Original Research Article

Determinants of Voluntary HIV/AIDS Counseling and Testing among university students in Ghana

ABSTRACT

Aim: The onset of the new global pandemics such as COVID-19 and Ebola may have shifted attention from factors affecting voluntary counseling and testing (VCT) for HIV/AIDS, especially among university students. The study sought to determine the factors influencing VCT uptake among university students.

Study design: This was a cross-sectional study

Place and Duration of Study: The study was conducted at the University for Development Studies, from May to June 2020.

Methodology: The study population was 119 (males: 71.4% and females: 28.6%) aged between 20 to 45 years. Data were collected using a pre-tested, structured questionnaire.

Results: Males were less likely to obtain information regarding VCT from the hospital as compared to the media [OR: 0.193(95%CI: 0.041-0.914)]. A student who was informed regarding VCT [OR: 6.833(95%CI 1.258-37.119)], a student who knew where VCT services were provided [OR: 9.336(3.002-29.032)], a student who was willing to take an HIV test [OR: 4.400(1.515-12.777)] and a student who tested for HIV on campus [OR: 5.455(1.930-15.418)] had greater odds of VCT uptake. However, the odds that a student tested for HIV was less for other reasons either than medical [OR: 0.284(0.084-0.959)].

Conclusions: The findings of this study are useful for healthcare providers, non-governmental organizations, policymakers and university management regarding HIV infection prevention and control among students.

Keywords: Voluntary counselling and testing, HIV/AIDS, University students, Uptake, Ghana

1.0 INTRODUCTION

Sub-Saharan Africa is the worst affected by the HIV/AIDS pandemic, especially among young adults between the ages of 15-24years (Organization & UNICEF, 2002). According to the 2019 fact sheet of the Ghana AIDS Commission, the national prevalence of HIV/AIDS was 2.0%, however, the prevalence was 1.7% for people aged from 15-49 years. Young adults between 15-24yrs contributed to 28.0% of all new infections in 2019 and most university students are within this age bracket (Ali et al., 2019). University students are mostly single and usually live alone without parental control, usually for the first time. The thrill over their 'newly acquired independence' may lead them to risky sexual behaviour fueled by their exposure to inappropriate media content, peer pressure, and the joy of experimenting and exploring, particularly regarding sex (Imaledo et al., 2012; Mill & Anarfi, 2002; Sadgrove, 2007; Tagoe & Aggor, 2009). The likelihood of contracting sexually transmitted diseases (STDs) including HIV/AIDS is therefore high among university students and this phenomenon has been a public health concern in Ghana (Oppong Asante, 2013). The fight against HIV/AIDS cannot be fought without the contribution of university students because they form an important constituency in the intervention process(de Beer et al., 2012)

The uptake of voluntary HIV/AIDS counselling and testing (VCT) among university students is low according to studies (Fikadie et al., 2014; Peltzer et al., 2004; Tagoe & Aggor, 2009). There are several barriers to VCT uptake among university students (Ndabarora & McHunu, 2014). The false sense of low risk among some students may lead them to believe they cannot contract HIV (Khawcharoenporn et al., 2016; Lalo et al., 2020). Socio-cultural and

religious beliefs regarding HIV/AIDS and testing may also be a barrier. Major among these barriers is the fear of stigmatization, discrimination, and rejection by family, friends, and society if one is found to be HIV positive(Ulasi et al., 2009). These factors may prevent university students from accessing VCT services even when they are available and free. The lack of VCT facilities, trained personnel, and other resources on university campuses also militate against VCT uptake among students. The traditional model of disseminating HIV/AIDS-related information through formal workshops, conferences, and talks is not also helpful. University students have newer channels of accessing information mainly through social media and the internet (Abiodun et al., 2014; Chng et al., 2005). Therefore, there may be under-reporting of HIV/AIDS prevalence among university students due to occult HIV infection as a result of the many barriers to the uptake of VCT.

The global campaign against HIV/AIDS and particularly in Ghana is waning primarily due to the shortage of funds to sustain campaigns and improved treatment methods such as anti-retroviral therapy (ARVs). Sensational reports from the media regarding emerging pandemics such as Ebola and COVID-19 have made HIV/AIDS a lesser evil. Although there has been more awareness regarding HIV/AIDS in Ghana since 2003, VCT uptake is still poor among university students and young people because knowledge of HIV and VCT does not usually translate into VCT uptake (DiClemente, 1991; Koku, 2011; Onah et al., 2004; Oppong Asante, 2013). The reduction in sensitization programs on HIV/ADIS may reduce the level of knowledge and awareness of university students regarding the pandemic. These factors may create a false sense of low risk for HIV and a culture of complacency among university students. This study was therefore conducted to assess the determinants of VCT uptake among university students in Ghana in the face of reduced media campaigns, sensitization, and the new global pandemics.

2.0 MATERIALS AND METHODS

2.1 Study design and settings

This cross-sectional study was conducted from May to June 2020 at the University for Development Studies (UDS), Tamale campus. The University for Development is a multidisciplinary university with two campuses in Tamale and one campus in Nyankpala, all in the Northern region of Ghana. The university offers both under- and postgraduate programs in Medical, Agricultural and Educational disciplines. The university admits students from all parts of Ghana and some from other African countries such as Nigeria and Kenya (UDS, 2020).

2.2 Participants

The study population consisted of 119 students of whom 28.6% (34/119) were female and 71.4% (85/119) were male. The study was open to all students who were willing to participate. To be eligible for the study, however, one must be an identifiable student of UDS, either persuading an undergraduate or postgraduate program. Sample selection was not restricted by a student's program of study. Students perusing any program including Doctor of Medical Laboratory Sciences, Nutrition, Nursing, Medicine or Education were all eligible. However, to ensure we had a comparable number of males and females participating, the sampling process was stratified into male and female after which a convenient sampling method was then used to select the participants.

2.3 Data sources

The data were collected using a semi-structured self-administered questionnaire. The researchers sought permission from lecturers to use the last 10 minutes of their lecture time to educate students about the study. Students were pre-informed through their class representatives before the visit of a member of the research team to their class. The students were given orientation on the structure of the questionnaire and how to fill it. They were also made to know that participation was voluntary and they reserved the right to participate or decline. The students were assured that the study was going to be anonymous

and the confidentiality of their information was assured. The questionnaire was pre-tested with a small group of students. It was observed at the pre-testing stage that students preferred an electronic version of the questionnaire since most of the students used social media and were more likely to participate in the study if the questionnaire was being posted on their class social media platforms. The questionnaire was then adjusted for clarity and coded in Google form before it was posted on the students' class platform for volunteers to complete.

2.4 Statistical methods

The data was collected in Microsoft Excel and were then dummy coded. The data was then exported into IBM SPSS v23 (SPSS Inc., Chicago, IL, USA) for analysis. Summary statistics of the variables were then presented frequency (per cent). Logistic regression analysis was performed to establish associations between the uptake of VCT and other variables. For all comparisons, a P <0.050 was considered statistically significant.

3.0 RESULTS

3.1 Participants

The total number of participants was initially 133. After the questionnaires were vetted, 4 (3.0%) did not provide all sociodemographic data, 6 (4.5%) and 4(3.0%) provided less than 50% of the information needed in sections 2 and 3 of the questionnaires respectively. In the end, 119 participants were used for the study.

3.2 General characteristics of the study population

The general characteristics of the study population are shown in Table and Figure 1. Males constituted a majority of the study population (71.4%). A large portion of the students was between the ages of 25 to 30 years (51.3%) and the majority were single (70.6%). Most of the students were informed regarding VCT (70.6%) or knew where VCT services were provided (84.9%). Also, from Figure 1, most of the students who were enrolled in the study obtained their information regarding VCT from the hospital (48.7%).

Table 1. General characteristics of the study population

Variable	Frequency n (%)
Age (years)	
<25	33(27.7)
25 - 30	61(51.3)
>30	25(21.0)
Sex	
Female	34(28.6)
Male	85(71.4)
Religion	
Christian	24(20.2)
Islam	94(79.0)
Marital status	
Single	84(70.6)
Married	35(29.4)
Are you informed about VCT?	
No	7(5.9)
Yes	112(94.1)
Do you know where VCT is done?	
No	18(15.1)
Yes	101(84.9)
Is testing for HIV important?	
No	5(4.2)

Variable	Frequency n (%)
Yes	114(95.8)
Will you take an HIV test?	
No	17(14.3)
Yes	102(85.7)
Why wouldn't you test for HIV?	
Fear	29(24.4)
Believes	29(24.4)
Other's bad experiences	47(39.5)
Have you tested for HIV?	
No	35(29.4)
Yes	84(70.6)
Should HIV/AIDS be a course of study?	
No	23(19.3)
Yes	96(80.7)

Results were presented as frequencies (per cent).

3.3 Sources of VCT-related information

As shown in figure 1, the majority of the respondents indicated that they obtained their information regarding VCT from the hospital (48.7%) followed by friends (22.7%), the media (16.0%), and then non-governmental organizations (NGOs) which formed only 12.6%.

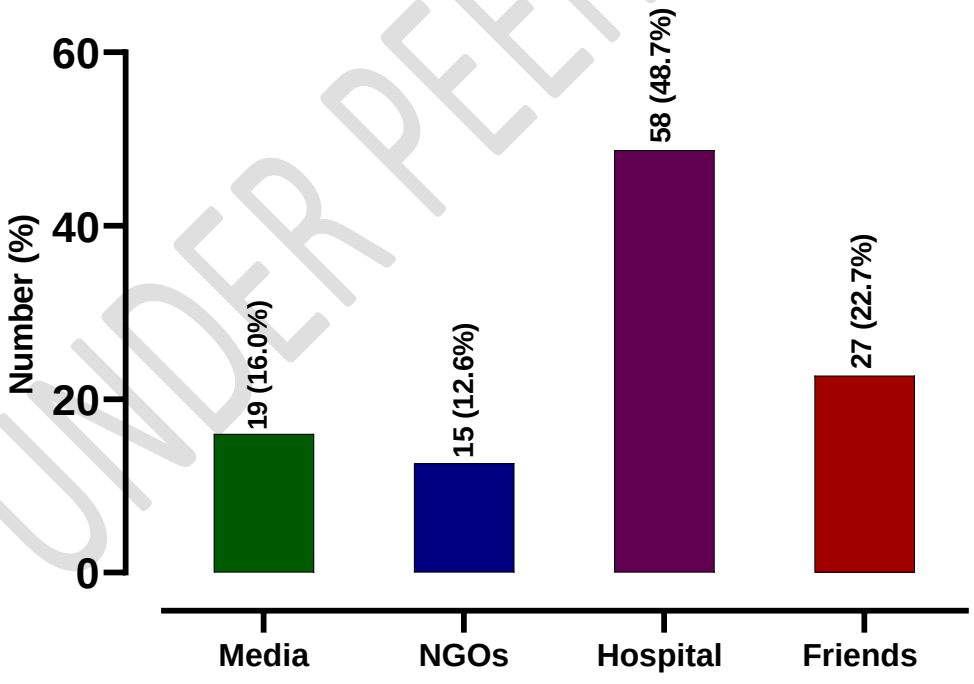

Figure 1. Frequency distribution of the sources of information regarding voluntary counseling and testing for HIV/AIDS among the participants

3.4 Uptake of VCT between males and females

The association between the uptake of VCT among males and females is shown in Table 2. The odds that males, relative to females, will obtain their VCT related information from the hospital was less compared to the media [OR: 0.193(0.041-0.914)].

Table 2. Determinants of VCT uptake stratified by sex

Variable	Have you tested for HIV?			
	n	Female	Male	OR (95%CI)
Is testing for HIV important?				
No	5	1(20.0)	4(80.0)	1
Yes	114	33(28.9)	81(71.1)	0.614(0.066-5.697)
What is your source of information?				
Media	19	2(10.5)	17(89.5)	1
NGO	15	1(6.7)	14(93.3)	1.647(0.135-20.116)
Hospital	58	22(37.9)	36(62.1)	0.193(0.041-0.914) *
Friends	27	9(33.3)	18(66.7)	0.235(0.044-1.249)
Will you take the HIV test?				
No	17	3(17.6)	14(82.4)	1
Yes	102	31(30.4)	71(69.6)	0.491(0.132-1.831)
Have you tested for HIV?				
No	35	7(20.0)	28(80.0)	1
Yes	84	27(32.1)	57(67.9)	0.528(0.205-1.350)
What is the reason for testing for HIV?				
Medical	28	11(39.3)	17(60.7)	1
Fear	45	14(31.1)	31(68.9)	1.433(0.534-3.843)
Other	46	9(19.6)	37(80.4)	2.660(0.929-7.614)
Have you tested for HIV on campus?				
No	74	19(25.7)	55(74.3)	1
Yes	45	15(33.3)	30(66.7)	0.961(0.307-1.553)
Do you trust the VCT personnel?				
No	29	8(27.6)	21(72.4)	1
Maybe	42	10(23.8)	32(76.2)	1.219(0.414-3.591)
Yes	48	16(33.3)	32(66.7)	0.762(0.277-2.097)
Why wouldn't you test for HIV?				
Fear	29	7(24.1)	22(75.9)	1
Believes	29	6(20.7)	23(79.3)	1.220(0.354-4.203)
Other's bad exp	47	17(36.2)	30(63.8)	0.561(0.199-1.585)
Should HIV/AIDS be made as a course of study?				
No	23	4(17.4)	19(82.6)	1
Yes	96	30(31.3)	66(68.8)	0.463(0.145-1.479)

Results were presented as frequencies (per cent). OR; odds ratio, CI; confidence interval. Significant at the level P<0.050

3.5 Determinants of willingness to test for HIV

From Table 3, the odds that a student will be willing to take an HIV test was less if the student was informed regarding VCT [OR: 0.190(0.039-0.942)]. However, the willingness to

take an HIV test had greater odds if a student knew where VCT services were provided [OR:5.791(1.832-18.304)].

Table 3. Determinants of willingness to take an HIV test among the study population

Variable	Will you take an HIV test?			
	n	No	Yes	OR (95%CI)
Age (years)				
<25	33	3(9.10)	30(90.9)	1
25 - 30	61	9(14.8)	52(85.2)	0.578(0.145-2.301)
>30	25	5(20.0)	20(800)	0.400(0.086-1.864)
Sex				
Female	34	3(8.8)	31(91.2)	1
Male	85	14(16.5)	71(83.5)	0.491(0.132-1.831)
Marital status				
Single	84	12(14.3)	72(85.7)	1
Married	35	5(14.3)	30(85.7)	1.000(0.324-3.086)
Are you informed about VCT?				
No	7	3(42.9)	4(57.1)	1
Yes	112	14(12.5)	98(87.5)	0.190(0.039-0.942) *
Do you get enough VCT information on campus?				
No	74	13(17.6)	61(82.4)	1
Yes	45	4(8.9)	41(91.1)	2.184(0.666-7.170)
What is your source of information on VCT?				
Friends	27	3(11.1)	24(88.9)	1
Media	19	5(26.3)	14(73.7)	0.350(0.072-1.692)
NGO	15	1(6.7)	14(93.3)	1.750(0.166-18.482)
Hospital	58	8(13.8)	50(86.2)	0.781(0.190-3.211)
Do you know where VCT is done?				
No	18	7(38.9)	11(61.1)	1
Yes	101	10(9.9)	91(90.1)	5.791(1.832-18.304) **
Why wouldn't you test for HIV?				
Fear	29	6(20.7)	23(79.3)	1
Believes	29	3(10.3)	26(89.7)	2.261(0.507-10.084)
Other's bad exp	47	6(12.8)	41(87.2)	1.783(0.515-6.169)
What will motivate you to take the HIV test?				
Education	89	26(29.2)	63(70.8)	1
Privacy	17	4(23.5)	13(76.5)	0.411(0.112-1.509)
Other	13	4(30.8)	9(69.2)	0.422(0.099-1.796)
Are there VCT centres on campus?				
No	62	8(12.9)	54(87.1)	1
Yes	57	9(15.8)	48(84.2)	0.790(0.282-2.210)
Are campus VCT centres enough?				
No	77	13(16.9)	64(83.1)	1
Yes	42	4(9.5)	38(90.5)	1.930(0.587-6.345)

Results were presented as absolute numbers (per cent). OR; odds ratio, CI; confidence interval. *Significant at the level P<0.050, **Significant at the level P<0.010Z

3.6 Determinants of VCT uptake

Factors that were associated with the uptake of VCT among students is shown in Table 4. Students who were more informed regarding VCT [OR: 6.833(1.258-37.119)] and students who knew where VCT service was provided [OR: 9.336(3.002-29.032)] had greater odds to have tested for HIV. Also, students who were willing to take the HIV test [OR: 4.400(1.515-12.777)] and students who took their HIV test on campus [OR: 5.455(1.930-15.418)] had odds to have tested for HIV. However, the reason a student tested for HIV was more related to medical than to other factors [OR: 0.284(0.084-0.959)]. Moreover, the odds that a student took the HIV test was reduced if the testing was done by the staff at the hospital relative to a VCT mobile team [OR: 0.225(0.072-0.704)].

Table 4. Determinants of VCT uptake among the study population

Variable	**Have you tested for HIV?**			
	N	**No**	**Yes**	**OR (95%CI)**
Age(years)				
<25	33	11(33.3)	22(66.7)	1
25 - 30	61	17(27.9)	44(72.1)	1.294(0.158-3.231)
>30	25	7(28.0)	18(72.0)	1.286(0.414-3.996)
Sex				
Female	34	7(20.6)	27(79.4)	1
Male	85	28(32.9)	57(67.1)	0.528(0.205-1.360)
Marital Status				
Single	84	29(34.5)	55(65.5)	1
Married	35	6(17.1)	29(82.9)	2.548(0.949-6.841)
Are you informed about VCT?				
No	7	5(71.4)	2(28.6)	1
Yes	112	30(26.8)	82(73.2)	6.833(1.258-37.119) *
What is your source of information?				
Friends	27	7(25.9)	20(74.1)	1
Media	19	10(52.6)	9(47.4)	0.315(0.091-1.095)
NGO	15	7(46.7)	8(53.3)	0.400(0106-1.513)
Hospital	58	11(19.0)	47(81.0)	1.495(0.507-4.415)
Do you know where VCT is done?				
No	18	13(72.2)	5(27.8)	1
Yes	101	22(21.8)	79(78.2)	9.336(3.002-29.032) ***
Will you take the HIV test?				
No	17	10(58.8)	7(41.2)	1
Yes	102	25(24.5)	77(75.5)	4.400(1.515-12.777) **
Where were you tested?				
Public health facility	74	17(23.0)	57(77.0)	1
Private health facility	17	6(35.3)	11(64.7)	0.547(0.176-1.697)
Mobile team	23	8(34.8)	15(65.2)	0.559(0.206-1.543)
Why did you take the test?				
Medical	28	4(14.3)	24(85.7)	1
Fear	45	14(31.1)	31(68.9)	0.369(0.108-1.266)
Other	46	17(37.0)	29(63.0)	0.284(0.084-0.959) *
Why wouldn't you test for HIV?				
Fear	29	5(17.2)	24(82.8)	1
Believes	29	10(34.5)	19(65.5)	0.396(0.116-1.355)
Other's bad experience	47	15(31.9)	32(68.1)	0.444(0.142-1.393)
Who tested you?				
VCT Mobile team	59	14(23.7)	45(76.3)	1
Staff at Health facility	39	9(23.1)	30(76.9)	0.225(0.072-0.704) *
Other personnel	21	12(57.1)	9(42.9)	0.964(0.371-2.509)
Did you pay for the test?				
No	76	15(19.7)	61(80.3)	1

Yes	28	8(28.6)	20(71.4)	0.615(0.227-1.664)
Have you tested for HIV on campus?				
No	74	30(40.5)	44(59.5)	1
Yes	45	5(11.1)	40(88.9)	5.455(1.930-15.418) **

Results were presented as absolute frequency (per cent). OR; odds ratio, CI; confidence interval. Significant at the level P<0.050, **Significant at the level P<0.010, ***Significant at the level P<0.001.

4.0 DISCUSSION

This study aimed to determine the factors influencing VCT uptake among university students. It was observed that the majority of the students were single and were between the ages of 25-30 years. The number of students who were informed about VCT or knew where VCT was done formed a larger portion of the study sample. Students who were willing to take the HIV test and those who tested for HIV were more than those who were not willing to test or haven't tested for HIV. Male students were more likely than females to access VCT-related information from the media. Knowledge of VCT was associated with VCT uptake and knowing where VCT was done was also associated with both the willingness to test for HIV and testing for HIV. Most students were tested for HIV based on medical reasons. Moreover, VCT services provided by mobile teams or on the university campus were associated with VCT uptake.

A significant number of the study population were single and young. This was consistent with other studies (Oppong Asante, 2013). This was expected because most university students are usually young and single and those who are married are mostly students pursuing top-up programs or post-graduate studies. This is a significant finding that should make authorities focus more on educating university students about HIV and VCT. Most university students are leaving home for the first time. The thrill of their newly found “independence”, peer influence, and their quest to explore the unknown make them more likely to engage in risky sexual behaviour and therefore more likely to contract sexually transmitted infections including HIV (Woldeyohannes et al., 2017). Also, male students had greater odds than females to access VCT related information from the media compared to the hospital. Previous studies have shown that university students were more likely to obtain HIV/AIDS-related information from media (social media, television, and print) than from other sources (Chng et al., 2005; de Beer et al., 2012; Laryea et al., 2014; Nwokoji & Ajuwon, 2004; Sallar, 2009). Mass-media campaigns have had a significant influence on social norms and also, in raising awareness of health services (Abdool Karim & Meyer-Weitz, 2009). The differences in sources of information regarding VCT could be due to the general observation that females are more concerned about their health and are more likely to visit the hospital to seek information regarding VCT (Oppong Asante, 2013). Traditionally, males are not usually involved in domestic choirs and are most likely to be watching television or surfing the internet and social media during vacations where they probably will be exposed to information regarding VCT. Stakeholders should recognize the variations in information sources among university students. Information on VCT targeting males should be made available through mass media and the internet, while VCT related information for females should be channelled through the hospitals.

A larger proportion of the students were informed about VCT and also, knew where VCT services were provided (Ntata et al., 2008). This was consistent with previous studies (Anwuri et al., 2017; de Beer et al., 2012; Fikadie et al., 2014; Oppong Asante, 2013; Uzochukwu et al., 2011; Woldeyohannes et al., 2017) but contrary to others (Charles et al., 2009; Cheruiyot et al., 2019; Fikadie et al., 2014). The higher VCT knowledge and uptake could be attributed to the efforts of the National HIV/AIDS control program (NACP) with support from local and international partners which have held a sustained sensitization program on HIV/AIDS in Ghana over the years through the mass media and the hospitals. In

some instances, HIV/AIDS clubs were formed on the campuses of secondary and tertiary institutions for peer-to-peer education among students (Oppong Asante, 2013). The odds that a student had tested for HIV previously were greater if he/she had knowledge of VCT and knew where to access VCT services. This was also observed in similar studies among university students (Cheruiyot et al., 2019; Oppong Asante, 2013). Although the willingness to take an HIV test was associated with knowledge of where VCT services were provided, it was, however, not associated with knowledge of VCT. This has been demonstrated by previous studies which showed that HIV knowledge does not always translate into willingness to test for HIV or VCT uptake. Previous studies, including one study among private university students in Ghana, have shown that although the majority of had knowledge regarding HIV, less than half had previously tested for HIV (Oppong Asante, 2013; Tagoe & Aggor, 2009). Moreover, increased knowledge and awareness of HIV among university students do not always predict behavioural change. Expressing a willingness to test for HIV does not also translate into actually testing for HIV, and this usually constitutes a major barrier to VCT uptake among students (DiClemente, 1991; Khawcharoenporn et al., 2016; Onah et al., 2004).

Testing for HIV on campus or VCT services that were provided by a mobile team increased the odds that a student tested for HIV previously. The model used in VCT for HIV does have an effect on the uptake of VCT among university students. A study by Cheruiyot et al. (2019) revealed that the majority of students were familiar with the mobile VCT model, which could have accounted for the high VCT uptake among the students in their study. Similar studies have shown that students prefer door-to-door mobile VCT services because they were convenient, accessible, and eliminated the fear of being seen at a VCT centre. Door-to-door VCT services,, reduced the fear of stigmatization which is one of the major barriers to VCT uptake among students (Angotti et al., 2009; Meda, 2013). The Ghana Health Service (GHS) with support from the NACP and some NGOs regularly embark on sensitization campaigns on VCT which are usually termed as “Know your status” where mobile VCT teams move to campuses of universities and schools to sensitize students and to offer them free VCT services for HIV. In addition to that, most students’ groups, as part of their week-long programs to create awareness regarding their future professions, do include free medical screening for students and HIV test is usually a routine test in such programs. Stakeholders and school management should therefore focus more on establishing VCT mobile services on campuses since they have been shown to provide increased access to VCT(Payne et al., 2006).

The current study has some strengths: this study adds to the few studies that have been conducted among university students in the northern part of Ghana. The study has also provided useful information regarding the need for providing VCT services on university campuses. The authors, however, recognize that there are some limitations in the study: this was a cross-sectional study among university students; therefore, a causal relationship cannot be established; the results of this study cannot also, be extrapolated to all university students in Ghana since it was a single university study. Also, the results largely depended on the responses of the participating students, and such recall bias and withholding of information cannot be entirely ruled out.

5.0 CONCLUSION

The uptake of VCT among university students can be enhanced through education, particularly in the media for males and also through the hospitals for females. The establishment of mobile VCT teams to offer VCT services on campus will greatly help improve VCT uptake among university students.

CONSENT

Informed consent was obtained from all the participants before the study.

ETHICAL APPROVAL

All procedures performed in studies involving human participants were done following the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Institutional Review Board of the University for Development Studies (UDS), Tamale.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

REFERENCE

Abdool Karim, Q., & Meyer-Weitz, H. A. (2009). Interventions with youth in high prevalence areas. HIV preventions: A comprehensive approach. Edited by: Mayer K, Pizer HF. 2009. In: London: Academic.

Abiodun, O., Sotunsa, J., Ani, F., & Jaiyesimi, E. (2014). Knowledge of HIV/AIDS and predictors of uptake of HIV counseling and testing among undergraduate students of a privately owned university in Nigeria. *BMC Res Notes*, *7*, 639. https://doi.org/10.1186/1756-0500-7-639

Ali, H., Amoyaw, F., Baden, D., Durand, L., Bronson, M., Kim, A., . . . Swaminathan, M. (2019). Ghana's HIV epidemic and PEPFAR's contribution towards epidemic control. *Ghana medical journal*, *53*(1), 59-62.

Angotti, N., Bula, A., Gaydosh, L., Kimchi, E. Z., Thornton, R. L., & Yeatman, S. E. (2009). Increasing the acceptability of HIV counseling and testing with three C's: convenience, confidentiality and credibility. *Social Science & Medicine*, *68*(12), 2263-2270.

Anwuri, G. C., Dunn, M. S., & Schulze, F. (2017). Determinants of Voluntary HIV/AIDS Counseling and Testing among Community College Students in the United States. *Int J MCH AIDS*, *6*(2), 109-120. https://doi.org/10.21106/ijma.212

Charles, M. P., Kweka, E. J., Mahande, A. M., Barongo, L. R., Shekalaghe, S., Nkya, H. M., . . . Mahande, M. J. (2009). Evaluation of uptake and attitude to voluntary counseling and testing among health care professional students in Kilimanjaro region, Tanzania. *BMC Public Health*, *9*, 128. https://doi.org/10.1186/1471-2458-9-128

Cheruiyot, C., Magu, D., Mburugu, P., & Sagwe, D. (2019). Uptake and utilization of institutional voluntary HIV testing and counseling services among students aged 18-24 in Kenya's public Universities. *Afr Health Sci*, *19*(4), 3190-3199. https://doi.org/10.4314/ahs.v19i4.42

Chng, C. L., Eke-Huber, E., Eaddy, S., & Collins, J. R. (2005). Nigerian college students: HIV knowledge, perceived susceptibility for HIV and sexual behaviors. *College Student Journal*, *39*(1), 60-72.

de Beer, I. H., Gelderblom, H. C., Schellekens, O., Gaeb, E., van Rooy, G., McNally, A., . . . Tobias, R. W. F. (2012). University students and HIV in Namibia: an HIV prevalence survey and a knowledge and attitude survey. *J Int AIDS Soc*, *15*(1), 9. https://doi.org/10.1186/1758-2652-15-9

DiClemente, R. J. (1991). Predictors of HIV-preventive sexual behavior in a high-risk adolescent population: The influence of perceived peer norms and sexual communication on incarcerated adolescents' consistent use of condoms. *Journal of adolescent health*, *12*(5), 385-390.

Fikadie, G., Bedimo, M., & Alamrew, Z. (2014). Prevalence of Voluntary Counseling and Testing Utilization and Its Associated Factors among Bahirdar University Students. *Adv Prev Med*, *2014*, 906107. https://doi.org/10.1155/2014/906107

Imaledo, J. A., Peter-Kio, O. B., & Asuquo, E. O. (2012). Pattern of risky sexual behavior and associated factors among undergraduate students of the University of Port Harcourt, Rivers State, Nigeria. *Pan African Medical Journal*, *12*(1).

Khawcharoenporn, T., Chunloy, K., & Apisarnthanarak, A. (2016). Uptake of HIV testing and counseling, risk perception and linkage to HIV care among Thai university students. *BMC Public Health*, *16*, 556. https://doi.org/10.1186/s12889-016-3274-8

Koku, E. F. (2011). Stigma, sexual risk and desire for HIV tests in Ghana. *Sex Health*, *8*(1), 110-119.

Lalo, R., Theodhosi, G., & Breshanaj, A. (2020). Health beliefs and barriers related to HIV prevention and screening among students of the University of Vlora: a cross-sectional study. *BMC Public Health*, *20*(1), 1302. https://doi.org/10.1186/s12889-020-09416-8

Laryea, D. O., Awuah, B., Amoako, Y. A., Osei-Bonsu, E., Dogbe, J., Larsen-Reindorf, R., . . . Konney, T. O. (2014). Cancer incidence in Ghana, 2012: evidence from a population-based cancer registry. *BMC cancer*, *14*(1), 362.

Meda, L. (2013). Assessing factors influencing university students to uptake voluntary counselling and testing (VCT) of human immune deficiency virus/acquired immune deficiency syndrome (HIV/AIDS). *Journal of AIDS and HIV Research*, *5*(6), 173-180.

Mill, J. E., & Anarfi, J. K. (2002). HIV risk environment for Ghanaian women: challenges to prevention. *Social Science & Medicine*, *54*(3), 325-337.

Ndabarora, E., & McHunu, G. (2014). Factors that influence utilisation of HIV/AIDS prevention methods among university students residing at a selected university campus. *SAHARA-J: Journal of Social Aspects of HIV/AIDS*, *11*(1), 202-210. https://doi.org/10.1080/17290376.2014.986517

Ntata, P. R. T., Muula, A. S., Siziya, S., & Kayambazinthu, E. E. (2008). Gender differences in university students' HIV/AIDS-related knowledge and sexual behaviours in Malawi: a pilot study. *SAHARA-J: Journal of Social Aspects of HIV/AIDS*, *5*(4), 201-205. https://doi.org/10.1080/17290376.2008.9724920

Nwokoji, U. A., & Ajuwon, A. J. (2004). Knowledge of AIDS and HIV risk-related sexual behavior among Nigerian naval personnel. *BMC Public Health*, *4*(1), 24.

Onah, H. E., Mbah, A. U., Chukwuka, J. C., & Ikeme, A. C. (2004). HIV/AIDS awareness and sexual practices among undergraduates in Enugu, Nigeria. *Niger Postgrad Med J*, *11*(2), 121-125.

Oppong Asante, K. (2013). HIV/AIDS knowledge and uptake of HIV counselling and testing among undergraduate private university students in Accra, Ghana. *Reprod Health*, *10*, 17. https://doi.org/10.1186/1742-4755-10-17

Organization, W. H., & UNICEF. (2002). Young people and HIV/AIDS: Opportunity in crisis. In *Young people and HIV/AIDS: opportunity in crisis* (pp. 27-27).

Payne, N. S., Beckwith, C. G., Davis, M., Flanigan, T., Simmons, E. M., Crockett, K., . . . Sly, K. F. (2006). Acceptance of HIV testing among African-American college students at a historically black university in the south. *J Natl Med Assoc*, *98*(12), 1912-1916.

Peltzer, K., Nzewi, E., & Mohan, K. (2004). Attitudes towards HIV-antibody testing and people with AIDS among university students in India, South Africa and United States. *Indian J Med Sci*, *58*(3), 95-108.

Sadgrove, J. (2007). 'Keeping up appearances': Sex and religion amongst university students in Uganda. *Journal of Religion in Africa*, *37*(1), 116-144.

Sallar, A. M. (2009). Correlates of misperceptions in HIV knowledge and attitude towards People Living With HIV/AIDS (PLWHAs) among in-school and outof-school adolescents in Ghana. *Afr Health Sci*, *9*(2).

Tagoe, M., & Aggor, R. (2009). Knowledge, behaviour, perceptions and attitudes of University of Ghana students towards HIV/AIDS: what does behavioural surveillance survey tell us? *J Health Hum Serv Adm*, 51-84.

UDS. (2020). *Profile of the University for Development studies (online) https://uds.edu.gh/about-us/ [Assessed 19-04-2020]*. Retrieved 19-04-2020 from https://uds.edu.gh/about-us/

Ulasi, C. I., Preko, P. O., Baidoo, J. A., Bayard, B., Ehiri, J. E., Jolly, C. M., & Jolly, P. E. (2009). HIV/AIDS-related stigma in Kumasi, Ghana. *Health & place*, *15*(1), 255-262.

Uzochukwu, B., Uguru, N., Ezeoke, U., Onwujekwe, O., & Sibeudu, T. (2011). Voluntary counseling and testing (VCT) for HIV/AIDS: a study of the knowledge, awareness and willingness to pay for VCT among students in tertiary institutions in Enugu State Nigeria. *Health Policy*, *99*(3), 277-284. https://doi.org/10.1016/j.healthpol.2010.11.007

Woldeyohannes, D., Asmamaw, Y., Sisay, S., Hailesselassie, W., Birmeta, K., & Tekeste, Z. (2017). Risky HIV sexual behavior and utilization of voluntary counseling and HIV testing and associated factors among undergraduate students in Addis Ababa, Ethiopia. *BMC Public Health*, *17*(1), 121. https://doi.org/10.1186/s12889-017-4060-y