

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

Abstract

Introduction: Cancer of the cervix is the second most common gynecological 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 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 analyzed using Epi-Info version 7. Statistical significance was set at P-value <0.05. **Results:** The mean age of the participants was 22.08 ($\pm$ 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 ($P=0.81$); 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; cost of screening, lack of information on screening programs, fear, and beliefs that pap smear screening is painful. **Conclusions:**

Comment [I1]: however, there was...

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24 There is poor knowledge of cervical cancer among university students. There was no gender
25 difference with knowledge. Uptake of Pap smear screening was very low. We therefore
26 recommend more health education and preventive programs targeting male and female
27 students.

Comment [I6]:

Comment [I7]: The repeated use of "there is/was" especially at the beginning of sentences is rather redundant.

Comment [I8]: Why target males and females when only females are risk of the disease.

28 **Keywords:** Cervical Cancer, knowledge, Attitude, Pap smear, University students, Buea.

29 1. INTRODUCTION

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

Comment [I9]: Do you mean "problem"?

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39 The Human Papilloma Virus (HPV) has been implicated as the main causative agent of
40 cervical cancer. It is sexually transmitted ~~transmitted through sexual intercourse~~ and can later
41 cause cervical cancer ~~through a slow growth~~ over a period of 10-20 years [5]. Strains 16 and
42 18 of HPV are known to be responsible for up to 70% of cervical cancer worldwide [6]. It has
43 been shown that, at least 50% of women who are sexually active have suffered from an
44 infection with at least one strain of HPV [7]. However, most of these scenarios do not
45 progress to the disease state because the immune system prevents the progression of most
46 precancerous lesions. Girls have been found to be infected with HPV as early as 16-25 years
47 of age; and among university students, HPV is seen as a common infection [8]. Other risk

Comment [I12]: repeated introduction of a new sentence with "it is/has" is redundant

48 factors of cervical cancer include promiscuous sexual behaviours such as having multiple
49 sexual partners, history of early sexual intercourse, non-use of condoms during intercourse,
50 history of STI's, and other conditions such as smoking, prolonged used of oral contraceptive,
51 history of multiple childbirth, as well as family history of cervical cancer [9]. Regular
52 screening for cervical precancerous lesions is an effective method in-for the early detection
53 and prevention of cervical cancer. Pap smear happens to be the most widely used screening
54 method with a sensitivity of 60-80% and a specificity of 80-90% [10].

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

63 According to the Cameroon HPV and related diseases summary report of the year 2015, more
64 than 6 million Cameroonian females who are aged 15 and above are at risk of developing
65 cervical cancer, and there are 1993 new cases of cervical cancer yearly, of which 1120 die of
66 the disease annually [6]. In a survey done among health workers in Yaoundé-Cameroon, it
67 was noted that 75% of the participants thought that the general public is not adequately
68 informed about cervical cancer [13]. While a community-based study carried out in Buea,
69 Cameroon revealed that, only 3.6% of study participants had good knowledge of cervical
70 cancer, and 82% of participants with secondary and tertiary level of education had never had
71 a pap smear [14]. Yet in a study among students in the University of Douala-Cameroon,
72 promiscuous sexual behaviors ranging from early sexual intercourse to multiple sexual

Comment [I13]: must be written in full for the first time and abbreviated as STIs afterwards, if need be

Comment [I14]: I think these are not unconnected with sexual transmission of HPV

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Comment [I15]: how are these – smoking, contraceptive use etc- conditions?

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Comment [I17]: How will screening uptake improve if men have better knowledge? Besides, a number of studies have examined differential knowledge between sex, (research further on this). The disease affects only women. This study has not been appropriately justified.

73 | partners and history of STI²s; and a low knowledge about HPV and its relationship with
74 | cervical cancer was reported [15].

75 | The level of knowledge and attitude of the general population is therefore very important in
76 | determining the right strategy in the planning of effective intervention programs against
77 | cervical cancer. However, there was no available data on the knowledge of cervical cancer
78 | among University of Buea students. The objective for this study was, to evaluate the
79 | knowledge of cervical cancer and its risk factors among students in the University of Buea, as
80 | well as their attitudes and practices towards Pap smear screening.

Comment [I18]: What about students in other schools in Cameroun, Other parts of West Africa and Africa?

Comment [I19]: Assess, not evaluate, since there is no comparison with a baseline or standard

81 | 2. MATERIALS AND METHODS

82 | 2.1 Study design and setting

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

90 | 2.2 Study Population and sampling

91 | The World Health Organization (WHO), recommend a target age for Pap smear screening to
92 | be from 21 to 65 years [17]. However, students in the University of Buea from 16 years of
93 | age were enrolled. This target population was chosen due to their vulnerability to the risk
94 | factors of cervical cancer; secondly, these are potential participants for Pap smear screening later on
95 | in life. Stratified random sampling was used to enroll 416 male and female students. The
96 | different faculties were considered as strata. The number of participants from each faculty

Comment [I20]: Why assess their practice now if they are not eligible for screening until later in life?

Comment [I21]: How was power or sample size calculation done?

97 was proportionately allocated base on students' distribution in every faculty. Students who
98 did not give their consent were excluded from the study.

99 2.3 Approached to participants

100 After obtaining ethical approval (N^o 2017/ 003/UB/SG/IRB/FHS), administrative
101 authorization was obtained from the South West Regional Delegation for Public Health.
102 Participants were enrolled on campus at the end of a class. Before completing the
103 questionnaire, they were informed of the study, consent form and were told that participation
104 is not obligatory. Written consents were obtained from all participants. Assent forms were not
105 used because it was assumed that university students could take responsibility for their
106 declaration.

107 2.4 Data collection and analysis

108 In order to develop a questionnaire that met the objectives of this study, we extracted and
109 modified information from previously created valid/reliable questionnaire[18], and other
110 relevant KAP materials on cervical cancer[19,20]. The questionnaire was pretested among 25
111 students from the Higher Technical Teachers' Training College of the University of Buea
112 (Students from this faculty/school did not participate in the final study). The participants
113 involved in the pilot study were selected using a purposive sampling method. The responses
114 of the participants from the pilot study were used to modify the questionnaire, prior to
115 commencement of the study. Data was collected on demographic characteristics, knowledge
116 of cervical cancer and its risk factors, and attitudes and practices towards Pap smear
117 screening. Participants who had difficulties in completing the questionnaires were assisted by
118 the research assistants. The questionnaires were checked rapidly by the principal investigator
119 to see if they were appropriately filled.

Comment [I22]: Approached?

Comment [I23]: Enrolled into school or this study?

Comment [I24]: What

Comment [I25]: Incomplete, run-off or hanging statement

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Comment [I31]: Rapidly?

120 A database was created using Epi Info version 7 statistical software (CDC/US, 2014). Every
121 weekend, all data collected was entered into an established data base for subsequent analysis.
122 Data were systematically checked for errors during data entry by using legal values as well as
123 specified ranges in Epi-info version 7. Continuous variables were described using mean and
124 standard deviation. Frequencies and percentages were used to describe categorical variables.
125 Chi-Square test and Fischer Exact test were used to determine associations between
126 categorical variable. Statistical ~~significant~~ significance was set at P-value <0.05. Knowledge
127 was calculated using a scoring system; Ten questions were used to assessed the students'
128 knowledge on cervical cancer (Table 2). Each question answered correctly was allotted a
129 score of one, making a total knowledge score of 10. Based on the score used to assess
130 knowledge of every student, the students were categorized into three groups; "good"
131 knowledge (score 7 to 10), "fair" knowledge (score 4 to 6), and "poor" knowledge (score 0 to
132 3). Comparison of knowledge among male and female students was done using Fisher-exact
133 test and ANOVA. While bivariate analysis was used to determine any association between
134 good knowledge and sociodemographic variables.

Comment [I32]: Data base Where? which one?

Comment [I33]: Why?

Comment [I34]: This statement is hanging.

135 3. RESULTS

136 3.1 Socio-Demographic Characteristics

137 Four hundred and sixteen (416) students were enrolled (208 males and 208 females). As
138 shown in Table 1, their ages ranged from 16-47 years, with 71% of the students being within
139 the 20-29 years' age group. The mean age ($\pm$ SD) of the study population was 22.08 ($\pm$ 4.03)
140 years, with a modal age of 21years. The mean age of the female students was 21.48 ($\pm$ 3.94)
141 while that of the male students was 22.69 ($\pm$ 4.03). Ninety eight percent of the students were
142 Christians and single, while only 2% were Muslims, and 2% were married. Among these
143 students, 20% were from the Faculty of Health Sciences, while 80% were from 8 other

144 faculties in the University of Buea. Ninety percent were undergraduate, while 10% were
 145 postgraduate students.

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

VARIABLE		MALES	FEMALES	TOTAL
		Frequency,(%)	Frequency,(%)	Frequency,(%)
		n=208	n=208	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	Single	203 (97.6)	206 (99.0)	409 (98.3)
status	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)
	ASTI	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)
	Undergraduate	186 (89.4)	191 (91.8)	377 (90.6)

Comment [I35]: What is this?

Postgraduate	22 (10.6)	17 (8.2)	39 (9.4)
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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 ~~that there exists a relationship between~~ HPV is the causative agent of and 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 ~~that there is about~~ a vaccine to prevent cervical cancer with 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)	

156

157 As shown in Table 3, only 25.2% of these students had “good” knowledge of cervical cancer;
158 48(23.1%) females and 57(27.4%) males. The number of students in the two groups
159 categorized as having “good” knowledge was not statistically significantly different (P=0.37).
160 Up to 182(43.8%) of these students had “poor” knowledge about cervical cancer without
161 gender difference (P=0.37). Furthermore, 129(31%) of the students had “fair” knowledge of
162 the disease, and there was no statistically significant gender difference in the number of male
163 and female with fair knowledge (P=0.06). The mean knowledge score of these students was
164 below average (4.48/10). The mean score for females was slightly higher than that for males,
165 that is, 4.51/10 and 4.45/10 respectively, but this was not statistically significantly different
166 (P= 0.81). Using bivariate analysis to determine the association between “good” knowledge
167 and socio-demographics factors, and there was a strong association between being a health
168 science student and having “good” knowledge (P<0.001).

169

170

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

Categories	Scores	Females,	Males	Total	P-value
		Frequency,(%)	Frequency,(%)	Frequency,(%)	Fisher-

		n=208	n=208	N=416	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

172

173 3.3 Knowledge on risk factors of cervical cancer

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

180 **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

181

182 3.4 Attitudes towards Pap Smear screening

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

191 3.5 Practice of Pap smear

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

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

Barriers	Frequency	Percentage
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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

197

198 4. DISCUSSION AND CONCLUSION

199 This cross-sectional study was conducted to assess the knowledge of cervical cancer and its
200 risk factors, and attitudes and practices toward Pap smear screening among male and female
201 University students, and to evaluate if there is any gender difference in the knowledge.

Comment [I36]: Don't you think this is a repetition?

202 Socio-demographic characteristics

203 The mean age of the study population was 22.08 (± 4.03) years, and 21.48 (± 3.94) and 22.69
204 (± 4.03) years in the female and male groups respectively. The dominant age group was 20 to
205 29 years; this was similar to the mean age of 23.8 years and the same dominant age group
206 obtained by Akujobi *et al* in Nigeria [11]. However, this was higher than the mean age of
207 19.47 years obtained by Hoque *et al*. in South Africa [20], and lower than the mean age of
208 32.3 years obtained by Ekane *et al* in Buea Cameroon [14]. These differences could be due to
209 the fact that, Hoque *et al* studied only first year university students who are much younger
210 than the postgraduate as well as 2nd and 3rd year students in this study. While Ekane *et al* did
211 a community-based study and enrolled older women within the reproductive age [14].
212 Majority of the participants 408(98%) were Christians and single; this was similar to other
213 studies carried out in other parts of Africa [11,20]. The predominance of Christian
214 participants could be due to the choice of the geographical area where the study was carried
215 out. While participants being mainly single is expected for a University milieu.

216 Knowledge on cervical cancer

217 Only 25.2% (23.1% females and 27.4% males) of participants had good knowledge of
218 cervical cancer, while 43.8% of participants had poor knowledge of cervical cancer.
219 Nakibuule *et al* in-Kampala Uganda, revealed a lower knowledge; were only 9.9% (11.8%
220 women, and 8.1% men) of participants had good knowledge [21]. The findings in this study
221 were also similar to those of Ekane *et al* in Buea Cameroon, were 40.7% of participants had
222 poor knowledge on cervical cancer [14]. Low knowledge was also reported by Tebeu *et al* in
223 the Far North region of Cameroon among women [22]. These similarities could be due to the
224 fact that these studies were carried out in the same country. Pertaining to having good
225 knowledge of cervical cancer, there was a statistically significant difference among students
226 of Faculty of Health Sciences and those from other faculties ($P<0.001$). Adanu *et al* in Ghana,
227 Medeiros *et al* in 2010 in Portugal, also reported that health science students had good
228 knowledge of cervical cancer compared to non-health science students [8,23]. This could be
229 due to the fact that health science students have courses where they are being taught about
230 this disease.

231 The mean score of the participants as regards knowledge was below average (4.48/10) for the
232 study population. The mean score of female students was slightly higher than that of male
233 students, 4.51/10 to 4.45/10 respectively. Medeiros *et al* in 2010 in Portugal, and Rosser *et al*
234 in 2014 in Kenya, also reported a higher mean score among females compared to males
235 [8,24]. This higher knowledge score among females could be due to the fact that, being a
236 female pathology, women probably showed much interest in learning about the disease
237 compared to their male counterpart. There was no statistically significant gender difference
238 with respect to the mean score of the two groups. However, Medeiros *et al* in Porto Portugal
239 had a statistically significant gender difference in the mean scores. This could be due to the
240 fact that, Medeiros *et al* worked with a larger sample size of 1706 students [8].

Comment [I37]: Avoid segmenting your discussion into sub-headings. Let it flow with only paragraphs

Comment [I38]: Repeating result

Comment [I39]: Results in discussion?

Comment [I40]: This discussion lacks cohesion. Some of the sentences hanging without appropriate interpretation of the results.

241 In this study, only 37% of participants had heard about Human Papilloma Virus (HPV). This
242 was low compared to the 54% obtained in Portugal [8]. This discrepancy in findings could be
243 attributed firstly to the fact that Portugal is a high-income country that has implemented
244 multiple cervical cancer health programs. Secondly, more than half of their participants were
245 health science students. Our participants had a low knowledge about a link between HPV and
246 cervical cancer, as up to two-third of them didn't know that HPV was the cause of cervical
247 cancer. This was in line with finding from another part of Africa [25].

248 Approximately 37% of these students knew that there is a vaccine for the prevention of
249 cervical cancer. This was higher than the study conducted by Wright *et al* in Lagos in 2014
250 where only 6% of participants had heard of a vaccine for cervical cancer [26]. Recent
251 information as regards prevention of cervical cancer by immunisation could explain this
252 difference. Our findings was however lower than that of Abdul-Aziz in 2014 in Yemen,
253 where up to 70% of participants knew there is a vaccine for the prevention of cervical cancer
254 [27]. Furthermore, these discrepancies could be due to the fact that, Wright *et al* did a
255 community base study where more than 50% of the participant had not been educated beyond
256 secondary school. On the other hand, Abdul-Aziz recruited reproductive health clients who
257 must have had access to information from physicians and other health personnel's. Secondly,
258 more than half of their participants were graduates.

259 **Risk factors of cervical cancer**

260 More than half of the students did not know most of the risk factors of cervical cancer, and
261 there was no statistically significant gender difference in their responses. Multiple sexual
262 partner was the most known risk factor identified by 64% of participants, early sexual
263 intercourse by 47%, and smoking by 47%. We had much similarities with the findings of
264 Medeiros *et al* where 62% identified multiple sexual partner as a risk factor of cervical

cancer, early sexual intercourse by 43%, and smoking by 40% [8]. Our findings were however higher than that obtained by Hoque *et al* in South Africa where only 22% identified multiple sexual partner as a risk factor, early sexual intercourse by 19%, and smoking by 10% [20]. This difference could be due to the fact that Hoque *et al* surveyed more naïve first year university students. Only 16% of these students identified multiple deliveries as a risk factor of cervical cancer, and family history was identified by 35% of participants. This mirrored the findings of Ekane *et al* in 2015 in Buea where family history and multiple deliveries was considered a risk of cervical cancer by 35% and 13.3% of participants respectively [14]. 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* in 2014, where 93.6% of participants had no knowledge on the risk factors of cervical cancer [28]. 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 secondary level of education.

Pap smear screening and cervical cancer prevention

About 66% of these students believed Pap smear was beneficial in preventing cervical cancer. These findings was lower compared to the findings of McCarey *et al* in 2011 in Yaoundé Cameroon where 90% of the participants believed Pap smear screening offers benefits in the prevention of cervical cancer [13]. 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% [11,14,21,25,26,29]. 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

289 programs and mass media campaigns. Contrary to our findings, Twinn *et al* reported an
290 uptake of 59% among Hong Kong women [30]. This high uptake is due to the fact that the
291 Hong Kong Cancer Fund launched a territory wide cervical cancer screening program that
292 has been operational since 2004.

293 Several factors were mentioned by the female participants as reasons for the low uptake of
294 Pap smear test. The cost of Pap smear screening was the dominant barrier among our
295 participants. Other barriers were; Pap smear test being an embarrassing test, painful, the fear
296 of having a positive test result, lack of information on screening programs, ignorance on the
297 part of the population and religious beliefs. These findings were similar to studies in other
298 parts of Africa where the same barriers to Pap smear screening were reported [11,14,25,31].
299 This could be due to similar cultural, religious, and social norms among most sub-Saharan
300 African countries.

301 **Conclusions**

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

306 **CONSENT**

307 Informed consent was obtained from all the participants prior to enrolment. Confidentiality
308 was ensured by coding questionnaires. They were also reassured that the information given
309 will be used solely for research purposes

310

311 **ETHICS APPROVAL**

312 Ethical clearance was obtained from the Faculty of Health Science Institutional Review
313 Board (N^o 2017/ 003/UB/SG/IRB/FHS) for the ethics of research involving human
314 participants, of the University of Buea.

Comment [I41]: These are integral aspects of the methods and shouldn't come here.

315 AVAILABILITY OF DATA AND MATERIALS

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

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