My daughters are happy to be vaccinated	2.1 (n = 7)	2.4 (n = 8)	21.7 (n = 73)	47.2 (n = 159)	14.5 (n = 49)
Cervical cancer is the leading cause of death in women worldwide	3.7 (n = 12)	3.7 (n = 12)	13.1 (n = 44)	37.4 (n = 126)	32.9 (n = 111)
I am not afraid of cervical cancer as I am to HIV	18.7 (n = 63)	26.4 (n = 89)	20.8 (n = 70)	16.3 (n = 55)	5.3 (n = 18)
I will inform my sexual partner if I am diagnosed with HPV infection	3.3 (n = 11)	3.6 (n = 12)	13.6 (n = 46)	54.6 (n = 184)	13.4 (n = 45)
HPV vaccines is very cheap in Cameroon	29.7 (n = 100)	12.5 (n = 42)	18.7 (n = 63)	22.3 (n = 75)	6.2 (n = 21)
HPV vaccine is available in most Cameroonian hospitals or pharmacies	34.4 (n = 116)	19.3 (n = 65)	17.5 (n = 59)	14.5 (n = 49)	4.7 (n = 16)

multiple sexual partners exposes one to high risk of HPV infections. The majority of parents (90.3%) recognized that the vaccine prevents most HPV infection causing cervical cancer and 77.1% were aware that one needs more than one dose to complete the immunization. Most of them were willing to vaccinate their daughters, with 49.9% agreeing and 27.0% strongly agreeing. Furthermore, 58.5% of the parents agreed and 20.5% strongly agreed they would recommend HPV vaccine to their children's friends and relatives.

Regarding vaccine safety, 21.1% of the parents strongly agreed and 54.0% agreed that the vaccine is safe but 10.7% were neutral. When the parents were asked about their perception towards the cost of the vaccine, only 6.2% strongly agreed and 22.3% agreed that HPV vaccine is cheap in Cameroon. At the same time, most parents were also aware that HPV vaccine is not available, with 34.4% strongly disagreeing and 19.3% disagreeing that the vaccine is accessible in most of the hospitals and pharmacies in Cameroon. Interestingly, 5.3% strongly agreed and 16.3% agreed that they are more afraid of HIV than cancer of the cervix.

Knowledge of Prevention and Predictors of Perceived Risk

Knowledge surrounding prevention of HPV showed that 65.9% considered condom use as a means of protection against HPV. Bivariate analysis also showed that higher perceptions of risk were associated with having multiple

sexual partners, employment status, level of income, use of protection, knowledge of HPV and perceived shame (Table 3). These factors were unique predictors of perceived risk. Across the sample, the mean level of perceived shame was just below the midpoint of the scale (mean = 2.72; SD = 1.15). Higher perceptions of shame were observed in both male and female, perceived risks, HPV knowledge and interest in their daughter being vaccinated. However, gender (male) ($p = 0.0102$), perceived risks ($p = 0.0345$), HPV knowledge ($p = 0.0154$), interest in daughter being vaccinated ($p = 0.0206$) and factors considered before vaccinating their daughter ($p = 0.0044$) emerged as unique predictors of perceived shame. Five predictors emerged in regards to interest in HPV education: age group of the parents ($p = 0.0385$), primary level of education ($p = 0.0021$), factors considered before vaccinating their daughter ($p = 0.0071$), knowledge of HPV ($p = 0.0031$) and interest in their daughter being vaccinated ($p = 0.0197$).

Factors Considered by Parents Before Vaccinating Their Daughters

Although it was predicted, based on literature, [9, 13, 22] that the cost of the vaccine may be the most influential factor in parents' decisions to vaccinate their daughters, our findings suggest other important factors. Effectiveness (31.8%) and side effects/safety (18.4%) appeared to be the main concerns. Health care provider recommendations

Table 3 Correlations between predictor variables and primary outcome variables in a study of HPV knowledge and attitudes among parents of adolescent girls

Predictor variable	Factors to consider before vaccinating a daughter	Have health insurance	HPV knowledge	Perceived risk	Perceived shame	Interest in HPV education	Vaccine interest
Demographics							
Gender	-0.06	0.2*	-0.02	0.1	0.14*	-0.08	-0.04
Age	-0.09	-0.1	0.11*	-0.1	0.01	-0.11*	-0.04
Marital status	-0.05	0.02	-0.04	0.07	0.04	0.03	-0.06
Level of education	0.16*	0.04	0.09	0.03	0.03	0.18*	-0.07
Employment status	0.04	0.13*	-0.18*	0.19*	0.01	0.04	0.17*
Salary range	0.23*	-0.16*	0.09	0.20*	-0.01	0.02	-
Have health insurance	-0.06	-	-0.02	0.02	-0.06	0.1	-0.06
Sexual history							
Sexually active	-0.06	0.11	0.04	0.1	-0.03	-0.06	-0.05
Use protection	0.04	0.06	-0.15*	0.16*	0.06	0.07	-0.1
HPV awareness	0.09	0.1	-0.16*	0.1	0.02	-	-0.13*
HPV knowledge	-0.04	-0.02	-	-0.35**	-0.13*	-0.16*	0.04
HPV beliefs							
Perceived risks	0.08	0.02	-0.35**	-	0.12*	0.1	-0.04
Perceived shame	0.06	-0.06	-0.13*	0.12*	-	0.02	-0.13*
Interest in daughter being vaccinated	-0.01	-0.06	0.04	-0.04	-0.13*	-0.13*	-

* $p \leq 0.05$; ** $p \leq 0.01$

321 (17.8%) and cost of the vaccine (16.6%) followed. The
 322 income levels of our respondents reflect the possibility of
 323 dependence on a vaccination program as the majority
 324 (72%) earned less than US\$108 per month (Table 1). The
 325 low level of income is reflected in the fact that only 18.1%
 326 of the parents have health insurance at an average contribu-
 327 tion of US \$6 per month. Reasons for not having health
 328 insurance include: it is not affordable, a lack of information
 329 about health insurance, a lack of trust of insurance com-
 330 panies and the absence of health insurance services in the
 331 area. Bivariate analysis (Table 3) showed four predispos-
 332 ing factors to acquire health insurance: gender of the parent
 333 (male) ($p = 0.0007$), parents with daughters between
 334 the ages 9–13 years ($p = 0.0131$), employment status
 335 ($p = 0.0406$) and level of income ($p = 0.0035$).

336 Bivariate analysis also reveals other factors influencing
 337 parents' decisions to vaccinate their daughters. These fac-
 338 tors included the level of education ($p = 0.0006$), the level
 339 of income ($p = 0.0044$), perceived risks ($p = 0.0044$) and
 340 interest in HPV education ($p = 0.007$). Furthermore,
 341 despite the fact that 76.9% of the parents would recom-
 342 mend their daughters to get vaccinated against HPV,
 343 employment status ($p = 0.0050$), perceived shame
 344 ($p = 0.0206$) and the level of education ($p = 0.0197$) are
 345 driving factors towards interest in allowing their daughters
 346 to get vaccinated against HPV.

Discussion

347
 348 One of the distinctive findings of this study is the high
 349 awareness and knowledge among parents/guardians in the
 350 North West Region of Cameroon about HPV (75.5%),
 351 cervical cancer (75.5%), and the use of the HPV vaccine as
 352 a preventive measure against HPV infections (90.3%). The
 353 high level of awareness is most likely attributed to the
 354 campaign strategies employed by the CBCHS before
 355 delivery of the vaccine in 2010. In contrast with our find-
 356 ings, previous studies demonstrated low awareness and
 357 knowledge of cervical cancer (28%) among women living
 358 in Maroua, a city in the North Region of Cameroon where
 359 no prior sensitization had been conducted before the survey
 360 [33]. Low levels of knowledge have also been reported in
 361 other studies conducted in Sub-Saharan African countries
 362 including Kenya, [36, 37] South Africa, [7] Botswana, [38]
 363 Zimbabwe, [39] Uganda, [40] and elsewhere in India [5]
 364 and Laos [41]. To the best of our knowledge, this is the first
 365 study reporting such high levels of awareness of cervical
 366 cancer among parents in a rural African setting. The high
 367 awareness was likely the direct consequence of active
 368 sensitization.

369 This suggests that key to successful prevention of cer-
 370 vical cancer is increasing public awareness and available
 371 alternatives for its management. Our study indicates that

372 parents living in the North West Region of Cameroon
373 could benefit from the currently available cervical cancer
374 interventions, particularly screening since the awareness
375 about HPV, cervical cancer and HPV vaccine is very high.

376 Awareness of Prevention and Screening as Measures 377 of Effectiveness of the Sensitization Campaign

378 Consistent with the high awareness and knowledge about
379 cervical cancer and its causal organism (HPV), 35.3% of
380 women had sought a cervical cancer screening, signifi-
381 cantly higher than the general estimated rate of cervical
382 cancer screening (<10%) in other parts of Cameroon [33],
383 and 5% in rural parts of sub-Saharan Africa [30, 31]. In a
384 study of health care workers who were offered free Pap
385 smear screening in Yaounde, a similarly low proportion of
386 women (less than 40%) had been screened in the previous 5
387 years [42].

388 Pap smear availability in Cameroon is very low, due to
389 high cost, shortage of pathologists and cytotechnologists,
390 and an inadequate postal system that cannot manage
391 mailing Pap slides to laboratories [33, 43]. CBCHS has
392 overcome these barriers by using a screening method called
393 digital cervicography (DC), which combines a widely used
394 screening method called “visual inspection with acetic
395 acid” (VIA) [31, 44]. VIA is based on the fact that cervical
396 pre-cancers appear white when acetic acid (vinegar) is
397 applied. In the use of VIA for screening, the provider looks
398 at the acetic acid-stained cervix with the naked eye to
399 detect pre-cancers. DC enhances VIA by using a digital
400 camera to project greatly-magnified images of the acetic
401 acid-stained cervix onto a television monitor visible to both
402 the woman and the provider. The provider can thus visually
403 educate the woman on any cervical abnormalities and
404 empower her to take part in treatment decisions. In addi-
405 tion, the provider takes a permanent photograph, which is
406 stored in a computer along with the woman’s history and
407 physical exam, to be used for follow up, consultation, staff
408 training, and quality improvement. DC is more sensitive
409 (detects more pre-cancers) than Pap smears and is cheaper
410 and more convenient for women, because they immediately
411 know their results and can often be treated for low-grade
412 pre-cancer during the same visit. In contrast, it may take
413 weeks for laboratories to send results on Pap smears, and
414 the woman must make more return visits. Thus, our find-
415 ings of a relatively high screening rate provide two
416 insights: 1) sensitization efforts to raise awareness and
417 knowledge about the need for screening are effective, and
418 2) using a screening method that is relatively inexpensive,
419 convenient, and educational is highly acceptable to women
420 and can increase screening rates.

421 Of the 35.3% who reported to have been screened in our
422 study, 20.2% reported abnormal results, indicating possible

cervical pre-cancer or cancer [24, 30]. Thus, educating 423
424 women about HPV, cervical cancer and the need for
425 screening may result in seeking care and diagnosis at an
426 earlier stage, when treatment may be more effective and
427 potentially save a greater number of lives. There is a
428 compelling need to increase cervical cancer screening,
429 especially among women aged 26–45 years. In our study,
430 77.8% of women surveyed in this study were in this age
431 group, but only 35.4% of them had been screened. This
432 suggests that further reduction of cost and removal of
433 barriers may increase screening rates. Although the average
434 charge of DC is very low (about \$4) in rural areas, where
435 women have low income, CBCHS have observed high
436 increase in screening rate when the service is subsidized
437 further or offered for free. Thus, in order to expand the
438 program, particularly in rural areas where health care ser-
439 vices are limited [27, 28, 45]. More women would be
440 screened, if the cost of screening could be reduced and if
441 sensitization effort is expanded.

442 The low level of knowledge about genital warts (a
443 characteristic of HPV infection) and that HPV infection
444 may clear on its own reflects the fact that many parents
445 have not yet received adequate information, thus more
446 room for education is still available.

447 Willingness to Vaccinate

448 Providing routine HPV vaccination will not be possible for
449 most developing countries where most families cannot
450 afford to pay for it [9, 13, 22]. Cameroon’s health profile
451 shows that current routine immunizations with relatively
452 high coverage rates include measles (91%), BCG (97.9%),
453 OPV (85.7%), MCV (85.2%) and pentavalent
454 DTP + HiB + Hep B (89.7%), but low coverage for yel-
455 low fever (12%) and no coverage for pneumococcus (0%)
456 or rotavirus (0%) [46, 47]. Cameroon’s vision is to sig-
457 nificantly increase coverage of the above vaccines with low
458 coverage but cost remains a barrier, [46–48] and HPV
459 vaccine will not be included through the year 2018 [48].
460 The purpose of CBCHS’s vaccination project with this
461 limited amount of Gardasil, is to determine the most
462 effective vaccine delivery strategies for adolescents in
463 order to help the national government explore the feasi-
464 bility of upscaling HPV vaccination if and when the cost of
465 the vaccine is reduced to the point that Cameroon can
466 afford it.

467 Acceptability studies in developing and developed
468 countries have demonstrated a generally high willingness
469 for parents, especially mothers, to have their daughters
470 vaccinated against HPV [2–4]. In this study, the high
471 willingness among parents to vaccinate their daughters
472 (67%), to recommend the vaccine to their children, friends
473 and relatives (80%), and their faith that the vaccine is safe

474 (75%) in spite of feeling they do not have enough knowl-
475 edge about the vaccine (51.6%), suggests a high level of
476 trust in CBCHS sensitization program and in the strong
477 endorsement of Gardasil as a cervical cancer prevention
478 strategy. This is very encouraging because it indicates that
479 if national funding of HPV vaccine ever becomes available
480 it will also be feasible to effectively scale up vaccine
481 delivery, if adequate sensitization and education are first
482 provided on a countrywide scale.

483 While the primary concern among the parents surveyed
484 was effectiveness and safety of the vaccine, the results
485 surrounding cost reveal some distinctive insights consid-
486 ering cost has been shown in previous studies to be a major
487 impeding factor for HPV vaccine access [9, 37]. At the
488 time of this research, the HPV vaccine was provided at no
489 cost by the CBCHS to the public with only a small
490 administrative charge paid. Therefore, the significantly low
491 number of parents that identified cost as an impeding factor
492 suggests that most of the respondents relied heavily on the
493 donated vaccine, considering 72.8% of parents earned less
494 than US \$108 per month and only 18.1% of parents have
495 health insurance. This signifies a potential dependency on
496 the donated vaccine, particularly for parents with more
497 than one daughter. There is also a possibility that those
498 who did identify cost as an issue had not been reached by
499 the CBCHS's vaccination program. Therefore, free or
500 heavy subsidization of vaccine by the Cameroonian gov-
501 ernment or by international organizations will play a piv-
502 otal role in financially assisting parents. Other studies [1,
503 22, 49] have shown that in countries with health insurance
504 programs success in upscaling HPV vaccination is more
505 achievable, but this is seldom a possibility in developing
506 countries such as Cameroon.

507 Conclusion

508 The high awareness of HPV, cervical cancer and HPV
509 vaccine among parents demonstrates the effectiveness of
510 the CBCHS sensitization program. However, the miscon-
511 ceptions surrounding characteristics and transmission of
512 HPV highlights the need for more expanded outreach to
513 this demographic as well as the need to ensure that ade-
514 quate information is available to the demographic popu-
515 lation. Additionally, the high levels of willingness among
516 parents to vaccinate their daughters and recommend the
517 vaccine to their children, friends and relatives is a positive
518 indication that administrative and operational planning of a
519 small-scale HPV vaccination and cervical cancer screening
520 campaign program in Cameroon has the potential to be
521 successful. Leveraging both the effectiveness of the cam-
522 paign and the willingness of parents to vaccinate their
523 daughters and learn more about the vaccine is pivotal in

empowering parents/guardians as decision-makers and
therefore further increasing their willingness to vaccinate
while increasing the rate of cervical cancer screening
among mothers. The high acceptability of the CBCHS's
small HPV vaccination project suggests that, if the Cam-
eroon government will someday be able to include this
vaccine among its routine immunizations, there will be
good acceptance among its population, if adequate sensi-
tization and education are first provided on a countrywide
scale.

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