

## Original Research Article

### Knowledge of Human Immuno Deficiency Virus (HIV) status and preferred testing approach among men in Bono Region, Ghana

#### ABSTRACT

**Key messages:** add at least three key messages coming from the findings

Comment [N1]: Consider adding this section

**Background:** Countries are making progress ~~towardstoward~~ the global goal of 90% of people with HIV knowing their status by 2020 and 95% by 2030. In 2019 ~~an estimated 7.2 million people globally about~~ 19% of all those ~~living~~ with HIV ~~worldwide~~ were undiagnosed. The study sought to assess the knowledge of HIV status and preferred testing approach among men in the Bono Region, Ghana.

Comment [N2]: The use of 7.2 million and 19% was a bit confusing

**Methods:** A cross-sectional survey involving 403 men aged 18 years and above who were accessing HIV counselling and testing services in seven major health facilities in the Bono region was employed. The data were analysed by using SPSS version 25.0 software with both descriptive and inferential analysis. Data were presented using frequencies, tables and charts. Statistical significance for all testing was set as 0.05.

**Results:** The results revealed that most of the respondents were below 30 years with mean age of 42.5 and standard deviation of 6.8. ~~Also, †~~The ~~current~~ prevalence rate of men who ~~knew~~ ~~know~~ their HIV status in the Bono was 55.6% ~~and~~ the preferred HIV testing approach was self-testing ~~approach~~ (61.3%). The reasons for the preferred approach was privacy (41%) and the predictors of HIV status ~~was~~ awareness (source of knowledge was significant; OR= 0.67(95%CI=0.32,1.4); p-value=0.003. The location of the testing facility was statistically significant with OR= 1.66(95%CI=0.94,2.93); p-value=0.002 as well as marital status and occupation of the respondents were also statistically significant with OR=4.86(95%CI=1.8-79); p-value=0.000 respectively.

Comment [N3]: Some sentences require revising

**Conclusion:** The study concludes that if men are exposed to the facts about HIV testing services, the misconception about the disease will be reduced and more men will be involved in the HIV testing services. The study recommends that management of the health facilities should continue with the education on HIV testing services especially among men who are yet to undertake such services to prevent fear and anxiety.

**Comment [N4]:** This recommendation is good but the authors may consider making some additional recommendations as follows: Policy recommendation and Future research recommendation

Plain English Summary: Kindly add a section under plain English summary

**Comment [N5]:** Consider adding this section

*Keywords: Knowledge; HIV/AIDS; preferred testing and Bono Region*

UNDER PEER REVIEW

## 1. INTRODUCTION

Human immunodeficiency virus (HIV) is an infection that attacks the body's immune system. Acquired immunodeficiency syndrome (AIDS) is the most advanced stage of the disease [41]. HIV targets the body's white blood cells, weakening the immune system. This makes it easier to get sick with diseases like tuberculosis (TB), infections and some cancers [27]. HIV is spread from the body fluids of an infected person, including blood, breast milk, semen and vaginal fluids. HIV can be treated and prevented with antiretroviral therapy (ART) [27]. Untreated HIV can progress to AIDS, often after many years. World Health Organization (WHO) now defines Advanced HIV Disease (AHD) as CD4 cell count less than 200cells/mm<sup>3</sup> or WHO stage 3 or 4 in adults and adolescents. All children with HIV younger than 5 years of age are considered to have advanced HIV disease [21].

The Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) have become a worldwide public health and socioeconomic issue [27]. Three decades after the first case of (AIDS) was reported in 1981, the human species continues to suffer enormous human, economic, and social losses as a result of the disease's lack of a cure [21]. In 1981, HIV and AIDS were discovered for the first time [39]. Over 60 million individuals have become infected, over 30 million have died, and over 16 million children have been orphaned as a result of the disease since then [36]. Many interventions have been implemented around the world to limit exposure to HIV risk factors, but HIV continues to afflict millions of people [27]. There is currently no known HIV vaccine or cure; nevertheless, technology has played a role in transforming HIV, which was formerly considered a death sentence, into a chronic and manageable condition with lower mortality rates [41].

About 4.3 million adults and children who were newly infected with HIV in 2018, increased around 400,000 from 2015 [37]. The worldwide epidemic continues to wreak havoc on Sub-Saharan Africa. Sub-Saharan Africa, with its epicenter in southern Africa, is home to two-thirds (63%) of all adults and children living with HIV worldwide [37]. Southern Africa is home to one-third of all HIV-positive people worldwide (32%), as well as 34% of all AIDS-related fatalities in 2008 [37]. Young people aged 15 to 24 accounts for more than half of all HIV infections worldwide [11]. Every day, more than 6000 young people throughout the world become infected with HIV [37].

This high prevalence of infection is related to the fact that young people are more prone to engage in high-risk behaviors like unprotected sexual activity, which can lead to HIV infection [27]. At the age of 17, more than half of the youth would have had intercourse [34]. Adolescents and youth exhibit substantially more sexual desire and are also more likely to participate in unsafe sexual intercourse [14]. As a result, in terms of transmission, vulnerability, effect, and opportunity for behavior change, young people remain at the epicenter of the pandemic [26]. This means that the epidemic's trajectory will be determined by young people, making them a vital target for HIV prevention and behavior modification programs [26]. HIV counseling and testing creates an environment for teaching and learning about the virus and how it spreads, and the youth profit from their involvement. According to Boswell and Baggaley, HIV Voluntary Counseling and Testing (VCT), often known as HIV counseling and testing (HTS), is the process through which an individual or couple receives counseling in order to make an informed decision about whether or not to get tested for HIV [7].

When it comes to trustworthiness and confidentiality at the HTS center, this option must be fully up to the individual. HTS is about a lot more than just taking blood and giving therapy sessions. Those who test positive or negative for HTS can benefit from it. HTS reduces anxiety, raises clients' awareness of their HIV vulnerability, encourages behavior change, supports early referral for care and support, including antiretroviral (ARV) therapy, and, most importantly, helps communities reduce stigma [27]. Stigma is a problem associated with HIV in the Upper West Region [27]. HIV-positive people are frequently referred to as "muora" women, "lean legs" women, or "lean buttocks" women [27].

Sociodemographic characteristics, proximity to a health facility, HIV-related awareness and knowledge, perception of being at risk of HIV infection, perceived benefits of HTS, and psychosocial factors such as HIV/AIDS-related stigma and discrimination, as well as anxieties about confidentiality, are all known to influence knowledge on HTS uptake [27]. Although the majority of individuals in South Africa are aware about HTS [19], many of them avoid HIV testing due to negative attitudes toward testing services. Barriers to HIV testing have been observed in the health-care system [26]. A study conducted in Uganda found that a lack of confidentiality caused by health workers' apathy, as well as the quality of HIV test findings, were significant factors in reducing VCT use [26]. AIDS-related stigma and discrimination, which influence decisions about HTS and HIV treatment services [34], have a significant impact on an

individual's willingness to engage in HIV testing, treatment, and prevention, all of which would improve that individual's quality of life [41].

From the 2021 national estimates, the estimated adult national HIV prevalence is 1.69%. The number of people living with HIV and AIDS was estimated at 334,713 out of which 29514 (8.8%) of them were children between the ages of 0-14 years. There were 19,931 cases of new HIV infections with 3317 of them being children. However, the estimated number of annual AIDS deaths was 14,181 out of which 2769 were children aged 0-14 years [12]. Bono region has a variable HIV prevalence, which nearly stabilized at 2.0 percent in 2017 and 2018, but rapidly grew to 6% in 2020, more than double the regional prevalence of 2.6 percent in Bono [12].

Additionally, Summerfield [34] points out the advantages of knowledge on HIV status and preferred testing for both individuals and society as a whole. It improves a person's capacity to lower their risk of contracting or transmitting HIV, to get HIV-specific care, treatment, and support, to manage their health, and to make long-term plans. Additionally, getting tested for HIV is essential for gaining access to emotional support, enhancing coping mechanisms for HIV-related anxiety, and boosting motivation to abstain from risky behaviors. Additionally, if pregnant women and their families use such services and become aware of their serostatus, testing makes pregnant women and their families aware of safer options for preventing vertical HIV transmission.

For society, widespread knowledge of one's HIV status can result in better community mobilization against the epidemic, reduce HIV-related stigma and discrimination, and support human rights [26]. Various opinions have been voiced regarding the necessity of HIV testing and counseling. On the one hand, some contend that being aware of one's HIV status encourages individuals to engage in safe sex practices [29]). However, some believe that receiving a positive HIV test result is equivalent to receiving a death sentence, and many people would prefer to remain in the dark about their HIV status [23].

Regardless of the test's results or conclusion, the client learns information that, if the result is negative, can lead to behavior modification in an effort to keep the test results that way. On the other hand, if test results are good, it provides a chance for early treatment and opportunities to also live a longer, healthier life [1]. Regardless of the test's results or conclusion, the client learns information that, if the result is negative, can lead to behavior modification in an effort to keep

the test results that way [1]. On the other hand, if test results are found to be positive, it provides a chance for early treatment and opportunities to also live a longer, healthier life [2].

The value of HIV status awareness as a potent strategy for avoiding HIV and AIDS among men cannot be overstated. The majority of the population, particularly men, find it more difficult to determine their HIV status, even though HIV testing has frequently been employed as a diagnostic tool to confirm AIDS symptoms [3]. As a result, even if more individuals with HIV and AIDS appear to be receiving ART, the goal of world leaders to eradicate the HIV and AIDS pandemic by the year 2030 appears to be failing [4].

Ghana's capacity to lessen HIV and AIDS is undermined, for example, by the low uptake of testing and counseling among students (21% of females and 14% of males). Only 17% of female and 12% of male HIV test participants really follow up with their results. A survey carried out in Ghana found that 78% of respondents had never had their HIV tested and that most respondents were not utilizing the HTC services that were available [6]. Although having knowledge of one's HIV status has many benefits, research [12], has shown that HIV testing can also have negative effects on the person being tested. HIV continues to be a public health threat for many Ghanaian people between the ages of 18 and 49, with females accounting for the majority of those affected [13] despite the efforts of the Ghana National AIDS/STI Control Program to reduce HIV prevalence in Ghana.

From January to June, 2022 alone 23,495 individuals in Ghana underwent HIV testing during the first half of last year [14]. The percentage is 2% of the 948,094 individuals who had HIV testing between January and June of 2022 [12]. The National STIs and HIV/AIDS Control Programme, claim that the number of new infections is too high and that more people need to be made aware of the reality of HIV. Overall, as of December 2021, the estimated population of HIV-positive persons in the country was 350,000, with only 71 percent being identified by the control program [5].

The HIV prevalence in Sunyani (4.2%) is much higher than that of the Brong Ahafo Regional (2.7%) and the national average (2.4%) [6]. Since UNAIDS/WHO released their Policy Statement on HIV Testing in 2004 and the availability of effective treatment increased, HTS services have become more broadly accessible globally (WHO, 2020). Despite this increase in accessibility and interest, HTS service acceptance is still low [2], likely as a result of a lack of knowledge and attitudes toward the condition [8]. Even if the majority of the population is

willing to get tested for HIV or know their status, only a small percentage of people actively use HTS services in Sub-Saharan Africa, according to numerous researches conducted over the past few decades [9]. Around 75% of Africans aged 15 to 49 are uninformed of their HIV status, according to the Regional Office for Africa of the World Health Organization [41]. As a result, there is still a substantial risk of disease transmission and ongoing patient infection [41].

Despite the fact that 76.0 percent of women and 84.1 percent of men in the Bono Region knew where to get an HIV test, only 18.3 percent of women and 8.5 percent of men had ever been tested and received their results [31]. These percentages are frighteningly low, given the importance of HTS uptake and knowing your sero-status [23].

Only a few publications from studies on this topic have been published in Ghana[21]. A cross-sectional survey in Northern Ghana conducted on the use of lay counselors to encourage testing uptake[21], while [18] conducted a survey in Kumasi, Ghana on HIV-related stigma. While it is probable that data on factors influencing HTS uptake has been obtained in the Bono Region, it has not yet been examined and published.

According to annual HIV sentinel surveys carried out by the National AIDS Control Program to track the country's HIV/AIDS epidemic, the prevalence of HIV in the Bono Region increased from 1.7 percent to 4.7 percent between 2013 and 2015 [6]. The Bono Region has surpassed the other Regions, which had a consistently high HIV prevalence during the preceding decade but only 3.6 percent in 2015 [9], to have the third highest HIV burden in Ghana. With a prevalence of 9.6% in 2015, the highest of all 40 sites surveyed, the prevalence of HIV/AIDS at the Bono sentinel site, which is inside the Bono Region, grew significantly from 2013 to 2015 [7]. The incidence of HIV in the Bono Region could rise even more if the Bono Regional Health Directorate does not take any steps to determine the cause of the rise in HIV cases. Finding the causes of the region's low HTS uptake can help with the creation of specialized therapies. As a result, the goal of this study was to evaluate the knowledge and preferred HIV testing approaches among men in Ghana's Bono Region. Also the study determined the current prevalence of men who knew their HIV status in the Bono Region, men's preferred HIV testing approaches, the reasons for men's preferred HIV testing approaches and the predictors of HIV status awareness among men in Bono region.

## 2. METHODS

### 2.1 Study site

The [study was conducted in](#) Bono area [which](#) is one of Ghana's sixteen administrative regions. Bono East region and Ahafo region were formed as a result of the remaining Brong-Ahafo area [10]. The regional capital is Sunyani, commonly known as Ghana's green city. Bono Region shares a boundary with Savannah Region in the north, the Ghana-Côte d'Ivoire international border in the west, Bono East in the east, and Ahafo Region in the south. According to the Ghana statistical service's census of 2021, it has a population of roughly 1,208,649 people.

The Regional Health Directorate's Departments are responsible for providing technical support, monitoring, and supervision of health services supplied in the region's districts, sub-districts, and communities. The region has 12 Municipal/District Health Directorates under the RHD, each headed by a Municipal/District Director of Health Service who supervise, offer technical and administrative assistance, and promote the implementation of health policies and programs throughout the region's districts and sub-districts.

Government, CHAG, private and quasi-government health facilities provide services in the region. The region's total number of facilities is 461. There are 366 GHS facilities, including private (62), CHAG (25) and quasi-government (25). Dormaa (eye, newborn care), Wenchi (urology), and the Bono Regional Hospital are among the health facilities in the region that provide specialised services (various specialties including paediatrics, maxillo facial surgery). All the health facilities in the region provide HIV counseling and testing. The RHD maintains close ties with all other Ministry of Health departments, the local government system, traditional authority and other stakeholders in health, including development partners and civil society in the region, as the body responsible for health services in the region.

### 2.2 Study Design

This study employed descriptive cross-sectional study design whilst the study type was a quantitative. Descriptive cross-sectional survey looks at current challenges, dominant activities, perceptions and behaviors, including ongoing processes and evolving patterns [16]. The descriptive cross-sectional form of survey design deals with concerns about what happens in a situation with regard to factors or circumstances [17]. Others characterize the design of descriptive surveys as a tool used by researchers to ask respondents questions about the existence

of problems at a certain point in time [20]. In this analysis, samples are chosen to represent the entire population and inferences made for the entire population and occur in a few days to weeks. It is one of the most commonly used research methods in social sciences and it is used to collect data from a population sample at a point in time. The purpose of quantitative research is to encourage and use statistical models, theories and/or hypotheses relating to traditional phenomena [22].

### 2.3 Study Population

The study population consisted of men aged 18 years and above who were accessing healthcare services in the facilities in the Bono region. The [study population](#) included all men 18 years and above accessing health services in health facilities in the Bono region. Also clients who had never tested positive for HIV were used.

### 2.4 Sample size determination

The sample size of a study is a section of the population that is drawn to make inference or projections to the general population. The sample size for this study was calculated using the Cochran's (1977) formula:

$$n_0 = \frac{Z^2 pq}{e^2}$$

**Z**; the confidence limits which in this study is 95% level of confidence and 1.96 as critical value

**P**; assumed prevalence/proportion of the dependent variable; this will be estimated as 50% in this study.

**Q**; as the acceptable deviation from the assumed proportion (1-0.50 = 0.50)

**D**; as the margin of error around p estimated as 0.05 in this study.

Therefore,  $n = \frac{(1.96)^2 * (0.50)(0.50)}{(0.05)^2} = 384.16$

Adding a non-response rate of 5% ([i.e.](#) 384.16+19.21 = 403.37) to the calculated sample size to account for possible refusal hence, the final sample size for the study will be 403

### 2.5 Sampling procedure

Stratified and simple random sampling techniques were used. Proportionate Stratified sampling method was used to determine the number of respondents from each of the seven health

facilities. Based on the required sample size (403) the number of respondents from each stratum (facility) was proportionately calculated according to the existing data using the formula:  $A/B * C$ , where A' is the average number of men at the facility, B'= the average number of clients (men) in the seven (7) selected health facilities and C'= the determined sample size. For example, the sample size for Bono Regional Hospital was calculated using the above formula where A=120, B=555, C=423 thus,  $120/555*423= 91$ . The same procedure was used for the other strata as shown in Table 1. Simple random sampling on the other hand was used to select the respondents by writing 'Yes and No' on pieces of paper until the required sample size was met. Those who chose yes after given consent were given questionnaire to answer.

**Table 1: Proportionate Stratified sampling of respondents**

Name of Health Facility (A)	Population of HTS clients	Proportion of clients to be selected
Bono Regional Hosp.	120	76
Sunyani Municipal Hosp.	97	61
Sunyani SDA Hospital	85	54
Berekum Holy Family Hosp.	86	54
Wamfie Hospital	73	46
Dormaa Presbyterian Hospital	94	60
Drobo St. Mary's Hospital	82	52
Total	637 (B)	403 (C)

## 2.6 Study Variables

The study variables were categorized into dependent and independent variables.

**Table 2: Study variables**

Dependent	Independent
The main outcome variable is the prevalence of HIV	<ul style="list-style-type: none"> <li>➤ <b>Demographic variables</b> Age, sex, religion, occupation, marital status, education, employment, geographic location, place of residence</li> <li>➤ <b>Preferred HIV testing approaches</b> Facility-based testing, community-based testing, HIV self-testing, provider-assisted referral and social network-based testing.</li> <li>➤ <b>Reasons for the preferred approaches</b></li> </ul>

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Fear, reliability, privacy, availability of logistics, location of clinic, cost of services, attitude of staff, reliability and hours of operation

➤ **Knowledge**  
Yes, No, Not sure

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## 2.7 Data Collection Tool and Technique

A structured questionnaire (Appendix 1) comprising of both close ended and open ended questions was used to collect data from the study respondents. The questionnaire was designed in English language, but the questions were asked and explained in both English and the local dialects (i.e. BonoandTwi). This ensured better understanding for respondents who had challenges with speaking the English language. Four trained data collectors together with the researcher did the data collection. The overall aim of the study was explained vividly to the data collectors during the training session. The questionnaire was pretested at the Techiman Holy Family Hospital since the respondents and the hospital had similar characteristics to evaluate the validity of the data collection tool.

**Comment [N6]:** In the study design, the author has indicated that this was a quantitative study. In data collection, the author is using both open ended and closed ended questions. There is need to clarify how the open ended questions are being used in a quantitative study.

## 2.8 Data Analysis

Data from the field were edited, and checked for completeness by the researcher before data entry was done. Data were entered into Excel spreadsheet and exported into the Statistical Package for Social Sciences (SPSS) software version 25 for analysis. Results were displayed in tables and graphs according to the study variables. Respondents' demographic characteristics were summarised using descriptive analysis (frequencies, percentages, mean, and standard deviations). Bivariate analysis was done to test for association using Pearson's correlation coefficient, in order to find out the relationship between the independent and dependent variables. P-value of less than 0.05 (i.e.  $p < 0.05$ ) was set as the significance level for the analysis. Logistic regression model was applied to variables which are significant at the bivariate analysis level to find out the strength of the association. The strength of the association for each independent variable was based on the 95% confidence interval, while holding other factors constant.

## 3. RESULTS

### 3.1 Sociodemographic characteristics of respondents

Table 3 shows the sociodemographic characteristics of the respondents. The majority of the respondents 214 (53.1%) were below 30 years followed by 113 (28.0%) who were within 31-45 years whilst 38 (9.4%) each were within age range 46-55 years and above 55 years with mean age of 42.5 and standard deviation of 6.8. Almost half of the respondents 168 (41.7%) were salary workers 33.5% were Artisans, 13.4% were Farmers as against 46 (11.4%) who were unemployed. On religion, 161 (40.0%) were Muslims, 35.7% were Christians whilst 98 (24.3%) were Traditionalists. About half of the respondents 156 (38.7%) were single whilst 121 (30.0%) of them were married. Majority of the respondents 237 (58.8%) were urban dwellers whilst 166 (41.2%) were living in the rural areas. Almost half of respondents 184 (45.7%) had tertiary as their educational level.

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**Table 3: Socio-demographic characteristics of respondents**

Variables	Categories	Frequency=403	Percent (%)
Age Mean=42.5 SD=6.8	Below 30 yrs	214	53.1
	31-45 yrs	113	28.0
	46-55 yrs	38	9.4
	Above 55yrs	38	9.4
Occupation	Salary worker	168	41.7
	Artisan	135	33.5
	Farmer	54	13.4
	Unemployed	46	11.4
Religion	Christianity	144	35.7
	Islam	161	40.0
	Traditionalist	98	24.3
Marital status	Married	126	31.3
	Single	156	38.7
	Cohabiting	121	30.0
Location of residence	Rural	166	41.2
	Urban	237	58.8
Educational level	No formal edu	46	11.4
	Basic	88	21.8
	Secondary	85	21.1
	Tertiary	184	45.7

Source: Field survey, 2023

### 3.2 Prevalence of men who know their HIV status in the Bono Region

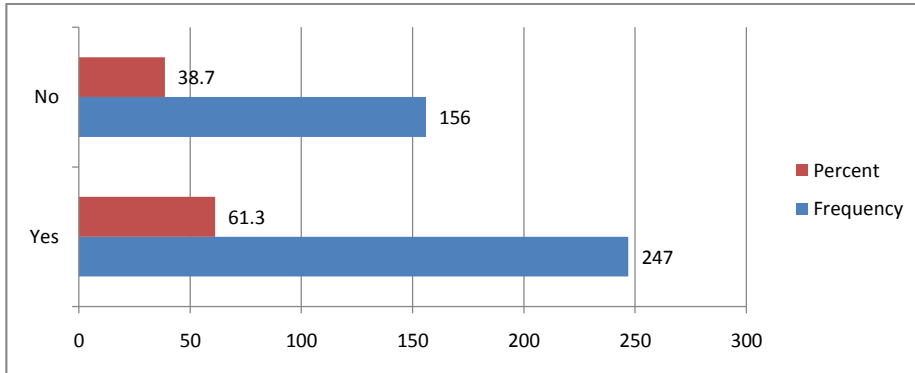
Table 4 depicts the current prevalence rate of men who know their HIV status in the Bono region. Most of the respondents 224 (55.6%) had tested for HIV whilst 179 (44.4%) had no idea about their HIV status. On the number of times the men had tested for HIV, majority 134 (58.8%) of those who had tested for HIV had done it 1-2 times. Also, most of the respondents 388 (96.3%) said it was important to go for HIV Testing Services whilst 15 (3.7%) said no. Whether health workers should encourage people to come for the HTS, majority of the respondents 360 (89.3%) said health workers should encourage people to go for the HTS whilst 43 (10.7%) said no. Most of the respondents 257 (63.8%) said they would not go for HTS because the disease has no cure.

**Table 4: Prevalence of men who know their HIV status in the Bono Region**

Variables	Frequency	Percentage (%)
<b>Have you ever tested for HIV?</b>		
Yes	224	55.6
No	179	44.4
Total	403	100
<b>If yes, how many times</b>		
1 to 2 times	134	58.8
3 to 4 times	82	26.6
More than 4 times	8	8.0
Total	224	100
<b>Is it important to go for HTS?</b>		
Yes	388	96.3
No	15	3.7
Total	403	100
<b>Health workers should encourage people to go for the HTS</b>		
Yes	360	89.3
No	43	10.7
Total	403	100
<b>I will go for HTS because the disease has no cure</b>		
Yes	146	36.2
No	257	63.8
Total	403	100

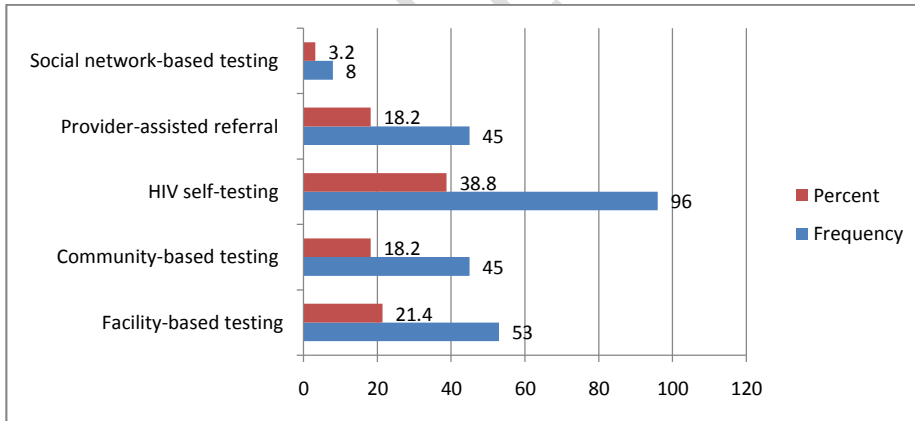
### 3.3 Men's preferred HIV testing approaches in the Bono region

Figure 1 shows the preferred HIV testing approaches among men in the Bono region. Majority of the men 247 (61.3%) knew of HIV testing approaches whilst few of them 156 (38.7%) did not.



**Figure 1: Do you know any HIV testing approach?**

Ninety six (96) respondents (38.8%) preferred HIV self-testing approach followed by facility-based testing 53 (21.4%) whilst minority 8 (3.2%) preferred social network-based testing.



**Figure 2: Men preferred approaches**

### 3.4 Factors influencing to the preferred testing approaches among men in the Bono region

Figure 3 shows the reasons why the men chose the HIV testing approach. Almost half of the respondents 102 (41%) said it was due to privacy that was why their preferred approach.

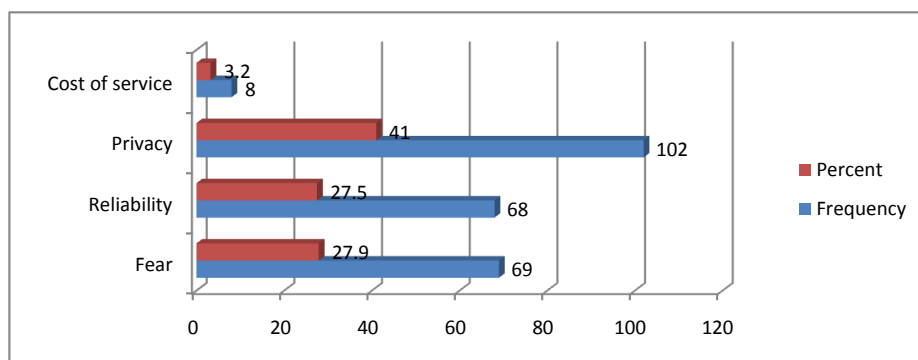


Figure 3: Factors influencing the preferred testing approaches among men

### 3.5 Predictors of HIV status awareness among men in the Bono region

#### 3.5.1 Sociodemographic predictors

Table 4 depicts the bivariate analysis of the sociodemographic predictors for HIV status awareness among men in the Bono region. Age was statistically significant for predicting men's HIV awareness status (p-value= 0.002). Marital status was statistically significant with (p-value=0.000) with HIV testing among the men. Occupation was also significant with (p-value=0.003) with sociodemographic predictors of HIV testing. Lastly, educational level of the respondents was significant predictor for HIV status awareness (p-value= 0.002).

Table 5: Bivariate analysis sociodemographic predictors

Variables	Have you tested for HIV before		Total f(%)	$\chi(p\text{-value})$
	Yes f(%)	No f(%)		
<b>Age</b>				
Below 30yrs	126(31.3)	88(21.8)	214(53.1)	14.949(0.002)*
31-45 yrs	53(13.2)	60(14.9)	113(28.0)	
46-55 yrs	23(5.7)	15(3.7)	38(9.4)	
Above 55yrs	22(5.5)	16(4.0)	38(9.4)	
Total	224(55.6)	179(44.4)	403(100)	
<b>Marital status</b>				
Single	82(20.3)	44(10.9)	126(31.3)	

Married	97(24.1)	59(14.6)	156(38.7)	23.932(0.000)*
Cohabiting	45(11.2)	76(18.9)	121(30.0)	
Total	224(55.6)	179(44.4)	403(100)	
<b>Religion</b>				
Christianity	83(20.6)	61(15.1)	144(35.7)	
Islam	80(19.9)	81(20.1)	161(40.0)	4.273(0.118)
Traditionalist	61(15.1)	37(9.2)	98(24.3)	
Total	224(55.6)	179(44.4)	403(100)	
<b>Occupation</b>				
Salary worker	79(19.6)	89(22.1)	168(41.7)	
Artisan	92(22.8)	43(10.7)	135(33.5)	14.199(0.003)*
Farmer	30(7.4)	24(6.0)	54(13.4)	
Unemployed	23(5.7)	23(5.7)	46(11.4)	
Total	224(55.6)	179(44.4)	403(100)	
<b>Educational</b>				
No education	16(4.0)	30(7.4)	46(11.4)	
Basic education	59(14.6)	29(7.2)	88(21.8)	17.475(0.002)*
Secondary	54(13.4)	31(7.7)	85(21.1)	
Tertiary	95(23.6)	89(22.1)	184(45.7)	
Total	224(55.6)	179(44.4)	403(100)	

Table 6 depicts the multivariate analysis sociodemographic predictors for HIV status awareness among men in the Bono region. Marital status was statistically significant with OR=4.86(95%CI:1.8-79) and (p-value=0.000) with HIV testing among the men. Occupation was also significant with OR=2.03(95%CI=1.7-5.32) and p-value=(0.003) with sociodemographic predictors of HIV testing.

**Table 6: Multivariate analysis of sociodemographic predictors**

Variables	Have you tested for HIV before		Total f(%)	OR(95% CI)	$\chi(p\text{-value})$
	Yes f(%)	No f(%)			
<b>Age</b>					
Below 30yrs	126(31.3)	88(21.8)	214(53.1)		
31-45 yrs	53(13.2)	60(14.9)	113(28.0)	8.15(1.6 - 5.57)	4.849(0.183)
46-55 yrs	23(5.7)	15(3.7)	38(9.4)		
Above 55yrs	22(5.5)	16(4.0)	38(9.4)		
Total	224(55.6)	179(44.4)	403(100)		
<b>Marital status</b>					
Single	82(20.3)	44(10.9)	126(31.3)		
Married	97(24.1)	59(14.6)	156(38.7)	4.86(1.8 - 79)	23.932(0.000)
Cohabiting	45(11.2)	76(18.9)	121(30.0)		
Total	224(55.6)	179(44.4)	403(100)		
<b>Religion</b>					
Christianity	83(20.6)	61(15.1)	144(35.7)		
Islam	80(19.9)	81(20.1)	161(40.0)	3.05(1.9 - 42)	4.273(0.118)

Traditionalist	61(15.1)	37(9.2)	98(24.3)		
Total	224(55.6)	179(44.4)	403(100)		
<b>Occupation</b>					
Salary worker	79(19.6)	89(22.1)	168(41.7)		
Artisan	92(22.8)	43(10.7)	135(33.5)	2.03(1.7 - 5.32)	14.199(0.003)
Farmer	30(7.4)	24(6.0)	54(13.4)		
Unemployed	23(5.7)	23(5.7)	46(11.4)		
Total	224(55.6)	179(44.4)	403(100)		
<b>Education</b>					
No education	16(4.0)	30(7.4)	46(11.4)		
Basic education	59(14.6)	29(7.2)	88(21.8)	0.73(0.44 - 1.44)	4.375(0.023)
Secondary	54(13.4)	31(7.7)	85(21.1)		
Tertiary	95(23.6)	89(22.1)	184(45.7)		
Total	224(55.6)	179(44.4)	403(100)		

### 3.5.2 Knowledge predictors

Table 7 depicts the bivariate analysis of the knowledge predictors for HIV status awareness among men in the Bono region. Source of information on HIV testing was statistically significant as most of the respondents had information on HIV testing from their friends with p-value=0.003. The meaning of HIV testing was also highly significant with (p-value=0.000) as majority of the respondents defined HIV testing as the method of knowing ones HIV status. Knowledge on the benefits of HIV testing was statistically significant (p-value=0.002). Places where HIV testing could be provided was again statistically significant (p-value=0.001).

**Table 7: Bivariate analysis of Knowledge predictors**

Variables	Have you tested for HIV before		Total f(%)	$\chi^2(p\text{-value})$
	Yes f(%)	No f(%)		
<b>Know HIV testing approach</b>				
Yes	216(53.6)	171(42.4)	387(96.0)	0.210(0.417)
No	8(2.0)	8(2.0)	16(4.0)	
Total	224(55.6)	179(44.4)	403(100)	
<b>Source of information</b>				
Radio	28(7.2)	7(1.8)	35(9.0)	
Television	75(19.4)	83(21.4)	158(40.8)	13.720(0.003)*
Friends	77(19.9)	59(15.2)	136(35.1)	
Health facility	36(9.3)	22(5.7)	58(15.0)	
Total	216(55.8)	171(44.2)	387(100)	
<b>What is HIV testing services</b>				
HIV CT	23(5.9)	52(13.4)	75(19.4)	38.368(0.000)*

Treatment of HIV	38(9.8)	36(9.3)	74(19.1)	
To know HIV status	118(30.5)	54(14.0)	172(44.2)	
Don't know	29(7.5)	29(7.5)	58(15.0)	
Total	216(55.8)	171(44.2)	387(100)	
<b>Benefits of HTS</b>				
Able to know status	74(19.1)	90(23.3)	164(42.4)	
Prevent HIV	67(17.3)	22(5.7)	89(23.0)	20.670(0.002)*
Safeguard HIV client	53(13.7)	59(15.2)	112(28.9)	
Don't know	22(5.7)	0(0.0)	22(5.7)	
Total	216(55.8)	171(44.2)	387(100)	
<b>Know HTScenter</b>				
Yes	210(93.8)	165(92.2)	375(93.1)	
No	14(6.2)	14(6.2)	28(6.9)	0.380(0.336)
Total	224(55.6)	179(44.4)	403(100)	
<b>Place of HTS services</b>				
Hospital	147(39.2)	143(38.1)	290(77.3)	
Health center	63(16.8)	22(5.8)	85(22.6)	14.994(0.001)*
Total	210(56.0)	165(44.0)	375(100)	

Table 8 shows the multivariate analysis of the knowledge predictors for HIV status awareness among men in the Bono region. Source of information on HIV testing was statistically significant as most of the respondents had information on HIV testing from their friends with OR of 0.67(95%CI:0.32-1.4) p-value=0.003. The meaning of HIV testing was also highly significant with OR of 1.66(95%CI:0.94-2.93) (p-value=0.000) as majority of the respondents defined HIV testing as the method of knowing ones HIV status. Knowledge on the benefits of HIV testing was statistically significant OR of 0.75(CI=0.19-3.00) (p-value=0.000). Places where HIV testing could be provided was again statistically significant OR= 1.64(CI=0.57-4.72) (p-value=0.001).

**Table 8: Multivariate analysis of knowledge predictors of HCT**

Variables	Have you tested for HIV before		Total f(%)	OR (95% CI)	$\chi(p\text{-value})$
	Yes f(%)	No f(%)			
<b>Know HIV testing approach</b>					
Yes	216(53.6)	171(42.4)	387(96.0)	0.21(0.04,1.12)	0.210(0.417)
No	8(2.0)	8(2.0)	16(4.0)		
Total	224(55.6)	179(44.4)	403(100)		
<b>Source of information</b>					
Radio	28(7.2)	7(1.8)	35(9.0)	0.67(0.32,1.4)	13.720(0.003)

Television	75(19.4)	83(21.4)	158(40.8)		
Friends	77(19.9)	59(15.2)	136(35.1)		
Health facility	36(9.3)	22(5.7)	58(15.0)		
Total	216(55.8)	171(44.2)	387(100)		
<b>What is HIV testing services</b>					
HIV CT	23(5.9)	52(13.4)	75(19.4)	1.66(0.94,2.93)	38.368(0.000)
Treatment of HIV	38(9.8)	36(9.3)	74(19.1)		
To know HIV status	118(30.5)	54(14.0)	172(44.2)		
Don't know	29(7.5)	29(7.5)	58(15.0)		
Total	216(55.8)	171(44.2)	387(100)		
<b>Benefits of HTS</b>					
Able to know status	74(19.1)	90(23.3)	164(42.4)		
Prevent HIV	67(17.3)	22(5.7)	89(23.0)	0.75(0.19,3.00)	41.970(0.000)
Safeguard HIV client	53(13.7)	59(15.2)	112(28.9)		
Don't know	22(5.7)	0(0.0)	22(5.7)		
Total	216(55.8)	171(44.2)	387(100)		
<b>Know HTScenter</b>					
Yes	210(93.8)	165(92.2)	375(93.1)		
No	14(6.2)	14(6.2)	28(6.9)	1.65(0.94,2.90)	0.380(0.336)
Total	224(55.6)	179(44.4)	403(100)		
<b>Place of HTS</b>					
Hospital	147(39.2)	143(38.1)	290(77.3)		
Health center	63(16.8)	22(5.8)	85(22.6)	1.64(0.57,4.72)	14.994(0.001)
Total	210(56.0)	165(44.0)	375(100)		

### 3.5.3 Health care facility's predictors

Table 9 presents the descriptive analysis of health facility's predictors of HIV testing among men in the Bono region. Almost half of the respondents 169 (41.9%) agreed that health workers treated them well. The location of the testing facility was agreed by the majority of the respondents 233 (57.8%). Again, the duration of the testing result according to almost half of the respondents 188 (46.7%) strongly disagreed that they waited for hours before receiving their results. Furthermore, 172 (42.7%) strongly agreed that HIV testing staff were friendly. Institutional discrimination also affect HIV testing as about half of the respondents 157 (39.0%) disagreed they experienced discrimination.

**Table 9: Health care facility's predictors**

Indicators	Freq.	Percentage
<b>I was treated well by health worker</b>		
Strongly agree	176	43.7
Agree	169	41.9
Disagree	29	7.2

Strongly disagree	29	7.2
<b>Testing facility is located far away</b>		
Strongly agree	73	18.1
Agree	233	57.8
Disagree	75	18.6
Strongly disagree	22	5.5
<b>Results kept long after the last test</b>		
Strongly agree	52	12.9
Agree	66	16.4
Disagree	97	24.1
Strongly disagree	188	46.7
<b>I waited for hours for the results</b>		
Strongly agree	67	16.6
Agree	66	16.4
Disagree	80	19.9
Strongly disagree	190	47.1
<b>It's expensive to have the test</b>		
Strongly agree	98	24.3
Agree	78	19.4
Disagree	114	28.3
Strongly disagree	113	28.0
<b>HIV testing staff were friendly</b>		
Strongly agree	172	42.7
Agree	165	40.9
Disagree	37	9.2
Strongly disagree	29	7.2
<b>Result was kept confidential</b>		
Strongly agree	233	57.8
Agree	89	22.1
Disagree	59	14.6
Strongly disagree	22	5.5
<b>People were around during HIV test</b>		
Strongly agree	113	28.0
Agree	110	27.3
Disagree	97	24.1
Strongly disagree	83	20.6
<b>I experienced discrimination</b>		
Strongly agree	43	10.7
Agree	66	16.4
Disagree	137	34.0
Strongly disagree	157	39.0

#### 4. DISCUSSION

On the current prevalence of men who know their HIV status in Bono region, the findings revealed 55.6% current prevalence rate of HIV of men who knew their HIV status. Outside sub-Saharan Africa, where epidemics are concentrated in key populations, men account for two thirds of all adults with HIV but are twice as likely to be undiagnosed as women [27]. This

finding is in contrast with the current study where majority of the men knew their HIV status. [A] reason for better HTS uptake among women is the successful integration of HTS into clinical services for women. For example, for more than two decades in many settings, HTS has been routinely offered as part of prevention of mother-to-child transmission to all women attending antenatal care (ANC) clinics [41]. There have been efforts to integrate HTS into clinical services that reach many men, such as tuberculosis (TB), viral hepatitis and sexually transmitted infection (STI) services to improve HTS among men.

Still, gaps persist. Efforts are needed to reduce missed opportunities for testing when men attend health facilities and services. Evidence suggests that, when men are offered testing, they do accept it [27]. This WHO evidence support the current findings where more than half of the respondents said health workers should encourage people to go for the HTS.

Other barriers to testing for men are structural, such as clinic operating hours or locations that are inconvenient for men who work, and the direct or indirect opportunity costs of obtaining services, such as time lost from work. Sociocultural beliefs and behaviours contribute as well. For men from key populations, stigma, discrimination, concerns about confidentiality in health care settings and punitive laws and enforcement may deter their access to HTS [21].

In general, HIV services in the country are free or heavily subsidized; counseling and testing are both free, while ART is heavily supported through the Global Fund for AIDS, Tuberculosis, and Malaria. A rapid-response HIV anti-body test is also used in most testing centers so that clients can have their results within ten minutes of the test being administered. This reduces the possibility of clients not returning for their results. Pre-test information is given to all customers, and the majority of them receive post-test counseling. Individuals who have a positive test result are also given a free confirmatory blood test. Over 250 new HTS centers opened across the country in 2010, bringing the total number of testing and counseling locations to 1,174. In the same year, the "Know Your Status Campaign," which began in 2008, was elevated to a higher priority and there was a huge success, with over one million people tested around the country. The number of people who were tested during this campaign in 2008 was only 467,935, but that figure climbed to 1,063,085 in 2010 and 1,151,034 in 2011 [39].

Despite the high priority put on public education about HIV and AIDS prevention, transmission, and treatment, lack of understanding remains a substantial obstacle to HTS acceptance. It is

**Comment [N8]:** The author is comparing a study conducted on men to a study conducted on women. There may be need to consider comparing studies that were investigating the same population to make proper conclusions.

apparent, that despite significant efforts to increase counseling and testing in Ghana, much more has to be done to ensure counseling and testing in the general population becomes universal [36].

The second objective assessed men's preferred HIV testing approaches in the Bono region and, the findings show that the majority of the respondents knew about more than one HIV testing approach. Also, almost half of the respondents preferred HIV self-testing approach. Knowledge on the various approaches for HIV testing could be due to the increased awareness creation on HIV in the sub region. Furthermore, the HIV self-testing used by most of the respondents might be as a result of confidentiality and fear of stigmatization. No wonder the World Health Organization recommends a strategic mix of differentiated HIV testing services (HTS) approaches to reach men and link them to appropriate prevention and treatment services. This policy highlights WHO recommended HTS approaches that programmes can be introduced or scale up now to optimize the uptake of HTS among men. The brief also summarizes a package of post-test services for men. HTS can link men to these services as appropriate for their test results [21].

Moreover, the HIV testing approaches being used in the country include Client-initiated testing and counselling, provider-initiated testing and counselling, routine antenatal testing, community based testing and counselling, assisted partner notification as well as other index case (e.g. family and social network contacts) based testing [37]. All these testing approaches are free for everyone. Plans to start Lay provider testing in the country is underway as sixty-four people have been trained recently. Plans to scale up these trainings across the country are currently ongoing and a task sharing policy document has been developed. Self-testing approach has been piloted among men who sleep with men but is yet to be conducted in the general population [27].

For the first 90 of the UNAIDS 90-90-90 goals, it was estimated that there are 55% of people living with HIV in the year 2018 with 43% of them being males. This is still lower than the expected target of 90% by 2020. Reaching men with HTS and then linking them to appropriate prevention and treatment services are essential for meeting national and global HIV goals. In high HIV burden settings such as those of East and Southern Africa, efforts are needed to reach more men in both general and key populations [26]. In low HIV burden settings, men from key populations need to be prioritized as well as those with STIs or with confirmed or suspected TB. Men who have partners with HIV and those who have HIV-related symptoms or indicator conditions should be tested.

**Comment [N9]:** The authors may consider comparing this finding to findings of other studies which were conducted on this subject

**Comment [N10]:** Consider revising the use of moreover at the beginning of a sentence

This objective examined the reasons for the preferred testing approaches among men in the Bono region. The findings revealed that almost half of the respondents chose self-testing due to confidentiality and privacy. Since HIV is surrounded by so many myths and stigmatization, most people hide to undertake the test and conceal the result when positive. There is no doubt that the main reason of controlling the HIV epidemic is early diagnosis. The finding supports a study that showed fear of possible social and individual consequences derived from a positive result is a reason that pushes people to do self-HIV testing [7]. Factors related to health providers, such as having to ask for an appointment, having to give personal data or having to wait for the results are all reasons that deter individuals from getting tested. Difficulties to access traditional health services have also been pointed, especially within most at risk and vulnerable populations.

In recent years, there has been a significant diversification of HIV counselling and testing alternatives to increase and improve the access of HIV testing in population groups. Programmes offering rapid HIV testing in outreach and community settings are one of the strategies that have been developed to overcome some logistical obstacles associated with traditional healthcare settings such as the amount of time spent in the testing process or having to ask for an appointment. The few studies analyzing reasons for HIV testing preferences from the participant's perspective were conducted before consolidation of the community-based testing strategies, mainly in the United States, whereas no information is available from countries with different health systems like those in the European Union [27].

On knowledge predictors of HIV status awareness, the findings showed that the source of information on HIV testing was statistically significant as most of the respondents had information on HIV testing from their friends. The meaning of HIV testing was also highly significant as majority of the respondents defined HIV testing as the method of knowing one's HIV status. Knowledge on the benefits of HIV testing was statistically significant. Place for HIV testing was again statistically significant. These findings support several studies for example, a study stated that the capacity and/or decision to obtain HTS services is influenced by an individual's understanding of HIV and AIDS and its severity, awareness of where to get HTS services, knowledge of the benefits of getting tested, and his or her perceived risk of contracting the virus [19]. In a study of undergraduate students at two Nigerian colleges, the most common reason for not using HTS services was a lack of knowledge on where to find them [41].

**Comment [N11]:** This is an opening sentence in this paragraph as such, there is need to use appropriate words.

**Comment [N12]:** This sentence is too long. Kindly consider revising

Similar findings were found in another Nigerian investigation: the majority of respondents were aware of HIV testing and counseling, but only 26% of those who were aware of HTS were aware of where they could obtain these services [12]. Knowledge of where to get an HIV test does not appear to be a major barrier to uptake in Ghana, since 70 percent of Ghanaian women and 75 percent of Ghanaian men said they knew where to get one [13]. In rural Tanzania, a link was discovered between knowledge of HTS service locations and testing uptake. Study participants who had heard of HTS or used the services before had the highest desire for HTS uptake and actual completion of the testing process, whereas those who had no knowledge of HTS or prior experience with testing had the lowest desire [16].

On healthcare predictors the findings show that almost half of the respondents agreed that health workers treated them well. The location of the testing facility was agreed by the majority of the respondents. Again, the duration of the testing result according to almost half of the respondents strongly disagreed that they waited for hours before receiving their results. Furthermore, almost half of the respondents strongly agreed that HIV testing staff were friendly. Institutional discrimination also affect HIV testing as about half of the respondents disagreed they experienced discrimination. This implies that even if knowledge on HIV and HTS services, stigmatization, and discrimination are eliminated, a variety of health-care variables may still prevent people from using HTS.

Cost of services, location of testing centers, attitudes and competency of clinic employees, clinic hours of operation, wait time, and privacy at the testing site may all influence a person's decision to be tested. A study in Uganda's Bushyi District, a series of focus group discussions and individual interviews were held to determine why people used or did not use HTS services [8]. Several health-care issues were identified as barriers to service uptake in the study. Distance to the testing center, cost of testing, poor quality of service, and long wait times before getting tested or receiving findings were among the complaints.

On sociodemographic predictors, marital status was statistically significant with HIV testing among the men. Occupation was also significant with sociodemographic predictors of HIV testing. The findings corroborate with other related studies which stated that the uptake of HIV counseling and testing varies greatly depending on socioeconomic conditions [1]. Age, sex, marital status, religion, education, occupation, ethnic group, geography, and income can all influence whether or not a person wants to or is able to get tested for HIV. Differences in age,

**Comment [N13]:** Kindly consider comparing the current findings with other studies on the subject

sex, religion, marital status, and ethnic group were all linked to the willingness to use VCT in a study of 8,970 people in rural Tanzania. While 31% of men said they wanted to be tested only 24% of women said they wanted to get tested [4]. The urge for testing was highest among those with the most years of schooling, Muslims, and non-Sukuma tribes, for both males and females. Widowed individuals, those over 45 years old, those without a high school diploma, and those who adhere to traditional values had the lowest desire for testing [6].

## 5. IMPLICATION FOR POLICY AND PROGRAMMES

If sufficient funding is obtained to maintain continuity in the implementation of HIV policies and actions, the 90-90-90 target set will be met. The number of men being tested is rising as a result of the deployment of differentiated service delivery trainings, and the tactics and activities used must be maintained and enhanced. Although there has been a gradual improvement, men are still underdiagnosed with the fear of stigmatisation. More capacity-building training for health facility workers and ongoing teaching on HIV counseling and testing would contribute to maintaining and improving the success so far.

In Ghana, the HIV program is doing better every year in terms of the number of people getting tested and who are also taking ARTs, but more work needs to be done to reach the 90% goal. In order to meet the goal, it is necessary to secure funds to guarantee that there will never be a stock-out of self-testing kits which most men desire.

In order to meet the specified goal of 90-90-90, there is a gap between HIV testing and linking to care. To ascertain their efficacy in closing the testing and linking gaps as well as retention in care and viral load suppression, the ongoing diversified testing delivery strategies must be monitored and assessed. The percentage of ART positives that retest at other testing facilities without disclosing their status must also be determined because this will aid in gathering accurate information for those who are tested but are not linked to care.

## 6. STRENGTH AND LIMITATIONS

Some of the respondents declined from giving the researcher vital information because of the sensitive nature HIV/AIDS. To obtain their consent, they were assured of confidentiality of their information given. The issue of fear of stigmatization and discrimination also deterred some respondents from answering questions from the researcher. Again they were assured of anonymity. It was difficult retrieving secondary data from the various selected institutions

**Comment [N14]:** How does this become a weakness? Kindly add more detail.

**Comment [N15]:** At what point in your study did you use secondary data?

however; introductory letter was presented to the facilities to aid in the release of the secondary data. This helped to improve data quality and findings of the study as a whole.

## **7.CONCLUSION**

The main finding of the study was that the prevalence rate of HIV testing awareness was high among the men however the in-depth knowledge on the condition was lacking. Also, most of the men preferred HIV self-testing to other approaches with the reason of privacy. Knowledge, health care and sociodemographic predictors influenced HIV testing services among men. The study concludes that if men are exposed to the facts about HIV testing services, the misconception about the disease will be reduced and more men will be involved in the HIV testing services.

To improve the HIV testing services among men in the Bono Region, it is recommended that policies, interventions and measures on testing should be integrated in a common health problem that brings men to hospitals just as done in women. Management of the health facilities should continue with the education on HIV testing services especially among men who are yet to undertake such services. Community education and screening must be done for individuals to know their status to make informed decision. Both formal and informal education on HIV testing must be improved to abolish the misconception about HIV disease. In order to lower the transmission of HIV, health workers should encourage the general public particularly men on HIV counselling testing. The education both formal and informal on HIV testing must be improved to abolish the misconception about HIV disease. Efforts are needed to reduce missed opportunities for testing when men attend health facilities and services.

Further study is required to guide a differentiated approach to programmatic interventions. Encourage a similar survey in different region to confirm or disconfirm the findings of this study.

## **CONSENT AND ETHICAL APPROVAL**

Ethical clearance was sought from the Ghana Health Service Ethics Review Committee as a requirement for the conduct of this study. An approval for data to be collected was given with GHS-ERC Number as GHS-ERC: 056/01/23. A letter of introduction from the Catholic University of Ghana was sent to the Bono Regional Health Directorate and other selected facilities to seek for approval to carry out the study. The purpose of the study was discussed with the respondents for their consent. Written consent was sought from the clients prior to

participating in the study. Each participant was taking through the study purpose and eligible persons were made to sign a consent form to indicate their acceptance to be part of the study.

[Declarations](#)

**Comment [N16]:** Consider adding additional sections as shown below

[Consent for publication](#)

[Availability of data and materials](#)

[Competing interests](#)

[Funding](#)

[Author's contribution](#)

[Acknowledgements](#)

[Author's information](#)

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