DETERMINANTS OF HUMAN IMMUMO DEFICIENCY VIRUS (HIV) PREVALENCE IN THE CENTRAL REGION OF GHANA

ABSTRACT

Background: A lot of interventions have targeted to reduce exposure to HIV risk factors however HIV continues to affect millions of people. The purpose of study was to assess the determinants of HIV prevalence in the Central Region of Ghana.

Method: A facility based cross sectional study was conducted in six hospitals in the Central Region. Stratified and census sampling techniques were used to select respondents who came for HIV Counseling and Testing (HCT) at the health facilities. A structured questionnaire was used to take data from 423 clients accessing HIV counselling and testing services. Multiple logistic regression method was used to identify the sociodemographic factors associated with HIV prevalence in the region.

Results: Majority of the respondents 416(98.3%) were HIV negative while 7(1.65%) were positive making the prevalence rate in the region to be 1.65%. On the determinants of HIV, the following variables had strong correlations with the HIV prevalence: Sexual intercourse, contaminated sharps, blood transfusion and blood spills with factor values of less than 1.000 each. Apart from age and marital status which were statistically significant (p-value <0.001) the rest of the variables were not statistically significant as p-values were above 0.05 significance level.

Conclusion: The HIV prevalence rate in the Central Region is lower than the national and global prevalence rates. The factors linked to the prevalence of HIV included sexual intercourse, use of contaminated sharps, and blood transfusion among others. Age and marital of the respondents were statistically significant. The study concludes that though the prevalence of HIV in the region is low however measures should still be put in place to eliminate the condition from the region.

Keywords: *HIV Testing and Counseling, Acquired Immune Deficiency syndrome, Knowledge Factors*

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Commented [JO3]: Multiple logistic regression is mentioned yet it was not used.
Suggestion: remove it

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Commented [JO4]: The results lack specific details on the p values for all significant determinants and how strong the correlations were

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Commented [JO8]: The conclusion is very general. It doesn't clearly explain any specific or actionable recommendations based on the findings.
Suggestion: provide more specific recommendations e.g. blood transfusion screening, sex education

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1. INTRODUCTION

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Although many interventions have been implemented worldwide to lower exposure to HIV risk factors, millions of people are still afflicted by the virus. Although there is currently no proven treatment or vaccine for HIV, technology has played a significant role in changing the perception of the virus from one that was always fatal to one that is now treatable and has lower death rates [1].

As have been previously reported in literature by the World Health Organization, [2] and the Centers for Disease Control and Prevention [3], having sex with no protection, having oral sex with an HIV infected person; transfusion of contaminated blood; sharing needles, syringes, surgical equipment or other sharp instruments that are contaminated are factors known to transmit HIV infection. Also, HIV infections are transmissible from mother to child pregnancy and childbirth as well as during breastfeeding [4].

The time between contact with an infected person and manifestation of signs and symptoms of HIV can vary widely between individuals [5]. The period from acquiring HIV and AIDS usually spans between 10–15 years, but sometimes longer [6]. Early detection and treatment of HIV can reduce progression of the infection into worsening state, within 5-10 years of being infected with HIV, the majority of people develop signs of HIV-related illness [7].

The World Health Organization reported that about 54% of adults and 43% of children infected with HIV in the world are put on antiretroviral treatment. Evidence indicates that antiretroviral therapy (ART) has the potential to slow the disease progression of HIV into AIDS, however, majority of persons living with HIV do not adhere to treatment or most people infected with HIV are unaware of their HIV status which consequently result in increase in viral load [8].

In 2019, the World Health Organization stated that about 36.7 million people in the world are living with HIV with about 2.1 million new cases recorded as at the end of the year 2020; so far in the world, an estimated 35 million people have died from HIV, about 70% of people with HIV in the world know their status [9]. According to the World Health Organization, approximately 70% of HIV infected individual in the world reside in Sub-Sahara Africa [10]. Though HIV morbidity and mortality have declined in the world by 35% and 28% respectively, sub-Saharan Africa continues to be the most affected region in the world [11].

The median HIV prevalence for 2019 in Ghana was 2.4%, an increase from the 2015 prevalence of 1.8% and 2014 prevalence of 1.6% [12]. This indicates an increase in HIV prevalence in

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Ghana over the past years. HIV prevalence at regional ranged from 0.7% in the Northern region of Ghana to 2.7% in the Volta region and Bono regions [13]. Bono has a fluctuating HIV prevalence which almost stabilized at 2.0% in 2015 and 2016, however, HIV prevalence in Bono steadily increased to 5% in 2017 which is double the Bono regional prevalence of 2.6% [14].

Prior to 2016, there has been a steady decrease to 3.8% in 2015 [15]. According to the Ghana National HIV Sentinel Site Survey Report, 2020, Sunyani was one of the thirteen (13) sites that did not change in prevalence over the previous year [16].

Although HIV/AIDS prevalence is low in Ghana (1.3%) compared to other countries, the report indicated that the disease was firmly established within the entire society and subpopulations with higher prevalence and risk of transmission. The regional prevalence, according to the report, ranged from 3.7% in the Eastern region as the site with the highest prevalence to 0.8% in both the Northern region and Upper West region, as lowest [17]. The Central region has been earmarked according to data as has had an increase in its HIV/AIDS prevalence rate lately [18].

Central region recorded the highest increase in HIV prevalence from 1.6% to 3.1% representing 94% between 2018 and 2019. Regionally, Central Region is the only region showing an increasing trend in prevalence of HIV [19]. However, the current prevalence rate of HIV for the Central region is 1.6% [20]. This makes the HIV/AIDS progression rate a worrisome one in the Central region and hence the need for this study to assess the various factors responsible for this increase in prevalence.

Despite all the interventions put in place by the Ghana National AIDS/STI Control Program to reduce the prevalence of HIV in Ghana, HIV continues to be a Public Health threat affecting many Ghanaian adults aged between 15-49 years old with females mostly infected [21]. In 2020, the national HIV prevalence of 2.4% was recorded in Ghana with a higher prevalence among urban site [22]. Large proportions of new HIV cases are recorded every year and these are not evenly distributed per geographic locations.

There has been several studies revealing that unprotected sex, sharing contaminated needles, syringes, accidental needle stick injuries, breast milk, unfavorable economic position of women, rate of rape, inconsistent condom, alcohol consumption are known factors associated with HIV transmission [23]. The National AIDS/STI Control Program has an overall goal of reducing the impact and effect of HIV with intervention such as “know your HIV status”, free “Prevention of

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Mother-to-Child Transmission", "condom promotion and distribution", "blood safety", "HIV Exposure Prevention in the Health care and other settings" [24].

In the face of all these interventions by the National AIDS/STI Control Program, the prevalence of HIV in Central region recorded the highest increase in HIV prevalence of 1.6% [25]. The issue of HIV/AIDS prevalence rate in Central region comes with myriads of problems. HIV/AIDS has caused several deaths within the productive age groups that are between 25 and 50 years [26]. Also, majority of these dead people have left their families behind thereby exerting pressure on other family members who are not capable of catering for their children [27]. This high HIV/AIDS progression rate if not curbed has the tendency has the greater tendency of increasing the transmission rate hence a further soar in the progression rate of HIV/AIDS [28].

Statistics from the 2020 Ghana Health Service Survey (GHSS) shows that there is 1.3 per cent prevalence rate of the HIV infection in the Central region. It is estimated that about 10,000 people in the region are infected with the virus. About 313,063 people, representing 1.67 per cent of Ghana's population, according to the Survey, are HIV positive [29]. It also said 15,694 people died of HIV/AIDS every year, raising public health concerns [30]. This is a situation that deserves an urgent attention so as to limit the number of people affected with HIV/AIDS in the Central region.

The study sought to assess the prevalence of HIV, the determinants of HIV and the association between the sociodemographic characteristics of the population and the prevalence of HIV in the in the Central region. Identifying the factors that drive this prevalence of HIV/AIDS progression helped in targeted intervention in the region. The study revealed the main factor leading to HIV progression in the region and this has contributed to existing literature on HIV/AIDS. It has also informed health communicators as to the most appropriate and effective communication strategies and channels to employ in reaching the populace in order to yield more positive outcomes.

2 METHODS

2.1 Study Area

An area of 9,826 square kilometers covers the Central Region, which is approximately 6.6 percent of Ghana's territory. It is surrounded by the Gulf of Guinea in the south, and the Western area in the west. The region has Greater Accra on the east, and the Eastern region has Ashanti on

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the north and north east [31]. There is an estimated population of 2,521,118 [32] in the Central Region and an annual population growth of 2.1 percent. With a population density of about 162 inhabitants per square kilometer, after Greater Accra, the central region is the second most densely populated region [33].

There are three tiers of health care service delivery; the neighborhood level consisting of Community-based Health Planning and Services (CHPS) compounds, clinics; the sub-district level consisting of health centres, reproductive and child health units, and private maternity homes; and the district level consisting of private and public government hospitals. In all levels of service, the District Health Administration oversees and co-ordinates the implementation of priority health care initiatives.

In the country, health delivery under the orthodox system exists up to Level C under the primary health care system of the countries, with referral services rendered by the Municipal Hospitals. Statistics from the 2020 Ghana Health Service Survey (GHSS) shows that there is 1.59 per cent prevalence rate of the HIV infection in the region (34). It is estimated that about 15,000 people in the region are infected with the virus. About 313,063 people, representing 1.67 per cent of Ghana's population, according to the Survey, are HIV positive. It also said 15,694 people died of HIV/AIDS every year, raising public health concerns [35].

2.2 Study Design and Type

This study employed descriptive cross-sectional study design whilst the study type was a quantitative. The descriptive cross-sectional survey looks at current challenges, dominant activities, perceptions and behaviors, including ongoing processes and evolving patterns [36]. The cross-sectional form of survey design deals with concerns about what happens in a situation with regards to factors or circumstances of interest [37]. 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 [38]. The purpose of quantitative research is to encourage and use statistical models, theories and/or hypotheses relating to traditional phenomena [39].

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2.3 Study Population

The study population consisted of all adults aged 18 years and above who were accessing HIV counselling and testing services in the six major health facilities in the Central Region were selected for the study.

2.4 Inclusion criteria

i. All clients accessing HIV counselling and testing services in any of the six selected health facilities in the Central Region
ii. Clients who had never tested positive for HIV
iii. Clients 18 years and above
iv. Clients who consented to be part of the study

2.5 Exclusion Criteria

i. Clients who met the inclusion criteria but failed to consent to be part of the study
ii. Client who were seriously ill at the time of accessing HIV counselling and testing

2.6 Sample size determination

The Cochran formula allows you to calculate an ideal sample size given a desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population. Cochran's formula is considered especially appropriate in situations with large populations. A sample of any given size provides more information about a smaller population than a larger one, so there's a 'correction' through which the number given by Cochran's formula can be reduced if the whole population is relatively small. The Cochran formula is:

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

Where:

- **e** is the desired level of precision (i.e. the margin of error),
- **p** is the (estimated) proportion of the population which has the attribute in question,
- **q** is 1 – p.

The **z**=z-value

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So p = 0.5. Now let's say we want 95% confidence, and at least 5% —plus or minus—precision. A 95 % confidence level gives us Z values of 1.96, per the normal tables, so we get

$$n = \frac{(1.96)2\ (0.5)\ (0.5)}{(0.05)2} = 385$$

The 10% non-response rate was included to the smallest sample size to make it 423. The actual sample size was therefore 423.

2.7 Sampling procedure

Stratified and census sampling techniques were used. Stratified sampling method was used to determine the level of respondents from each of the six health facilities. Based on the required sample size (423) the number of respondents from each stratum (facility) was proportionately calculated using the formula: A/B * C, where A' is the average number of HCT clients at a facility, B'= the average number of HCT clients in the six (4) selected health facilities and C'= the determined sample size. For example, the sample size for Upper West 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. After calculation of the sample size for each stratum, participants were selected using census until the required sample size was met.

Table 1: Stratified sampling of respondents

Name of Health Facility	Population of HCT clients	Proportion of clients selected
Cape Coast Teaching Hospital.	120	91
Cape Coast Municipal Hospital	97	74
Dunkwa Municipal Hospital	85	64
St. Francis Xavier Hospital	86	65
Twifo Praso District Hospital	94	73
Agona Swedro Hospital	73	56
Total	555	423

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2.8 Pre-testing

At Takoradi Hospital, the research data collection tool was pre-tested. Although the pre-test facility was located outside the study area, it shared similarities with the study area in terms of staff, client services, and building configuration. Pre-testing assisted in categorizing several challenges related to respondents' comprehension. To ensure that the instruments were reliable, the researcher pre-tested the questionnaire on thirty HCT clients. With a Cronbach Alpha coefficient of 0.879, the data collection instrument was very dependable.

2.9 Data Collection Tool and Technique

A structured questionnaire was used to collect the data from the respondents. Respondents were selected from all HIV counselling and testing services centres at the six selected health facilities. The research assistants were employed to take the data. The data collection tool captured the client's socio-demographics including age, sex, educational level, occupational status, marital status, and religion. Also, data on HIV transmission factors were captured as well as the prevalence of HIV. Secondary data were also collected to compliment the primary data from the various facilities particularly for the prevalence of HIV.

2.10 Data Analysis

Data obtained from respondents mean nothing unless they are analysed and interpreted. Quantitative data collected from respondents were entered into SPSS version 24 for analysis. Descriptive statistics was used to determine the prevalence of HIV. Factor analysis was also used to assess the determinants of HIV whilst binary and multivariate logistic regression analysis techniques were used to assess the association between the sociodemographic characteristics and the prevalence of HIV and data were presented in Tables, text and graphs.

3 RESULTS

3.1 Sociodemographic characteristics of respondents

Table 2 shows the sociodemographic characteristics of the respondents. Almost half of the respondents 188 (44.4%) while 36 (8.5%) were within the age range 52-61. Also, majority of the respondents 333 (78.7%) were females as against 90 (21.3%) males. Additionally, most of the respondents 244 (57.7%) were married while 67 (15.8%) were cohabiting. An overwhelming

Commented [JO13]: How were the respondents asked the questions surrounding transmission factors e.g. hugging, kissing? Were they to choose from a list, or they self-reported?

Clarify how data on blood transfusion, sharps, blood spill, mother to child transmission was collected.

You mention both primary and secondary data generally without briefly giving details. describe how secondary data was integrated with primary data.
Suggestion: clearly outline sources of secondary data and how they were used to complement primary data.

Kindly give details on the source of data on blood transfusion, sharps, blood spills, kissing, mother to child transmission.
Was it primary data(self-reported) or secondary data(from health records)
Suggestion: briefly mention the variables from each data source

Commented [JO14]: You mention secondary data on prevalence was collected from various facilities. In your results this is not mentioned anywhere. Was it also equal to prevalence of 7(1.65%)
This leaves the readers confused

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e.g was it used, if yes why were the findings not included. If no the statement needs to be removed

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Commented [JO16]: Were 18-30 years missing

Commented [JO17]: 1.Not clear, you could restructure it. Majority of the respondents (333, 78.7%) were females, while a few (90,21.3%) were males
2. Consider putting both values in brackets but this depends on the sentence. e.g. sentence one could be written. "Almost half of respondents (188, 44.4%) were aged 18-30 years, while 36(8.5%) were…."

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majority of the respondents 357 (84.4%) were salary workers followed by Artisan 24 (5.7%) while 9 (2.1%) were Drivers. Nearly half of the respondents 176 (41.6%) had tertiary as their educational level while 24 (5.7%) did not have any formal education. Majority of the respondents 360 (85.1%) were Christians while 3 (0.7%) were Traditionalists.

Table 2: Sociodemographic characteristics of respondents

Variables	Frequency (N,423)	Percent(%)
Age of respondents		
18-30	188	44.4
31-41	130	30.7
42-51	69	16.3
52-61	36	8.5
Total	423	100.0
Sex		
Male	90	21.3
Female	333	78.7
Total	423	100.0
Marital status		
Married	244	57.7
Single	112	26.5
Cohabiting	67	15.8
Total	423	100.0
Occupation		
Salary worker	357	84.4
Farmer	14	3.3
Artisan	24	5.7
Trading	19	4.5
Driver	9	2.1
Total	423	100.0
Educational status		
No formal education	24	5.7
Primary	74	17.5
Secondary	149	35.2
Tertiary	176	41.6
Total	423	100.0
Religion		
Christian	360	85

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Muslim	60	14
Traditionalist	3	1
Total	423	100.0

3.2 The prevalence of HIV in the Central region

Majority of the respondents 416(98.3%) were HIV negative while 7(1.65%) were positive making the prevalence rate of 1.65% (Figure 1).

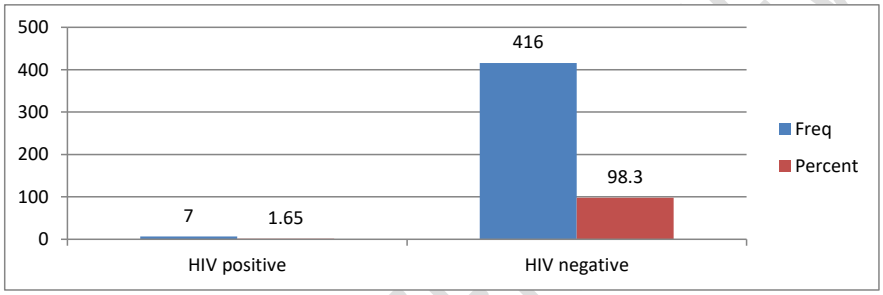

Figure 1: HIV prevalence in the Central Region

3.3 Determinants of HIV prevalence

Table 3 depicts the factor analysis of determinants of HIV prevalence among in the region. The following variables had strong correlations with the HIV prevalence: Sexual intercourse, contaminated sharps, blood transfusion and blood spills with factor values of less than 1.000 each.

Commented [JO20]: Provide a clear overview of how the analysis was conducted, particularly in relation to correlations presented. e.g. a correlation of 0.596 between sex and blood spill or -0.265 between sex and sharps are presented, but there is no clear explanation provided how these correlations are linked to HIV prevalence.

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Table 3: Factor analysis of determinants of HIV prevalence

Correlation matrix								
Variables	**Sex**	**Sharps**	**Transfusion**	**Mother-child**	**Blood spill**	**Spiritual**	**Kissing**	**Hugging**
Sex	0.100	-0.265	0.526	-0.216	0.596	0.174	0.486	-0.015
Sharps	-0.265	0.000	-0.520	0.150	-0.177	0.144	0.250	0.051
Transfusion	0.526	-0.520	0.000	-0.167	0.414	-0.064	-0.227	0.343
Mother-child	-0.216	0.150	-0.167	1.000	-0.289	0.078	-0.268	0.473
Blood spill	0.596	-0.177	0.414	-0.289	0.000	0.489	0.226	0.002
Spiritual	0.174	0.144	-0.064	0.078	0.489	1.000	0.304	0.052
Kissing	0.486	0.250	-0.227	-0.268	0.226	0.304	1.000	-0.288
Hugging	2.015	0.051	0.343	0.473	0.002	0.052	-0.288	1.000

3.4 Association between the socio-demographic characteristics and prevalence of HIV

Table 4 shows the association between the sociodemographic characteristics of respondents and the prevalence of HIV. Apart from age and marital status which were statistically significant (p-value <0.001) the rest of the variables were not statistically significant as p-values were above 0.05 significance level.

Commented [JO21]: I find the use of factor analysis in this study problematic.

The correlation values for some pairs of variables appear inconsistent/unrealistic. E.g. hugging has an unusually high value (2.015) in correlation matrix, which is likely signals issues with misinterpretation of variables It should be between (-1 and 1),

Some variables included e.g. spiritual and hugging do not seem relevant to HIV transmission, which might dilute the analysis. Including irrelevant variables can distort the factor structure.

I suggest a review of data quality and variable selection. E.g. only valid variables known to be directly related to HIV should be included in the analysis i.e. sex, sharps, blood transfusion, mother to child transmission.

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Commented [JO22]: It would be interesting to know the number of cases whose HIV infection is related to blood transfusion, sharps, blood spill from the 7(1.65%) participants focus the analysis on descriptive statistics such as the proportion of HIV positive cases across different risk factors. Use fisher's exact test

Overall: The data could be reanalyzed, I would have suggested logistic regression but due to collinearity of the variables, it may not be feasible
the correlation matrix provided does not provide valid insights into determinants of HIV prevalence
I would suggest you replace the inappropriate use of factor analysis by focusing on bivariate correlations between individual variables and HIV status. To ensure clear interpretable results that would greatly improve manuscripts scientific validity

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Table 4: Association between the demographic characteristics and prevalence of HIV

Variables	HIV Prevalence		Total f(%)	χ(*p-value*)
	Positive f(%)	Negative f(%)		
Age of respondents				
18-30	4(0.9)	184(43.5)	188(44.4)	
31-41	0(0.0)	130(30.7)	130(30.7)	50.48(*<0.001*)
42-51	0(0.0)	69(16.3)	69(16.3)	
52-61	0(0.0)	36(8.5)	36(8.5)	
Total	4(0.9)	419(99.1)	423(100)	
Sex respondents				
Male	0(0.0)	90(21.3)	90(21.3)	
Female	4(0.9)	329(77.8)	333(78.7)	1.091(*0.383*)
Total	4(0.9)	419(99.1)	423(100)	
Marital status				
Married	4(0.9)	240(56.7)	244(57.7)	
Single	0(0.0)	112(26.5)	112(26.5)	96.342(*<0.001*)
Cohabiting	0(0.0)	67(15.8)	67(15.8)	
Total	4(0.9)	419(99.1)	423(100)	
Occupation				
Salary worker	4(0.9)	353(83.5)	357(84.4)	
Farmer	0(0.0)	14(3.3)	14(3.3)	0.747(0.945)
Artisan	0(0.0)	24(5.7)	24(5.7)	
Trading	0(0.0)	19(4.5)	19(4.5)	
Driver	0(0.0)	9(2.1)	9(2.1)	
Total	4(0.9)	419(99.1)	423(100)	
Educational background				
Tertiary	0(0.0)	176(41.6)	176(41.6)	
Secondary	4(0.9)	145(34.3)	149(35.2)	7.426(*0.059*)
Primary	0(0.0)	74(17.5)	74(17.5)	
None	0(0.0)	24(5.7)	24(5.7)	
Total	4(0.9)	419(99.1)	423(100)	
Religion				
Christian	4(0.9)	356(84.2)	360(.1)	
Muslim	0(0.0)	60(14.2)	60(14.2)	0.707(*0.702*)
Traditionalist	0(0.0)	3(0.7)	3(0.7)	
Total	4(0.9)	419(99.1)	423(100)	

Commented [JO23]: Briefly give a narrative of the specific results.

Commented [JO24]: You seem to be having a prevalence of (4, 0.9%) yet in the Figure 1 above its 7(1.65%). Please clarify

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Commented [JO25]: Do percentages within each variable to make the results clear. e.g. 18-30 4(2.1%) 184(97.8%) ... 2.1% of those within age group 18-30 years were HIV positive

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4 DISCUSSIONS

4.1 The prevalence of HIV

On prevalence of HIV in the Central Region, majority of the respondents were HIV negative while 7 (1.65%) were positive making the regional prevalence rate of 1.65%. The results revealed that the HIV prevalence of region is somehow low. This result is in sharp contrast as compared to the percentage of adults living with HIV/AIDS in ten countries with the highest prevalence of HIV/AIDS in the world, Swaziland had the highest prevalence of 27.2%, followed by Lesotho with 25%, Botswana with 21.9%, South Africa 18.9%, Namibia 13.8%, Zimbabwe 13.5%, Zambia 12.4%, Mozambique 12.3%, Malawi 9.2% and Uganda, 6.5% [8].

Prevalence of HIV varies considerably across the country and populations, and is highest in densely populated areas, mining towns, and towns along borders and main transportation routes. Over the last decade the median prevalence has stabilized. The sentinel surveillance at ANC sites in 2011 indicated a median HIV prevalence of 2.1%. In 2012 the median HIV prevalence was determined to be 2.1%. The trend in the median HIV prevalence from sentinel sites since 2003 shows three peaks: 2003 (3.6%), 2006 (3.2%) and 2009 (2.9%). Despite the increase of HIV prevalence from 2007 to 2009, a linear trend analysis shows that prevalence since 2000 is on a downward trend [6].

Commented [JO26]: What are the potential impacts of these trends? This should come out clearly in discussion.

The prevalence is also lower than the National prevalence rate of 1.69 per cent [15]. The low prevalence of HIV in the Municipality could be as a result of low population density of the municipality. Also, the result may suggest that only healthy people came for the HIV Counseling and testing hence the low prevalence rate of HIV in the Municipality. A disturbing occurrence for all stakeholders is the situation that approximately half of all adults with the infection worldwide are women and in Africa, of the 23 million infected adults between 15 – 49 years, 57 percent representing 13.1 million are women. Those extremely susceptible to the virus and are three times extra probable to be infected than their male counterparts in a similar age group [31]. These findings corroborate with the current study where most of the respondents were females and this could account for the high prevalence of HIV among that sex group as compare to their male counterparts.

Commented [JO27]: What other factors could explain the low prevalence, beyond the view that only healthy people came for HIV testing. Are there other factors such as HIV prevention campaigns that might explain the low prevalence?

4.2 Determinants of HIV prevalence

On the determinants of HIV prevalence, the results revealed following variables: Sexual intercourse, contaminated sharps, blood transfusion and blood spills had strong correlations with the HIV prevalence with factor values of less than 1.000 each. Transmission of HIV is affected

Commented [JO28]: How do these factors contribute to HIV risk. How do they inform targeted interventions? The discussion should center around these factors.
Currently this is lacking in the discussion

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by many factors. For instance, some HIV infected persons who are not aware that they are infected with HIV may not understand the disease could be very severe even though HIV diagnosis and treatment services are free in most countries of the world [21]. HIV diagnosis depends on knowledge on the clinical presentation of symptoms and physical signs. HIV infected individuals may present with physical signs and symptoms of any of the stages of HIV infection. Acute seroconversion presents as a flulike illness which consists of malaise, of fever and a generalized body rash [14].

The findings again revealed that sexual intercourse, contaminated sharps, spill of blood, mother to child and spiritual were significantly associated with the prevalence of HIV. On the other hand, hugging and kissing were not statistically associated with the prevalence of HIV. These findings support studies conducted by many researchers on the factors associated with HIV transmission. For example, a study stated that the most common fluids capable of transmitting HIV are blood, rectal fluids, semen, vaginal fluids, pre-seminal fluids and breast milk [26]. For HIV to be transmitted, these fluids of an infected person come in contact with a mucous membrane or damaged tissue or are directly injected into the bloodstream (from a needle or syringe) of an uninfected person. Mucous membranes are found inside the rectum, vagina, penis, and mouth. HIV is mainly spread through sexual intercourse and sharing injection drug equipment, with HIV infected persons [3].

Furthermore, there is a statistically significant association between having more than one sexual partner, blood transfusion, medical history of injections and HIV infection [5]. Conversely, a study indicated that several factors contribute to HIV infection including older age, separated, women of lower class, widow, divorced and lower education levels [11]. This finding is also supported by a research where it was found that HIV infection is significantly associated with men with past 12 months history of genital ulcers [31].

In women, 12 months previous history of unusual vaginal discharge was associated with HIV infection [9]. The finding again is in support with a study stating that having more than a sexual partner and having sex with no protection as well as a history of sexually transmitted infection suggests a potential rapid spread of HIV [2]. Similarly, [20] stated that having multiple sex partners and drug use was associated with HIV risk predictors.

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4.3 The association between the socio-demographic characteristics of the population and the prevalence of HIV

On the association between the sociodemographic characteristics of respondents and the prevalence of HIV, the findings revealed association between age and marital status of respondents and the prevalence of HIV in the region. This corroborates with some other studies. The similarities could be due to the fact that similar respondents were used in the previous studies. Socio-demographic variables such as age, sex, socio-economic status, occupation and marital status have a bearing on the transmission of HIV [7].

Commented [JO29]: The discussion doesn't delve deeply into why these variables are significant. More interpretation of why these factors stood out compared to others would improve the discussion,

With regards to HIV, several studies have documented that marital status affect it since health care mostly lies with husbands or older family members such as mother-in-laws, grandmothers and family heads [5:3;12]. Women of reproductive age in developing countries are often poor and vulnerable, and while these cadre of women are in dire need of adequate maternal care while parturient, more often than not, there is inadequate utilisation of essential maternal health care services amongst them including HIV testing.

Also, a review of literature from global perspectives indicates that an array of factors are contributory to poor utilization of health care services and these include socio-demographic status, low socio-economic status, lack of physical accessibility, cultural beliefs, low educational level attainment of women, large family size and poor health care service delivery [29].

Several studies have documented the relationship between socio-demographic factors and HIV transmission which was not the case in this current study. These factors, although not exclusive to peri-urban dwellers are made more obvious amongst this group due to their lower socio-economic status and poorer education than the urban rich dwellers [15]. As well as poorly educated people having a very high risk of mortality when compared to educated persons [11], the huge divergence in educational levels between males and females also leads to high mortality rates due to the inability of the women to demand for appropriate health care [1].

Furthermore, it has been established that women who have some level of education are more likely than their uneducated counterparts to attend Antenatal Care clinics. It has also been documented that 70% of women that have had at least secondary education deliver their babies in a health care facility while 40% of those who have at most, an incomplete primary education have health facility deliveries [23].

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4.4 Limitations of the Study

The limitations of the study included but not limited to the following:

- Some of the respondents declined from giving the researcher vital information because of the sensitive nature HIV/AIDS.
- The issue of fear of stigmatization and discrimination also deterred some respondents from answering questions from the researcher.
- It was difficult retrieving secondary data from the various institutions for the prevalence of the HIV.

Commented [JO30]: The limitations listed are general. This can be improved by bringing up the issues such as sampling bias although the author has tried to point out this in the discussion where he /she mentions only healthy people came to facility.

Clearly outline the limitations posed by the small number of cases and how they affect the study's conclusions regarding determinants of HIV prevalence.

5 CONCLUSION

The HIV prevalence rate in the Central Region is lower than the national and global prevalence rates. The factors linked to the prevalence of HIV included sexual intercourse, use of contaminated sharps, and blood transfusion among others. Age and marital of the respondents were statistically significant. The study concludes that though the prevalence of HIV in the region is low however measures should still be put in place to eliminate the condition from the region.

6 RECOMMENDATIONS

i. The Regional Health Directorate should target and sustain effective preventive interventions such as health education and behavioral change communication. These interventions will help increase the knowledge of the people on the causes and prevention of HIV.

ii. Regional Health Directorate should scale up and prioritize STI/HIV clinics in the Region for HIV cascade of care within the context of 90-90-90 goal to end AIDS by 2030.

iii. The Ministry of Health should ensure that there are sufficient capacities to deliver health care and effectively implement and scale up collaborative HIV activities in the region.

iv. All stakeholders of HIV activities, including HIV programmes should support and encourage operational research on district/region-specific issues on HIV to develop the evidence base for efficient and effective implementation of HIV activities.

Commented [JO31]: Recommendations are generally sound but could benefit from a targeted focus based on the study findings e.g. what does the study recommend based on the findings: blood transfusion, blood spills. Mother to child transmission.

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ETHICAL CONSIDERATION

Ethical clearance was sought from the Ghana Health Service Ethics Review Committee as a requirement for the conduct of this study. 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. The researchers anticipated no potential risks of participation to participants. Most of the questions were non-sensitive to inflict any emotional injury on participants. Participants were assured of confidentiality and privacy of the information provided. Data files on computers and external hard drives were protected with security codes (password) to prevent easy access by other persons.

An informed consent was sought from participants after explaining the study purpose to them before recruiting them to be part of the study. Again, the researchers and the research assistants patiently read out and explained to participants the purpose of the study in a language they best understood. Those who agreed to be part of the study were made to sign a written consent form or produce their thumbprint on the form. Only investigators of this study are privy to the data.

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