Knowledge of Cervical Cancer and Its Risk Factors, Attitudes and Practices towards Pap Smear Screening among Students in the University of Buea, Cameroon

G. E. Halle-Ekane[1*], D. K. Nembulefack[1], G. E. Orock[2], P. N. Fon[3], A. A. Tazinya[4] and P. M. Tebeu[5]

[1]*Department of Obstetrics and Gynecology, Faculty of Health Sciences, University of Buea, Cameroon.*
[2]*Department of Biomedical Sciences, Faculty of Health Sciences, University of Buea, Cameroon.*
[3]*Department of Public Health and Hygiene, Faculty of Health Sciences, University of Buea, Cameroon.*
[4]*Mboppi Baptist Hospital, Douala, Cameroon.*
[5]*Department of Gynecology and Obstetrics, Faculty of Medicine and Biomedical Sciences, University of Yaounde 1, Cameroon.*

Original Research Article

ABSTRACT

Introduction: Cancer of the cervix is the second most common gynaecological malignancy and the leading cause of cancer mortality among women in Cameroon. Knowledge and attitudes toward cervical cancer screening depend largely on gender and educational level. The objective of

---

Corresponding author: Email: halle-ekane.edie@ubuea.cm, hallegregory@yahoo.fr;

this study was to determine the knowledge of cervical cancer and the attitudes and practices towards Pap smear screening among male and female university students.

Methods: This was a cross-sectional study that involved 416 students, carried-out from February to May 2017 among students of the University of Buea, Cameroon. Data was collected using a pretested questionnaire and analysed using Epi-Info version 7. Statistical significance was set at P-value <0.05.

Results: The mean age of the participants was 22.08 (± 4.03) years. Up to 82.2% of participants had heard about cervical cancer. Only 25.2% of participants had "good" knowledge of cervical cancer. There was no statistically significant difference in the overall knowledge between gender (P=0.81); however, there was an association between having "good" knowledge and being a health science student (P<0.001). About two-thirds of the students knew that having multiple sexual partners was a risk factor of cervical cancer, while more than 50%, could not identify early sexual intercourse, smoking, family history, and multiple deliveries as risk factors. Only 4.8% of the female students had had a Pap smear. The low uptake was attributed to barriers: the cost of screening, lack of information on screening programs, fear, and beliefs that pap smear screening is painful.

Conclusions: Knowledge of cervical cancer among university students was poor without a gender difference. Uptake of Pap smear screening was very low. We, therefore, recommend more health education and prevention programs targeting male and female students.

1. INTRODUCTION

Cervical cancer is a global health problem, being ranked the 7th most common cancer worldwide [1]. It is the second most common cancer among women and the leading cause of cancer-related deaths among women in the low-income countries [2]. It accounts for 8-20% of all cancers and 70-80% of all genital cancers [3]. The global incidence of cervical cancer is estimated to be about 529,409 cases and about 274,883 diagnosed cases die annually, despite the fact that cervical cancer is a preventable disease [2]. Among the newly diagnosed cases, 86% are reported in low-income countries. Furthermore, 88% of death resulting from cervical cancer is in low-income countries; and in Africa, most of the cases are reported in Sub-Saharan Africa [4].

The Human Papilloma Virus (HPV) which is sexually transmitted has been implicated as the main causative agent of cervical cancer over a period of 10-20 years [5]. Strains 16 and 18 of HPV are known to be responsible for up to 70% of cervical cancer worldwide [6]. At least 50% of women who are sexually active have suffered from infection with at least one strain of HPV [7]. However, most of these scenarios do not progress to the disease state because the immune system prevents the progression of most precancerous lesions. Girls have been found to be infected with HPV as early as 16-25 years of age; and among university students, HPV is seen as a common infection [8]. Other risk factors of cervical cancer not unconnected with sexual transmission of HPV (multiple sexual partners, history of early sexual intercourse, non-use of condoms during intercourse, history of sexually transmitted infections), smoking, prolonged used of oral contraceptive, history of multiple childbirth, as well as family history of cervical cancer have been documented [9]. Regular screening for cervical precancerous lesions is an effective method for early detection and prevention of cervical cancer. Pap smear happens to be the most widely used screening method with a sensitivity of 60-80% and a specificity of 80-90% [10].

In low-income countries, awareness, as well as uptake of cervical cancer screening services, has remained poor over the years [4,10] Several studies done in communities and among college students in sub-Saharan Africa revealed that knowledge was generally poor [4,11]. It should be noted that men's knowledge and attitudes towards cervical cancer screening have not been well studied, especially in sub-Saharan Africa [12]. Most studies carried out among university students concentrate on female participants. Therefore additional data on male students' involvement as regards cervical screening will help in bridging this gap and probably increase the uptake of cervical screening as result of peer and gender influence.

According to the Cameroon HPV and related diseases summary report of the year 2015, more than 6 million Cameroonian females who are aged 15 and above are at risk of developing

cervical cancer, and there are 1993 new cases of cervical cancer yearly, of which 1120 die of the disease annually [6]. In a survey done among health workers in Yaoundé-Cameroon, it was noted that 75% of the participants thought that the general public is not adequately informed about cervical cancer [13]. While a community-based study carried out in Buea, Cameroon revealed that only 3.6% of study participants had good knowledge of cervical cancer, and 82% of participants with a secondary and tertiary level of education had never had a pap smear [14]. In a study among students in the University of Douala-Cameroon, promiscuous sexual behaviours ranging from early sexual intercourse to multiple sexual partners and history of STIs; and low knowledge about HPV and its relationship with cervical cancer was reported [15].

The level of knowledge and attitude of the general population is therefore very important in determining the right strategy in the planning of effective intervention programs against cervical cancer. However, there is a paucity of data on the knowledge of cervical cancer among university students in Cameroon and other African countries. The objective of this study was, to assess the knowledge of cervical cancer and its risk factors among students in the University of Buea, as well as their attitudes and practices towards Pap smear screening.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This was a cross-sectional study carried out among students in the University of Buea from February to May 2017. Buea is the capital town of the South West Region of Cameroon. It is located about 4 degrees north of the Equator and 9 degrees east of the Greenwich meridian [16]. The University of Buea is the largest tertiary institution in this part of the country. It is an Anglo-Saxons university, with seven faculties and three schools/colleges. It is the first English university in the country, and it offers undergraduate, postgraduate, and professional courses to over 20,000 students from all over Cameroon.

2.2 Study Population and Sampling

The World Health Organization (WHO), recommend a target age for Pap smear screening to be from 21 to 65 years [17].

However, students at the University of Buea from 16 years of age were enrolled. This target population was chosen due to their vulnerability to the risk factors of cervical cancer; secondly, these are potential participants for Pap smear screening later on in life.

The sample size was calculated using John Eng. formula for comparing two proportions [18].

$$N = \frac{2 \cdot \left[Z_{crit} \sqrt{2\bar{p}(1-\bar{p})} + Z_{pwr}\sqrt{p_1(1-p_1) + p_2(1-p_2)} \right]^2}{D^2}$$

Where,

Z_{crit} – The standard normal deviate, corresponding to a significance criterion of 0.05(95), =1.96,
Z_{pwr} – The standard normal deviate, corresponding to a statistical power of 0.90, = 1.282
P_1- The pre-study estimate of the knowledge of cervical cancer among female university students revealed that 60.9% of participant had sufficient knowledge [11]
P_2 – The pre-study estimate of good knowledge of cervical cancer among males was 8.1% [19],
$P_0 = (P_1 + P_2)/2 = 34.5\%$
D- The minimum expected difference | $P_1 - P_2$| = 52.8%.

The minimum calculated sample size was 306 participants (153 males and 153 females). However, 416 male and female students were enrolled. A stratified random sampling method was used to select participants by considering different faculties as strata. The number of participants from each faculty was proportionately allocated base on students' distribution in every faculty. Students who did not give their consent were excluded from the study.

2.3 Approach to Participants

After obtaining ethical approval (N°2017/ 003/UB/SG/IRB/FHS), administrative authorisation was obtained from the South West Regional Delegation for Public Health. Participants were enrolled in the study at the end of a class. Before completing the questionnaire, they were informed of the study. The content of the consent form was explained, and they were told that participation was not obligatory. Written consents were obtained from all participants. For those below 18 years, assent forms were not used because it was assumed that university students could take responsibility for their declarations.

2.4 Data Collection and Analysis

In order to develop a questionnaire that met the objectives of this study, we extracted and modified information from previously created valid/reliable questionnaire [20], and other relevant knowledge, attitude and practice (KAP) materials on cervical cancer [21,22]. The questionnaire was pretested among 25 students from the Higher Technical Teachers' Training College of the University of Buea, a Campus of the University. None of the students from this Campus was subsequently enrolled in the study. The participants involved in the pilot study were selected using a purposive sampling method. The responses of the participants from the pilot study were used to modify the questionnaire prior to the commencement of the study. Data were collected on demographic characteristics, knowledge of cervical cancer and its risk factors, and attitudes and practices towards Pap smear screening. Participants who had difficulties in completing the questionnaires were assisted by three final year medical students who served as research assistants. The questionnaires were checked by the principal investigator to see if they were appropriately filled.

A database was created using Epi Info version 7 statistical software (CDC/US, 2014). Every weekend, all data collected was entered into an established password protected personal computer database for subsequent analysis. Data were systematically checked for errors during data entry by using legal values as well as specified ranges in Epi-info version 7. Continuous variables were described using mean and standard deviation. Frequencies and percentages were used to describe categorical variables. Chi-Square test and Fischer Exact test were used to determine associations between categorical variable. Statistical significance was set at P-value <0.05. Knowledge was calculated using a scoring system; Ten questions were used to assess the students' knowledge of cervical cancer (Table 2). Each question answered correctly was allotted a score of one, making a total knowledge score of 10. Based on the score used to assess knowledge of every student, the students were categorised into three groups; "good" knowledge

Table 1. Socio-demographic characteristics of participants (N=416)

Variable		Males	Females	Total
		Frequency, (%) n=208	Frequency, (%) n=208	Frequency, (%) N=416
Age	16 – 19	63 (30.3)	39 (18.8)	102 (24.5)
	20 – 29	140 (65.3)	158 (76.0)	298 (71.12)
	30 – 39	2 (1.0)	10 (4.8)	12 (2.9)
	40 – 49	3 (1.4)	1 (0.5)	4 (1.0)
Religion	Christians	204 (98.1)	204 (98.1)	408 (98.1)
	Muslims	4 (1.9)	4 (1.9)	8 (1.9)
Marital status	Single	203 (97.6)	206 (99.0)	409 (98.3)
	Married	5 (2.4)	2 (1.0)	7 (1.7)
Faculty	Social Science	43 (20.7)	37 (17.8)	80 (19.2)
	Arts	42 (20.2)	13 (6.3)	55 (13.2)
	Health sciences	39 (18.8)	48 (23.1)	87 (20.9)
	Science	36 (17.3)	46 (22.1)	82 (19.7)
	Education	20 (9.6)	7 (3.4)	27 (6.5)
	Engineering	11(5.3)	31 (15.0)	42 (10.1)
	School of Translation	8 (3.8)	11 (5.3)	19 (4.6)
	Agriculture/ Veterinary	6 (2.9)	10 (4.8)	16 (3.9)
	College of Technology	3 (1.4)	5 (2.4)	8 (1.9)
Level	Undergraduate	186 (89.4)	191 (91.8)	377 (90.6)
	Postgraduate	22 (10.6)	17 (8.2)	39 (9.4)

(score 7 to 10), "fair" knowledge (score 4 to 6), and "poor" knowledge (score 0 to 3). Comparison of knowledge among male and female students was done using Fisher-exact test. Furthermore, bivariate analysis was used to determine any association between good knowledge and sociodemographic variables.

3. RESULTS

3.1 Socio-demographic Characteristics

Four hundred and sixteen (416) students were enrolled (208 males and 208 females). As shown in Table 1, their ages ranged from 16-47 years, with 71% of the students being within the 20-29 years' age group. The mean age (±SD) of the study population was 22.08 (± 4.03) years, with a modal age of 21years. The mean age of the female students was 21.48 (± 3.94) while that of the male students was 22.69 (± 4.03). Ninety-eight percent of the students were

Christians and single, while only 2% were Muslims, and 2% were married. Among these students, 20% were from the Faculty of Health Sciences, while 80% were from 8 other faculties in the University of Buea. Ninety percent were undergraduate, while 10% were postgraduate students.

3.2 Knowledge of Cervical Cancer

Up to 82.2% of the students had heard about cervical cancer, amongst them were 174 females and 168 males respectively. About 38% of the students had heard about HPV, but only 33.2% of them knew HPV is the causative agent of Cervical cancer. There was a statistically significant difference in the number of males and females who knew of a relationship between HPV and cervical cancer (P= 0.01). Only 37% of these students knew about a vaccine to prevent cervical cancer in males being more knowledgeable (P= 0.01).

Table 2. Participants responses on knowledge of cervical cancer (N=416)

Variables	Responses	Female Frequency, % n=208	Male Frequency, (%) n=208	Total Frequency, % N=416	p-value Chi squared
1. Heard about cervical cancer (Ca)	Yes	174 (83.7)	168 (80.8)	342 (82.2)	0.52
	No	34 (16.4)	40 (19.2)	74 (17.8)	
2. First cause of cancer death among women in Cameroon	Yes	48 (23.1)	38 (18.3)	86 (20.7)	0.46
	No	90 (43.3)	93 (44.7)	183 (44.0)	
	Don't know	70 (33.7)	77 (37.0)	147 (35.3)	
3. Age group is at increased risk of cervical cancer	<20	12 (5.8)	10 (4.8)	22 (5.3)	0.30
	20-40	156 (75.0)	145 (69.7)	301(72.4)	
	>40	40 (19.2)	56 (26.9)	96 (23.1)	
4. Causes Cervical Cancer	Virus	65 (31.3)	84 (40.4)	149 (35.8)	0.14
	Bacteria	69 (33.2)	57 (27.4)	126 (30.3)	
	Don't know	74 (35.6)	67 (32.2)	141 (33.9)	
5. Heard about Human *Papilloma virus* (HPV) before	Yes	81 (38.9)	77(37.0)	158 (38.0)	0.65
	No	127 (61.1)	131 (69.0)	258 (62.0)	
6. Relationship b/w HPV and cervical Cancer	Yes	73 (35.1)	65 (31.3)	138 (33.2)	0.01
	No	40 (19.2)	20 (9.6)	60 (14.4)	
	Don't know	95 (45.7)	123 (59.1)	218 (52.4)	
7. HPV transmitted through sexual intercourse	Yes	78 (37.5)	75 (36.1)	153 (36.8)	0.52
	No	26 (12.5)	20 (9.6)	46 (11.1)	
	Don't know	104 (50.0)	113 (54.3)	217 (52.2)	
8. HPV Infected persons always show symptoms	Yes	57 (27.4)	44 (21.2)	101 (24.3)	0.54
	No	70 (33.7)	74 (35.6)	144 (34.6)	
	Don't know	81 (38.9)	90 (43.3)	171 (41.1)	
9. Vaccine to prevent cervical Ca	Yes	75 (36.1)	79 (38.0)	154 (37.0)	0.01
	No	63 (30.3)	38 (18.3)	101 (24.3)	
	Don't know	70 (33.7)	91 (43.8)	161 (38.7)	
10. Cervical Cancer treatable	Yes	120 (57.7)	134 (64.4)	254 (60.0)	0.002
	No	43 (20.7)	18 (8.7)	61 (14.7)	
	Don't know	45 (21.6)	56 (26.9)	101 (24.3)	

Table 3. Different knowledge categories with gender (N=416)

Categories	Scores	Females, Frequency,(%) n=208	Males Frequency,(%) n=208	Total Frequency,(%) N=416	P-value Fisher-exact
Poor knowledge	0-3	86 (41.4)	96 (46.2)	182 (43.8)	0.37
Fair knowledge	4-6	74 (35.6)	55 (26.4)	129 (31.0)	0.06
Good knowledge	7-10	48 (23.1)	57 (27.4)	105 (25.2)	0.37

As shown in Table 3, only 25.2% of these students had "good" knowledge of cervical cancer; 48(23.1%) females and 57(27.4%) males. The number of students in the two groups categorised as having "good" knowledge was not statistically significantly different (P=0.37). Up to 182(43.8%) of these students had "poor" knowledge about cervical cancer without gender difference (P=0.37). Furthermore, 129(31%) of the students had "fair" knowledge of the disease, and there was no statistically significant gender difference in the number of male and female with fair knowledge (P=0.06). The mean knowledge score of these students was below average (4.48/10). The mean score for females was slightly higher than that for males, that is, 4.51/10 and 4.45/10 respectively, but this was not statistically significantly different (P= 0.81). Using bivariate analysis to determine the association between "good" knowledge and socio-demographic factors, and there was a strong association between being a health science student and having "good" knowledge (P<0.001).

3.3 Knowledge of Risk Factors of Cervical Cancer

The most known risk factor of cervical cancer to participants was having multiple sexual partners (Table 4). Up to 267(64.2%) of these students knew that having multiple sexual partners is a risk factor of cervical cancer, 141(67.8%) females and 126(60.6) males (P=0.19). More than 208(50%) of these students did not know that a history of early first sexual intercourse, smoking, family history of cervical cancer, non-use of condoms/diaphragm, multiparity, were risk factors of cervical cancer.

3.4 Attitudes towards Pap Smear Screening

Among the female students, 186(89.4%) said they were willing to attend a cervical cancer screening program. Two hundred and seventy-four (65.9%) of the study population thought that Pap smear screening can help in the prevention of cervical cancer. Three hundred and twenty-eight (79.1%) of these participants agreed that they could encourage a friend or daughter to be a screen for Cervical cancer using the Pap smear test. Furthermore, 318(76.4%) of the study population agreed that it is beneficial for sexually active women to be routinely screened using the Pap smear test as recommended by WHO. And lastly, 121(58.2%) of the female students thought that their spouse could impede them from being screened.

3.5 Practice of Pap Smear

Of the total 208 female students who participated in the study, only 4.8% (10 female students) of them had had a Pap smear. The most common barriers to Pap smear screening were; cost as up to 150(72.1%) of these students thought Pap smear screening was expensive, embarrassment 78(37.5%), and the act 68(32.7%) being painful (Table 5).

4. DISCUSSION

The mean age of the study population was 22.08 (±4.03) years, and 21.48 (±3.94) and 22.69 (±4.03) years in the female and male groups respectively. The dominant age group was 20 to 29 years; this was similar to the mean age of 23.8 years and the same dominant age group obtained by Akujobi et al. [11] in Nigeria. However, this was higher than the mean age of 19.47 years obtained by Hoque et al. [22] in South Africa, and lower than the mean age of 32.3 years obtained by Ekane et al. [14] in Buea Cameroon. These differences could be due to the fact that, Hoque et al. [22] studied only first-year university students who are much younger than the postgraduate as well as 2nd and 3rd-year students in this study. While Ekane et al. [14] did a community-based study and enrolled older women within the reproductive age. Majority of the participants 408(98%) were Christians and single; this was similar to other studies carried out in other parts of Africa [11,22].

Table 4. Participants responses on risk factors of cervical cancer (N=416)

Risk Factors	Female	Male	Total	P-value
	Frequency,(%) n=208	Frequency, (%) n=208	Frequency,(%) N=416	Chi-squared
Multiple sexual partners	141(67.8)	126 (60.6)	267 (64.2)	0.19
History of STI's	133 (63.9)	130 (62.5)	263 (63.2)	0.06
Early first sexual intercourse	100 (48.1)	99 (47.6)	199 (47.8)	0.89
HIV infection	100 (48.1)	98 (47.1)	198 (47.6)	0.26
Smoking	94 (45.2)	92 (44.2)	186 (44.7)	0.11
Family history of cervical cancer	74 (33.6)	75 (36.1)	149 (35.8)	0.31
Non-use of barrier methods	62 (29.8)	70 (33.7)	132 (31.7)	0.14
Having many deliveries (children)	28 (13.5)	39 (18.8)	67 (16.1)	0.24

Table 5. Barriers towards Pap smear screening amongst female participants (N=208)

Barriers	Frequency	Percentage
Cost of Pap smear screening	150	72.1
Pap smear screening is embarrassing	78	37.5
Pap smear screening is painful	68	32.7
Lack of information on screening programs	21	10.1
Fear of a positive result	13	6.3
Ignorance on the benefits of Pap smear	11	5.3
Religious beliefs	10	4.8

The predominance of Christian participants could be due to the choice of the geographical area where the study was carried out. While participants being mainly single is expected for a University milieu.

Only 25.2% of participants had good knowledge of cervical cancer, while 43.8% of participants had poor knowledge of cervical cancer. Nakibuule et al. [19] in-Kampala Uganda revealed a lower knowledge; were only 9.9% (11.8% women, and 8.1% men) of participants had good knowledge. The findings in this study were also similar to those of Ekane et al. [14] in Buea Cameroon, were 40.7% of participants had poor knowledge of cervical cancer. Low knowledge was also reported by Tebeu et al. [23] in the Far North region of Cameroon among women. These similarities could be due to the fact that these studies were carried out in the same country. Pertaining to having good knowledge of cervical cancer, there was a statistically significant difference among students of the Faculty of Health Sciences and those from other faculties. Adanu et al. [8] in Ghana,

Medeiros et al. [24] in 2010 in Portugal, also reported that health science students had good knowledge of cervical cancer compared with non-health science students. This could be due to the fact that health science students have courses where they are being taught about this disease.

The mean score of the participants as regards knowledge was below average for the study population. However, female students were slightly more knowledgeable about cervical cancer than males. Medeiros et al. [8] in 2010 in Portugal, and Rosser et al. [25] in 2014 in Kenya, also reported a higher mean score among females compared to males. This higher knowledge score among women could be due to the fact that, being a female pathology, women probably showed much interest in learning about the disease compared to their male counterpart. There was no statistically significant gender difference with respect to the mean score of the two groups. However, Medeiros et al. [8] in Porto Portugal had a statistically significant

7

gender difference in the mean scores. This could be due to the fact that, Medeiros et al. [8] worked with a larger sample size of 1706 students.

In this study, only 37% of participants had heard about Human Papilloma Virus (HPV). This was low compared to the 54% obtained in Portugal [8]. This discrepancy in findings could be attributed firstly to the fact that Portugal is a high-income country that has implemented multiple cervical cancer health programs. Secondly, more than half of their participants were health science students. Our participants had a low knowledge about a link between HPV and cervical cancer, as up to two-thirds of them didn't know that HPV was the cause of cervical cancer. This was in line with finding from another part of Africa [26].

 Approximately 37% of these students knew that there is a vaccine for the prevention of cervical cancer. This was higher than the study conducted by Wright et al. [27] in Lagos in 2014 where only 6% of participants had heard of a vaccine for cervical cancer. Recent information as regards prevention of cervical cancer by immunisation could explain this difference. Our findings, however, lower than that of Abdul-Aziz in 2014 in Yemen, where up to 70% of participants knew there is a vaccine for the prevention of cervical cancer [28]. Furthermore, these discrepancies could be due to the fact that, Wright et al. [27] did a community base study where more than 50% of the participant had not been educated beyond secondary school. On the other hand, Abdul-Aziz recruited reproductive health clients who must have had access to information from physicians and other health personnel. Secondly, more than half of their participants were graduates.

 More than half of the students did not know most of the risk factors for cervical cancer, and there was no statistically significant gender difference in their responses. Multiple sexual partners were the most known risk factor identified by 64% of participants, early sexual intercourse by 47%, and smoking by 47%. We had many similarities with the findings of Medeiros et al. [8] where 62% identified multiple sexual partners as a risk factor of cervical cancer, early sexual intercourse by 43%, and smoking by 40%. Our findings were, however, higher than that obtained by Hoque et al. [22] in South Africa where only 22% identified multiple sexual partners as a risk factor, early sexual intercourse by 19%, and smoking by 10%. This difference could be due to the fact that

Hoque et al. [22] surveyed more naïve first-year university students. Only 16% of these students identified multiple deliveries as a risk factor for cervical cancer, and family history was identified by 35% of participants. This mirrored the findings of Ekane et al. [14] in 2015 in Buea where family history and multiple deliveries were considered a risk of cervical cancer by 35% and 13.3% of participants respectively. This similarity could be due to their similar study area. Worse case scenarios were reported among women in a community in Ghana by Ebu et al. [29] in 2014, where 93.6% of participants had no knowledge on the risk factors of cervical cancer. This situation could possibly be due to the fact that a significant number of the participants were petty traders and fishmongers who had not attained more than a secondary level of education.

About 66% of these students believed Pap smear was beneficial in preventing cervical cancer. These findings were lower compared to the findings of McCarey et al. [13] in 2011 in Yaoundé Cameroon where 90% of the participants believed Pap smear screening offers benefits in the prevention of cervical cancer. This discrepancy could be due to the fact that McCarey et al. surveyed health care workers who happened to have as part of their curricula pathological conditions.

As regards to the practice of Pap smear screening, only 4.8% had had a Pap smear. A low uptake was also reported in other parts of Africa, with uptake ranging from 0.0-19.6% [11,14,19,26,27,30]. This could be attributed to the fact that, these are all low-income countries that have not put in place effective population-based cervical cancer screening programs and mass media campaigns. Contrary to our findings, Twinn et al. [31] reported an uptake of 59% among Hong Kong women. This high uptake is due to the fact that the Hong Kong Cancer Fund launched a territory-wide cervical cancer screening program that has been operational since 2004.

Several factors were mentioned by the female participants as reasons for the low uptake of Pap smear test. The cost of Pap smear screening was the dominant barrier among our participants. Other barriers were; Pap smear test being an embarrassing test, painful, the fear of having a positive test result, lack of information on screening programs, ignorance on the part of the population and religious beliefs. These findings were similar to studies in other parts of

Africa where the same barriers to Pap smear screening were reported [11,14,26,32]. This could be due to similar cultural, religious, and social norms among most sub-Saharan African countries.

5. CONCLUSIONS

There was low knowledge of cervical cancer and its risk factors among students at the University of Buea. There were no differences in the level of knowledge of male and female students. Uptake of Pap smear was low due to perceived barriers. More health education campaigns on cervical cancer should, therefore, be organised among students.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. GLOBOCAN Cancer Fact Sheets: Cervical cancer.
Available:http://globocan.iarc.fr/old/FactSheets/cancers/cervix-new.asp
[Accessed 2017 Feb 1]

2. Kafuruki L, Rambau PF, Massinde A, Masalu N. Prevalence and predictors of cervical intraepithelial neoplasia among HIV infected women at Bugando Medical Centre, Mwanza-Tanzania. Infect Agent Cancer. 2013;8:45.

3. Chirenje ZM, Rusakaniko S, Kirumbi L, Ngwalle EW, Makuta-Tlebere P, Kaggwa S, et al. Situation analysis for cervical cancer diagnosis and treatment in East, Central and Southern African countries. Bull World Health Organ. 2001;79(2):127–32.

4. Lim JN, Ojo AA. Barriers to utilisation of cervical cancer screening in Sub Sahara Africa: A systematic review. Eur J Cancer Care (Engl); 2016.

5. Cervical cancer. University of Maryland Medical Center.
Available:http://umm.edu/health/medical/reports/articles/cervical-cancer
[Accessed 2017 Feb 1]

6. Cameroon: Human Papillomavirus and related diseases. Summary Report; 2015.
Available:hpvcentre.net
[Accessed 2016]

7. Winer RL, Lee S-K, Hughes JP, Adam DE, Kiviat NB, Koutsky LA. Genital human papillomavirus infection: Incidence and risk factors in a cohort of female university students. Am J Epidemiol. 2003;157(3):218–26.

8. Medeiros R, Ramada D. Knowledge differences between male and female university students about human papillomavirus (HPV) and cervical cancer: Implications for health strategies and vaccination. Vaccine. 2010;29(2):153–60.

9. Cervical cancer: Practice essentials, background, pathophysiology.
Available:http://emedicine.medscape.com/article/253513-overview#a1
[Accessed 2017 Feb 1].

10. Innovations in Pap screening for cervical neoplasia. Medscape.
Available:http://www.medscape.com/viewarticle/718182
[Accessed 2016 Dec 10]

11. Akujobi C. Knowledge, attitude and practice of screening for cervical cancer among female students of a tertiary institution in South Eastern Nigeria. PubMed Journals.
Available:https://ncbi.nlm.nih.gov/labs/articles/19140357/
[Accessed 2016 Dec 12]

12. Williams MS, Amoateng P. Knowledge and beliefs about cervical cancer screening among men in Kumasi, Ghana. Ghana Med J. 2012;46(3):147–51.

13. McCarey C, Pirek D, Tebeu PM, Boulvain M, Doh AS, Petignat P. Awareness of HPV and cervical cancer prevention among Cameroonian healthcare workers. BMC Womens Health. 2011;11:45.

14. Ekane GEH, Obinchemti TE, Nguefack CT, Nkambfu DM, Tchounzou R, Nsagha D, et al. Pap Smear Screening, the Way Forward for Prevention of Cervical Cancer? A Community Based Study in the Buea Health District, Cameroon. Open J Obstet Gynecol. 2015;5(4):226.

15. Koanga MM, Ngono NA, Wandjis A, Dongang NR, Donfack TH, Nganwa G, et al. Sexual behaviour: Human papilloma virus and cervical cancer risk among university students in cameroon. Afr J Haematol Oncol. 2010;1(4).
Available:http://www.afjho.com/index.php/AJOHAO/article/view/24
[Accessed 2016 Dec 8]

16. Buea Map. Cameroon Google Satellite Maps.
Available:http://www.maplandia.com/cameroon/sud-ouest/fako/buea/
[Accessed 2016 Dec 10].

17. Final recommendation statement. Cervical Cancer: Screening - US Preventive Services Task Force.
Available:https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/cervical-cancer-screening
[Accessed 2017 Apr 28]

18. England J. Sample Size Estimation: How Many Individuals should be Studied? Radiology; 2003
Available:Pdfs.semanticsscholar.org
[Accessed 2016 Dec 10]

19. Nakibuule C. Knowledge, attitudes and practices regarding cervical cancer among women and men in Kampala City, Uganda. 2014
Available:http://makir.mak.ac.ug/handle/10570/4428
[Accessed 2017 May 7]

20. Jaglarz K, Tomaszewski KA, Kamzol W, Puskulluoglu M, Krzemieniecki K. Creating and field-testing the Questionnaire for the Assessment of Knowledge about Cervical Cancer and its Prevention among school girls and female students. J Gynecol Oncol. 2014;25(2):81–9.

21. Urrutia MT. Developement and Testing of a Questionnaire: Beliefs about Cervical Cancer and Pap Test in Chilean Women. Open Access Dissertation; 2009.
Available:http//scholarlyrepository.miami.edu/oa_dissertation/309
[Accessed 2017 May 5]

22. Hoque E, Hoque M, Hoque M. Knowledge of and attitude towards cervical cancer among female university students in South Africa. South Afr J Infect Dis. 2009;24(1).
Available:http://www.sajei.co.za/index.php/SAJEI/article/view/158
[Accessed 2016 Dec 8]

23. The attitude and knowledge of cervical cancer by Cameroonian women; a clinical survey conducted in Maroua, the capital of Far North Province of Cameroon - TEBEU. Int. J Gynecol Cancer - Wiley Online Library; 2007
Available:http://onlinelibrary.wiley.com/doi/10.1111/j.1525-1438.2007.01066.x/abstract
[Accessed 2017 May 5]

24. Adanu RM. Cervical cancer knowledge and screening in Accra, Ghana. J Womens Health Gend Based Med. 2002;11(6):487–8.

25. Rosser JI, Zakaras JM, Hamisi S, Huckho M. Men's knowledge and attitudes about cervical cancer screening in Kenya | BMC Women's Health | Full Text.
Available:https://bmcwomenshealth.biomedcentral.com/articles/10.1186/s12905-014-0138-1
[Accessed 2017 May 7]

26. Abotchie PN, Shokar NK. Cervical cancer screening among college students in Ghana: Knowledge and health beliefs. Int J Gynecol Cancer Off J Int Gynecol Cancer Soc. 2009;19(3):412–6.

27. Wright KO, Aiyedehin O, Akinyinka MR, Ilozumba O. Cervical cancer: Community perception and preventive practices in an urban neighborhood of Lagos (Nigeria). Int Sch Res Not. 2014;2014:e950534.

28. Abdul-Aziz M. Knowledge, attitude and practice towards cervical cancer among reproductive health clients at the University of Science & Technology Hospital-Sana'a in Yemen. Yemeni J Med Sci. 2014 May 29;6.
Available:https://ust.edu/ojs/index.php/yjmp/article/view/21
[Accessed 2017 May 5]

29. Ebu NI, Mupepi SC, Siakwa MP, Sampselle CM. Knowledge, practice, and barriers toward cervical cancer screening in Elmina, Southern Ghana. Int J Womens Health. 2014;7:31–9.

30. Ayinde OA, Omigbodun AO, Ilesanmi AO. Awareness of cervical cancer, Papanicolaou's smear and its utilisation among female undergraduates in Ibadan. Afr. J. Reprod Health. 2004;8(3): 68–80.

31. Twinn S, Shiu A, Holroyd E. Women's knowledge about cervical cancer and cervical screening practice: a pilot study of Hong Kong Chinese women. - PubMed - NCBI.
Available:https://www.ncbi.nlm.nih.gov/pubmed/12394564
[Accessed 2017 May 5]

32. Owoeye IOG, Ibrahim IA. Knowledge and attitude towards cervical cancer screening among female students and staff in a tertiary institution in the Niger Delta. Int J Med Biomed Res. 2013;2(1):48–56.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history/26419