

**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA-LEGON**



**TRENDS IN HIV PREVALENCE IN HEALTH FACILITIES IN A
MINING DISTRICT OF BRONG AHAFO REGION FROM 2011-
2015**

BY

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(10376845)

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DECLARATION

I, Richard Osei-Yeboah hereby declare that except for reference to other people's work which I have duly cited, this is the product of my own research undertaken under supervision and has neither been presented in whole nor in part for another degree elsewhere. I am responsible for any flaws in this work

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DATE:

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DR. PATRICIA AKWEONGO

(SUPERVISOR)

DATE:



DEDICATION

This work is dedicated to all persons living with HIV & AIDS.



ACKNOWLEDGEMENT

I am grateful to God Almighty for the success of this work.

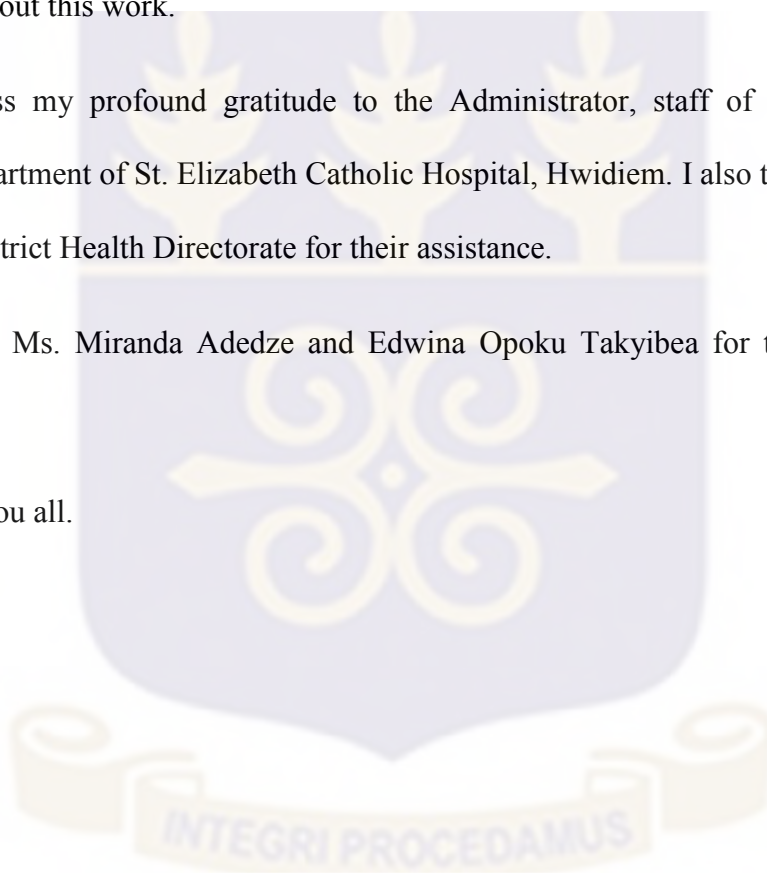
I thank my family for their support.

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May God bless you all.



ABSTRACT

Background: Migration plays a major role in the transmission of diseases. Mining is associated with high labor migrations, which pose a risk for the transmission of communicable and infectious diseases. HIV like other sexually transmitted infections significantly increases in incidence and prevalence with the commencement of large scale mining activities in most communities among several other biological, social and economic determinants.

Objective: The objective of this study was to determine trends in HIV prevalence in health facilities of a mining district of Brong Ahafo region from 2011 to 2015.

Method: Records on HIV screening from 2011 to 2015 were reviewed from hospital registry and information collected on age, sex, date of HIV screening, HIV screening results and location to determine the trends.

Results: HIV prevalence among HIV Counseling and Testing (HCT) cases remained nearly steady with 42.7% (133) for 2011 and 42.9% (107) for 2012 followed by a rise to 47.5% (114) in 2013 and then a consistent decrease of 39.5% (94) and 26.4% (47) in 2014 and 2015. Females had 64.2% (318) of the total positive cases against 35.8% (177) for males. Age groups 25-29 and 50+ recorded the highest HIV prevalence of 6.2% (76) with age group 15-19 recording the least prevalence 0.98% (12). The highest HIV cases (58/1000) were recorded in July (rainy/hunger season). The HIV prevalence by location for the period showed 54.69% (268) for rural location and 45.31% (222) for urban location.

Conclusion: HIV testing coverage is declining in the district however, prevalence remains high especially among women and younger generations, suggesting transactional sex activities due to

mining which indicates that active HIV campaigns are needed. Mobile voluntary counseling and testing for HIV could be explored.



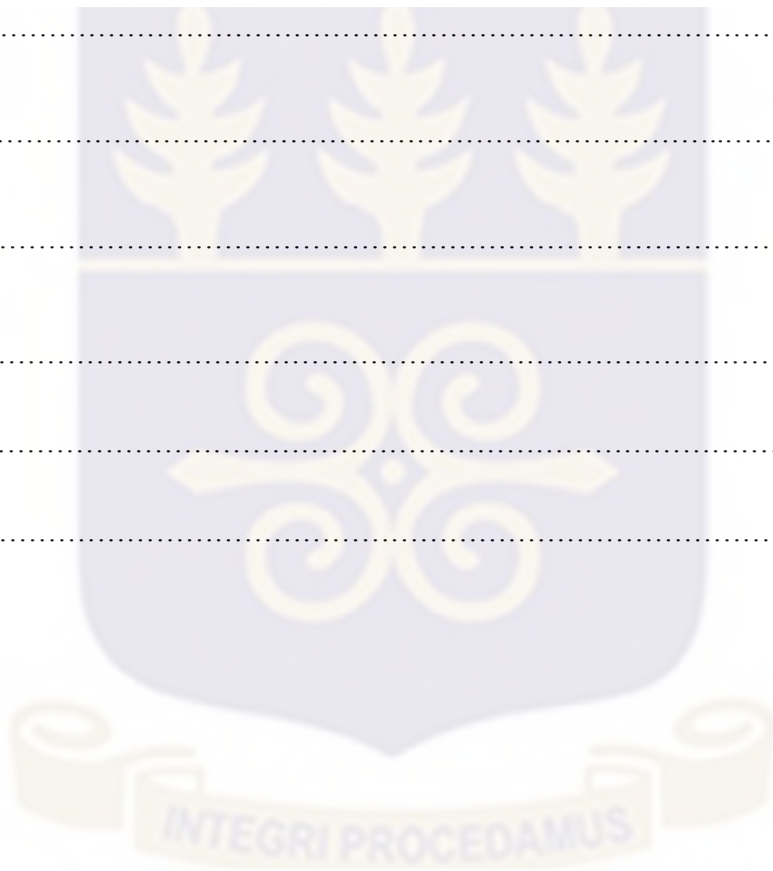
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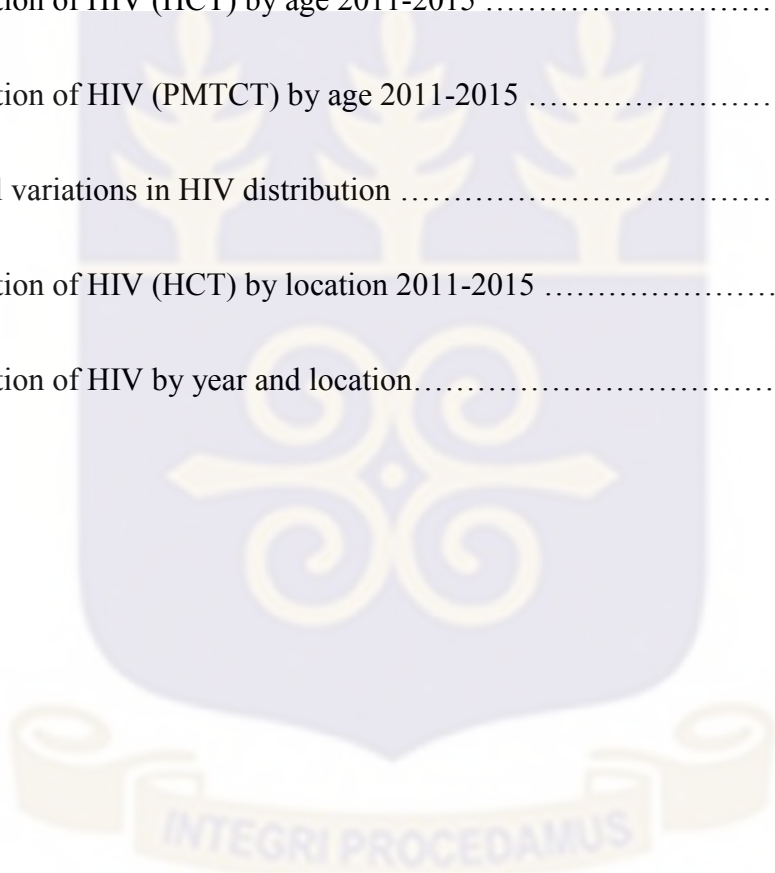
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LIST OF ABBREVIATIONS

WHO	World Health Organisation
UNAIDS	United Nations Programme for HIV/AIDS
STI	Sexually Transmitted Infections
HIV	Human Immune Virus
AIDS	Acquired Immuno Deficiency Syndrome
GAC	Ghana AIDS Commission
GDP	Gross Domestic Product
TB	Tuberculosis
GHS	Ghana Health Service
NACP	National AIDS Control Program
GIS	Ghana Immigration Service
GSS	Ghana Statistical Service
MSM	Men who have Sex with Men
PWID	People Who Inject Drugs
CDC	Centres for Disease Control & Prevention
ART	Anti-Retroviral Therapy
VCT	Voluntary Counselling and Testing

PMTCT	Prevention of Mother To Child Transmission
NGO	Non-Governmental Organization
UNICEF	United Nations International Children’s Emergency Fund
USAID	United States Agency for International Development
MDA	Municipal and District Assembly
HCT	HIV Counseling and Testing



CHAPTER ONE

1.0 INTRODUCTION

The Human Immunodeficiency Virus (HIV) has been described as one of the worst epidemics in about three decades. The World Health Organization in 2001 declared HIV as a global emergency. It is heterogenic in nature which varies between countries and within populations (UNAIDS and WHO, 2010). About 33.2 million people were estimated in 2007 to be living with HIV/AIDS worldwide (WHO, 2007). About 3,000 new cases of HIV infection occur daily in Africa (UNAIDS/WHO, 2007 and 2009). The global AIDS epidemic report by the UNAIDS in 2010 reported 33.3 million adults and 2.5 million children to be living with HIV. An estimated 68% of all people living with HIV resided in sub Saharan Africa which is a region with only about 12% of global population in mid-2010 (UNAIDS, 2011) however, 3.5 million people living with HIV was estimated to be in Nigeria in 2012 placing third after India and South Africa (NARHS Plus II, 2012).

The situation in Ghana has not been different from the sub-region and global levels however, there seems to be a fluctuation of HIV prevalence and incidence in Ghana over the years. In Ghana an estimated 250, 232 persons of which 59% were females and 41% males were reported to be living with HIV in 2014 with 229, 009(92%) being adults and 21, 223(8%) children (GAC, 2014b). A prevalence of 3.6% was recorded in 2003 and declined to 2.7% in 2005, in 2006 it increased to 3.2%, reduced to 2.2% in 2008 and increased to 2.9% in 2009 (National AIDS/ STI Control Programme, 2008, 2009, and 2010). The sentinel survey reported a prevalence of 2.0% and 2.1% for 2010 and 2011 respectively.

A total of 236, 151 adults and children (20,808) were estimated to be living with HIV/AIDS with 22,541 new infections in 2008. An estimation of 230,348 adults and children living with HIV/AIDS and 14, 165 new infections was observed in 2010. There were also 225,478 adults and children living with HIV/AIDS with 12,077 new infections out of which 1,707 were children in 2011. An estimated 17,230 and 15,263 AIDS deaths for 2010 and 2011 respectively was made (National AIDS/ STI Control Programme, 2013). The Ghana AIDS Commission's 2014 Status Report suggests a national adult HIV incidence of 0.07% and prevalence of 1.47% with 11, 356 new infections and 9248 AIDS associated deaths. The Eastern Region recorded the highest regional prevalence of 3.7%, however, the Brong Ahafo region recorded a prevalence of 2.6% in 2014.

There are several risk factors for the transmission of HIV, however, sexual risk behaviors such as unprotected sex and multiple sex partners are key for transmission of HIV (Mmbaga et al. 2007). A reduction in the transmission rate of HIV has been associated with changes in this risk behavior (Cleland et al. 2004, Gregson et al. 2006). UNAIDS and WHO, 2010 called for a country-specific description of the main contributory factors for the epidemic due to the variability in the HIV transmission between countries of sub-Saharan Africa where HIV spread has been rapid. In sub-Saharan Africa 5.5 million adults and children were estimated to be living with HIV with estimated death of 320,000 in 2005 (UNAIDS, 2006). The practice of unsafe sex due to lack of education on its relation with sexually transmitted diseases account for the high rates of transmission of HIV (Brummer, 2002).

The risk of HIV transmission could also be viewed to be impacted by labor, social, economic, political and / or cultural determinants rather than predominantly an individual behavior. Scientific

literature across health and social sciences suggest a link between labor migration and HIV transmission although the pathways are not entirely understood (UNAIDS, 2001). Stuckler, Basu Mckee & Lurie, 2011 contend that in Southern Africa, HIV has been amplified by mining through social, political and biological risks across the continent. This study intends to determine the trend of the incidence and distribution of HIV over a 5 year period in a mining district which is populated with migrants.

1.1 Problem Statement

A national adult HIV prevalence of 1.47% and 0.07% incidence with 11, 356 new infections was reported in 2014 for Ghana. The Brong Ahafo region recorded a prevalence of 2.6% (GAC, 2014a). Large scale mining activities have taken shape in Ghana presently contributing about 5% per annum of the total Gross Domestic Product (GDP) (Bank of Ghana, 2003). Migration is highly associated with mining and considered a significant factor for the transmission of communicable and sexually transmitted diseases. Studies support relationship between mine workers migration and HIV/AIDS (Akabzaa, 2001). According to the 2010 population census, 20,236 out of the 52,259 population of the Asutifi North were migrants. The large number of expatriates and migrants in mining communities could be the source of high incidence in diseases (Akabzaa, 2001). In 2006, Newmont Ghana Gold Ltd started its commercial operations in ten communities in the Asutifi North and Tano North Districts employing over 2,500 workers and contractors with over 53% as non indigenes as at December, 2016. This has resulted in the influx of migrants and expatriates in the various mining communities posing several risks including HIV transmissions. An HIV prevalence of 5.8% was recorded at Asutifi North district from January to October, 2010 (mobile.ghanaweb.com). In spite of the increasing migrants in the mining communities in the

district, it is unclear as to what the trends in HIV prevalence are in this district with mining activities and the distribution of HIV. The aim of this study is to determine trends in HIV prevalence in Asutifi North, a mining district of the Brong Ahafo region.

1.2 Justification

This study may provide empirical evidence on the trends of HIV prevalence in the district in relation to mining and migration which may inform the assemblies and health agencies on the need to establish a roadmap to address health challenges associated with the operations of mining industries. The findings of this study may become a baseline and assist in formulation and implementation of strategic intervention policies to control HIV in the district.

1.3 General Objective

To determine trends in HIV prevalence in Asutifi North, a mining district of Brong Ahafo from 2011 to 2015.

1.4 Specific Objectives

1. To determine trends in HIV prevalence in the Asutifi North district from January 2011 to December 2015.
2. To determine distribution of HIV by age and sex.
3. To assess seasonal variations in HIV prevalence.
4. To determine HIV distribution by location.

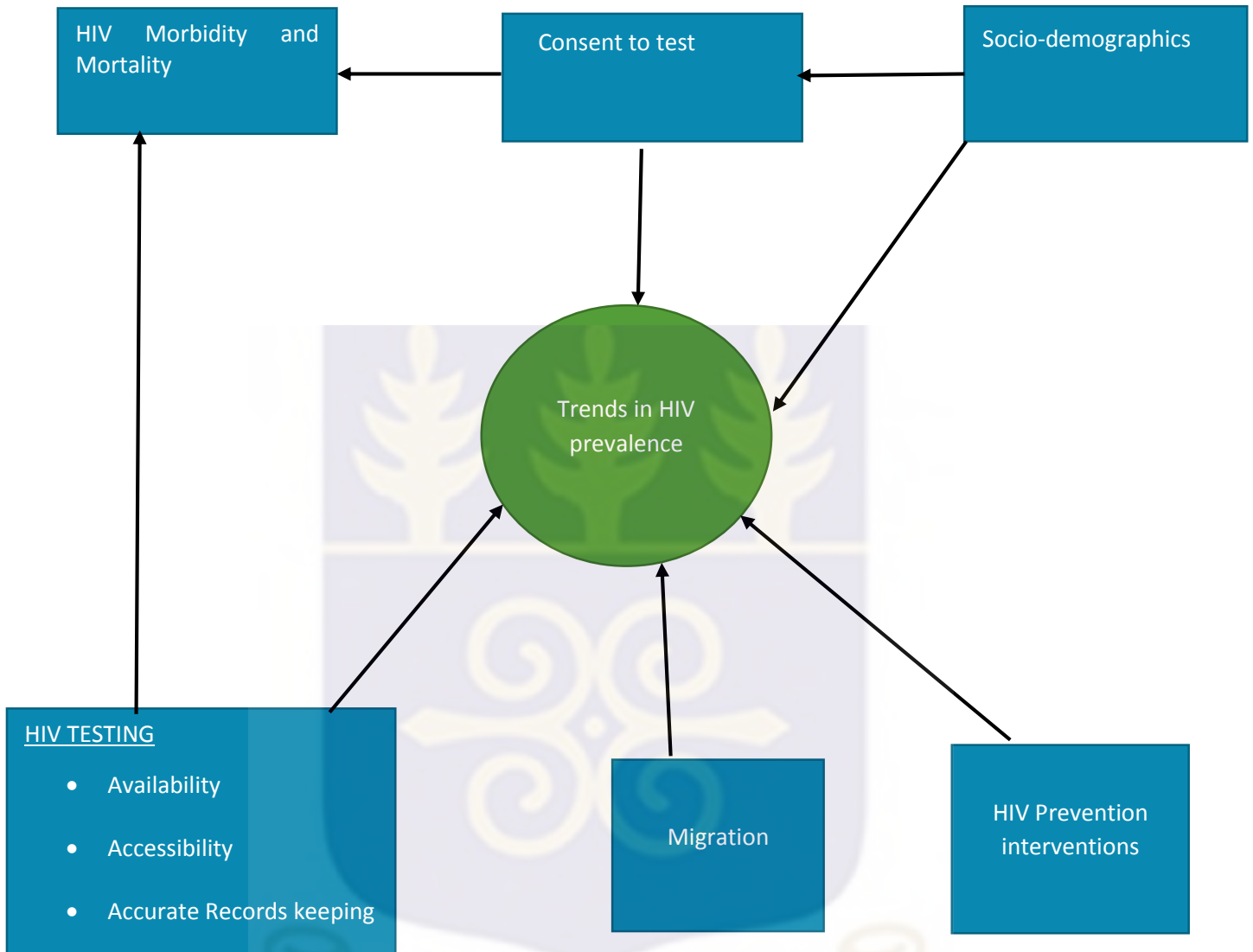


Figure 1: Conceptual Framework of Trends of HIV Prevalence

The study of the trends of HIV prevalence depends on several interconnected factors which have the tendency of affecting the actual trends. HIV being a sensitive condition has become complicated to be dealt with. In order to obtain the accurate trend of HIV prevalence, there is a need for individuals to consent to test for the disease which is basically informed by socio-

demographic characteristics such as age, sex and location in order to determine the disease burden. People in a certain age group may be willing to test while others may not. A characteristic associated with masculinity may discourage health promoting behaviors as such, males are known to be less willing in testing or knowing their HIV status as compared to women (Mills, Beyrer, Birungi, & Dybul, 2012) while being in a rural, peri-urban or urban areas influences consent to test for HIV (GAC, 2014b). Determining HIV morbidity and mortality are influenced by the number of individuals consenting to HIV testing and the availability and accessibility of HIV testing. The availability and accessibility of HIV test and accurate records keeping essential in analyzing the trends of HIV prevalence.

Other major factors that need to be considered when studying the trends of HIV prevalence of an area are migration into the area (Akabzaa, 2001) and existing interventions to educate and inform the inhabitants about HIV and its prevention intended to control or reduce the spread of the disease. Migration may increase the incidence of HIV with the inflow of people into communities posing a risk of spreading communicable diseases (Akabzaa, 2001) leading to high prevalence while control interventions such as education, communities' engagement, condom distribution, etc. may reduce the incidence of HIV over time which proportionally affect prevalence.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Global burden of HIV

The Human Immunodeficiency Virus (HIV) is a leading cause of death worldwide and the number one cause of death in Africa (UNAIDS, 2012). Since 2001, the overall new HIV infections have declined over 20% yet there were about 2.5million new infections in 2011 and more than 7,000 new HIV daily infections (UNAIDS, 2012). The burden of the epidemic varies between countries and regions. An estimated 0.8% of adults (15-49 years) worldwide are person living with HIV (UNAIDS, 2012). Sub-Saharan Africa continues to remain the widely affected sub region, with nearly 1 in every 20 adults (4.9%) living with HIV which accounts for 69% of the overall people with HIV worldwide (WHO, 2013).

The reduction of CD4+ lymphocytes is characteristic of HIV infection which manifests through loss of immunity against foreign or opportunistic infections. There is a loss of immune surveillance mechanism or capacity resulting in the development of such opportunistic infections as Tuberculosis (TB), Kaposi's sarcoma, etc. TB is currently a leading cause of death among people living with HIV/AIDS worldwide particularly in Africa. About 13% of new TB cases were reported in people with HIV in 2011 (WHO, 2013). According to UNAIDS, 2012, women form almost half of all people with HIV worldwide and more than 58% in sub-Saharan Africa. Young people within the ages of 15-24 account for 40% of new HIV infections. Sub-Saharan Africa has suffered a great deal of the HIV epidemic which has resulted in poverty, hunger, high cost of survival and deaths. More than 15million Africans are believed to have died from HIV/AIDS

related illness since the epidemic was declared (WHO,2009) and an estimated 1.2million adults and children died from HIV/AIDS related conditions in 2010 alone (UNAIDS, 2011).

2.2 HIV in Ghana

HIV was first detected in Ghana in 1986 in Accra (Ampofo, 2005) and has spread rapidly overtime. The first cases recorded 42 cases in1986 but rose to 37,298 cases by the close of 1999 (GAC, 2001). In Ghana the HIV epidemic has been described as “established low level generalized epidemic” with “mostly higher prevalence among certain communities and special groups” (GHS, 2013). HIV sub-type 1 is the predominant type in Ghana which constitutes 97.1% of all infections (GHS, 2013). The WHO nationwide study of Ageing and Adult Health in Ghana (SAGE Wave 1 2008) estimated prevalence of HIV among persons above 50 years. Age group 50-59 years recorded a prevalence of 2.3%, 60-69 years 3.0% and 1.3% for age 70 and above. Rural-urban prevalence in the same study recorded 1.8% and 2.6% for rural and urban respectively. Among this older population, 1.9% was recorded for males and 2.4% for females.

HIV prevalence among ante natal clinic attendants recorded a prevalence of 0.2% in Naleringu (rural) and 10.1% in Agormanya (rural/urban) (GHS, 2013). Since the introduction of Anti-retroviral Therapy in May, 2003, about 65,342 people were enrolled on the therapy by the end of 2011 with consistent increase thereafter. The National AIDS Control Program (NACP) and the Ghana AIDS Commission have expended efforts on the control and management of HIV and AIDS through information, education and communication targeting behavioral change. The overall trend analysis of HIV prevalence in Ghana shows a decline (GHS, 2013).

2.3 Mining and Health implications in Ghana

In spite of attempts to reduce the overall burden of infectious diseases worldwide (Lozano & Naghavi., 2012) they still remain a significant public health challenge (Viliani, Edelstein, Buckley, Llamas, & Dar, 2016) placing a major burden on global economies especially in low and middle income countries (Dye, 2014). Ghana has natural mineral resources like bauxite, diamonds, gold and manganese. However, the gold mining industry has dominated the mining sector over the years with higher of foreign exchange earnings. Gold mining in modern Ghana dates back before the era of the European invasion and until the Atlantic slave trade, gold was the commonest commodity(Ofosu-mensah,2010). The mining sector has immensely contributed to the development of Ghana's socio-economy serving as a major foreign exchanger earners contributing 95 percent of total value of mineral exports and 34 per cent of total commodity exports (Bank of Ghana, 2003). It accounted for about \$793 million of the country's foreign exchange earns in 1998 which represented 46% of the gross foreign exchange obtained in that year (Ismi, 2003).

The mining of gold and its processing involve several activities which predisposes human and environment to diseases. Mine blasting produces thundering noise and vibration of the ground as well as dust production which increases the atmospheric and environmental pollutants. Other harmful substances and chemicals such as cyanide, arsenic, Sulphur dioxide and other noxious gases are produced which have several implications on health. Of great concern is the increase in sexually transmitted diseases. Studies have shown that there is an increase in Syphilis and HIV cases in Tarkwa, a mining community in the Western region of Ghana (Akabzaa, 2001) and this is attributable to the large expatriate and migrant mine workers who patronize prostitutes in the area. Similarly "galamsey" operators in mining areas are considered to be of high propensity to

spread infections taking into consideration their promiscuous lifestyle (Akabzaa, 2001). According to Akabzaa, prostitution in the area has taken a different dimension as two categories of sex workers that is, mobile and resident are in operation in the area. The mobile sex workers are non-residents who come from neighboring towns and cities targeting the expatriate mine workers and the prosperous galamsey operators. It is believed that the increase in HIV incidence in the area is as a result of the mining activities which have brought numerous expatriates and migrants into the area.

2.4. Migration

Immigration and emigration are both a cause and a consequence of major social changes throughout the world. Labor mobility has become a key feature of globalization and the global economy with migrant workers earning \$440 billion in 2011 (www.iom.int). Majority of immigrants moving into Ghana are said to come from Africa (Asare, 2012). About 58.9% of non-Ghanaian residents were observed to be nationals of Economic Community of West African States (ECOWAS) countries in 2000, while 23% came from African other countries outside the ECOWAS (Asare, 2012). From the statistics obtained from the Ghana Immigration Services on the borders, “Europeans constituted the largest group of non-African arrivals (15.3%), followed by North Americans (9.7%), from 2000 to 2007” (GIS, 2008).

Migration is considered an important risk factor for the spread of communicable and sexually transmitted diseases. Migrants are often implicated for introducing and spreading HIV/AIDS in host communities. Migration of young ladies into mining communities in search of jobs may lead to prostitution with consequences of spreading transmittable diseases including HIV and AIDS

(World Bank, 2010). The existence of a relationship between migration and HIV/AIDS is supported by studies (Lurie, Williams, Zuma, Mkaya, Mwamburi, Garnett, Sturm, Sweat, Gittelsohn and Karim, 2003). The communities of destination of migrants suffer the consequences of accompanying infectious diseases due to the complex relationship between migrants and the indigenes. The mining sector requires some level of skilled labor for its operations. The general workforce at the mining sector has been a male dominated field with relatively low-skill. Mines have been dependent on labor migration to service the labor intensive sector. Evidently, there has been a major migration into mining communities from both local and foreign immigrants for labor and economic reasons. The 2010 population and housing census in Ghana showed that 20,236 out of the 52,259 population of the entire Asutifi North district were migrants (GSS, 2010).

2.5 Newmont Ghana Gold in Ahafo

One of the five core operating districts for the Newmont Mining Corporation is managed by Newmont Ghana Limited. The Newmont Ghana operates the Ahafo mine area in the Brong Ahafo region which consists of ten host communities covering the Asutifi North and Tano North districts. Another mine area named the Akyem Project in the Birim North district of Eastern region is a development project under the Newmont Ghana operations. Approximately 4,900 employees and contractors are engaged by the company with the majority of these employees working at the Ahafo mine (www.newmont.com). The company started its commercial operations in the Ahafo mine in 2006 with over 53% of the total employees being non indigenes as at December, 2015. A study by Opoku-Ware (2010) reported increase in prostitution in Kenyasi the capital of the Asutifi North district which hosts the mining and attributed it to the presence of Newmont and its mining activities. Prostitution was observed to be common among females between ages 16 to 35 years

who are mostly patronized by expatriates believed to be migrant workers living in the community which poses a major health risk (Opoku-Ware, 2010).

2.6. Socio-demographic factors and HIV infection

Social and demographic factors of a group play a key role in its nature and characteristics. While some factors are seen as possible risks for the contraction of certain diseases, others play distant yet significant roles in determining the extent at which a group may be vulnerable to certain conditions. Age, sex (gender) and geographical locations are deterministic factors for HIV incidence among a particular group.

HIV continues disproportionately to impact on vulnerable populations, including young women and girls, men who have sex with men (MSM), sex trade workers, people who inject drugs (PWID) and migrant populations (Delpech & Asia, 2013).

The risk of HIV infection has been associated with age which makes individuals vulnerable to the disease. People in their sexually active ages are considered more vulnerable to HIV infections. The overall global HIV prevalence in 2011 among adults (15-49 years) was 0.8%, though this varies widely by world region (Delpech & Asia, 2013). Adults (15 years and above) recorded 9,467 (83%) out of 11, 356 new HIV infections in 2014 (GAC, 2014a). Individuals within the ages of 15 and above are considered to be in their sexually active periods mainly characterized by exploitations, curiosity and peer influence. Young adults in this period are probably likely to indulge in unprotected sex due to lack of knowledge on sexually transmitted infections, unavailability and/or inaccessibility of condoms as means of protection (Coughlin, 2016). Of all

births registered in Ghana in 2014, 30% were by adolescents and 14% of adolescents aged between 15 and 19 had already begun childbearing (Coughlin, 2016).

Females are considered two to four times more vulnerable to HIV and other Sexually Transmitted Infections (STI) than men during unprotected sexual intercourse. This is as a result of a larger surface area exposed to contact and a possibility of micro trauma during sexual intercourse (Dicarlo et al., 2014). However, globally, men who have sex with men are about 19 times risky of HIV than the general population. It is reported that median HIV prevalence in western and central Africa among gay men and other men who have sex with men is 19% and 13% in eastern and southern Africa (GAP Report, 2014). In Ghana, 148,237 (58%) females were infected and living with HIV in 2014 as compared to their male counterparts of 101,995 (41%) (GAC, 2014b).

HIV has long been seen as an urban problem, while rural areas are often believed to be less affected by the pandemic. Although most attention has been paid to urban areas, the number of people living with HIV may be greater in absolute numbers in rural areas. This could be due to the fact that many of the countries that are most affected by HIV are primarily rural. An unpublished study conducted in Rwanda showed high prevalence of HIV in urban areas as compared to rural areas thus 7.3% and 2.2% for urban and rural respectively (www.dhsprogram.com). A study by Magadi (2013) of cross national analysis of poverty and risk of HIV infection in 20 countries in sub-Saharan Africa showed that the urban poor in the region had a significantly higher odds of HIV infection than their rural poor counterparts. The prevalence of HIV among urban dwelling pregnant women in Ghana has been consistently higher than the rural areas (GAC, 2014a). In 2014, the urban dwellers had a median prevalence of 2.0% as against 1.1% among the rural dwellers (GAC, 2014a). Urban dwellers recorded a higher prevalence in HIV than the rural dwellers in all age groups except for ages of 40-44 and 45-49 years. The 45-49 age groups in rural areas recorded the

highest HIV prevalence of 3.7% whilst the same age group counterparts in the urban areas recorded 0.0% (GAC, 2014b). In 2013, HIV prevalence by urban sites ranged from 11.6% in Agormanya to 0.6% in Jirapa while it ranged from 2.4% in Dangbe East to 0.2% in Adibo for rural sites (GAC, 2013).

2.7 HIV Testing

The Centers for Disease Control and Prevention (CDC) recommends everyone between the ages of 13 to 64 years is tested for HIV at least once however, people at higher risks for HIV infection should get tested each year and pregnant women are recommended to test very early in each pregnancy. Testing for HIV only determines whether a person is infected or not but it cannot detect how long a person has been infected or if the infection has reached the most advanced stage of AIDS. Testing negative for HIV indicates the absence of the virus while a positive test is indicative of the presence of the virus (www.cdc.gov). Factors such as engaging in vaginal or anal sex without the use of condom with HIV infected person or a person whose HIV status is unknown, injecting drugs and sharing needles, syringes or drug equipment with others, exchanging sex for money or drugs, having a sexually transmitted disease such as syphilis and having hepatitis or tuberculosis increase the risk of a person of HIV infection. Antiretroviral therapy (ART) is available for people infected with HIV to boost their immune system and enhance their survival (www.cdc.gov).

2.8 Screening for HIV (Voluntary Counseling and Testing)

Voluntary Counselling and Testing (VCT) is a client-initiated HIV testing and remains critical to the effectiveness of HIV prevention and management (UNAIDS, 2004). It is the process by which an individual or a couple undergoes counselling to enable them make informed choices about being

tested for HIV. All models of VCT must be guided by five key principles according to UNAIDS (2004). These key principles are services must be confidential, attendance must be voluntary, accessing the services must go through both pre-test and post-test counselling, clients who test positive must not be discriminated against and clients must have ongoing services in prevention and care and support.

There are several VCT models designed specifically for various groups targeted to meet different objectives and achieve diverse results. A model may usher individuals with HIV and AIDS into clinical care whilst another could be used for effective prevention of HIV from mother to a child. A model may also serve as a tool for the prevention of HIV in a general population (FHI, 2005). Six Counselling and Testing models identified by FHI (2005) are; the Stand alone model, the Integrated model, the Quasi-Integrated model, the Private sector model, the Mobile model and the Home based model.

The Stand-alone Model

The Stand-alone model is often ran by Non-Governmental Organizations (NGOs) at designated stand-alone sites also called free-standing sites. The model is mostly not linked to established medical institutions. Usually, Counselling and Testing (CT) is done exclusively at the designated sites with the staff employed for full-time provision of counselling and testing services(FHI, 2005). This model is not known to be in use in Ghana.

The Integrated model

Counselling and Testing (CT) services are provided in health facilities by medical professionals trained for that purpose in the integrated model. CT is offered together with other services including general in- and out-patient, tuberculosis (TB), antenatal, and sexually transmitted

infection (STI) care. There are two main approaches to the integrated model; Diagnostic CT and Routine CT. Patients reporting at the health facility with HIV symptoms and other clinical signs are offered a diagnostic CT. This maximizes the identification of HIV positive persons for referral for treatment, care and support (FHI, 2005). The Routine CT is included in services such as the antenatal, STI or TB clinics as part of standard care. CT is mainly offered together with other tests which allow a client to decline testing if he/she so desires (FHI, 2005). The integrated model is the widely used model in hospitals in Ghana as it is the case at St. Elizabeth Hospital in the Asutifi North District.

The Quasi-integrated model

Quasi-integrated sites afford Non-Governmental Organizations (NGOs) the opportunity to provide CT in public health facilities; the NGO together with the integrated facilities both ensure the management of the services. This model dwells on the strengths of both stand-alone and integrated models and the quality of the partnership determines its success (FHI, 2005). Uganda offers a good example of NGOs joined to health facilities for the provision of HIV VCT services. One great advantage of the quasi-integrated model is that services are effectively and efficiently funded and managed (FHI, 2010). Newmont Ghana Gold has supported health facilities and Asutifi North district hospital with equipment and logistics to offer health services including VCT to communities within the mine area.

The private sector model

The private sector counselling model involves the provision of CT services mostly in private medical offices and as a variety of integrated CT. This model targets people in the high social class who are unlikely to patronize the services public-sector facilities (FHI, 2005).

The mobile counselling and testing model

The mobile HIV CT model involves rendering of the services to individuals within the community by providing CT services from mobile vans or at selected places within the community (FHI, 2005). In some instances, bicycles and motorcycles can be used. Service providers in teams set up a temporary site to offer services to the general population or a defined group such as a church congregations, company employees, or to “hard-to-reach groups” like sex workers, truck drivers, street boys or those with no fixed address under this model (FHI, 2005). Mobile CT has the advantage of improving access for “hard-to-reach” and rural populations. This model of VCT is used in Ghana as it has the advantage of bringing services to the doorsteps of beneficiaries.

The Home counselling and testing model

Home-based CT has similarities with the mobile model in the regard that CT services are offered at home to family members. This model is also referred to as “the family-based model” (FHI, 2005). According to AVERT (2010), in the Bushenyi district of Uganda, door to door HIV testing contributed to a radical reduction in HIV prevalence in the early 2000s, from 8% to about 3% in three years. The home based CT has an advantage of addressing the needs of an entire family. Prevention and behavioral change education and discussion may be more effective in the context of the family and the home (FHI, 2005) however this is not widely practiced in Ghana.

2.9 Trends of HIV

The HIV/AIDS epidemic has affected a considerable population regardless of age and sex. The trend of HIV vary between sub-regions. A UNICEF worldwide estimation stated that 36.9 million people were living with HIV in 2014 (UNICEF, 2015) and approximately, 5,600 individuals were

newly infected with HIV each day that year. Around 220,000 children were recorded with new HIV infections in 2014 however, there has been a sharp decline of nearly 60% of new HIV infection among children (0-14years) since 2001(UNICEF, 2015). A 24% decline was observed from 2000-2009 and 45% from 2009-2014. Based on these projections of annual rate of decline observed in recent years, the 2015 target of 90% was projected to be missed by 155,000 new HIV infections among children which is unlikely to be reached over a decade (UNICEF, 2015).

Over 80% of all adolescents infected and living with HIV in low and middle income countries were in sub Saharan Africa by the end of 2014. The Eastern and Southern Africa accounted for 61%, West and Central Africa-21%, East Asia and the Pacific-4%, Latin America and the Caribbean-4%, Middle East and North Africa-1%, CEE/CIS-1% and rest of the world-2% (UNICEF, 2015). A five year trend study by Alvarez-uria, Midde, & Naik, 2012 from 2007 to 2011 in rural India showed a significant uniform decline in prevalence of HIV among pregnant women from 1.22% in 2007 to 0.35% in 2011.

Trends of previous growth in HIV incidence in Ghana indicates a somewhat stable situation in the southern sector with the northern sector showing a slow growth over time thus these trends suggest an overall slow increase in new HIV cases in Ghana (Aboagye-Sarfo, Cross, & Mueller, 2010). The number of new cases of HIV infection among males and females was observed to be increasing on monthly basis with major contributors identified as males in ages 30 and above and 30-59 for females in the northern sector and the age group 20-39 for females in the southern sector (Aboagye-sarfo,Cross,&Mueller,2010).

2.10 HIV Prevention Interventions

According to USAID (2005), the main mode of HIV transmission in Ghana is heterosexual intercourse otherwise known as pinoviginal sex which is said to be accounting for 75 to 80 per cent of all HIV infections in the country. Mother To Child Transmission (MTCT) or Vertical transmission of HIV is another major form of transmission and accounts for about 15 per cent of total transmission in the country (USAID, 2005).

The Government of Ghana realizing the alarming rate of new infections of HIV and AIDS in the year 2000, adopted a psycho-social approach in an attempt to halt or at least slow down the spread of the disease. This led to the setting up of the Ghana AIDS Commission (GAC) under the auspices of the President of the Republic of Ghana to coordinate all activities relating to HIV and AIDS in Ghana. The Ghana AIDS Commission aimed at containment of the disease through the prevention of new infections through reducing MTCT and VCT. The commission since its establishment has formulated policies and programmes intended to meet international standards which mainly target HIV infections reduction and the providing assistance and care for those who are HIV positive.

The approaches adopted included intensive education and condom distribution, setting of voluntary counselling and testing centers, antiretroviral clinics. The ABC approach as known to be effective for reduction of HIV infection in countries like Uganda (AVERT, 2010) was widely used in the early 2000s. It basically focused on highlighting on Abstinence from sex for unmarried people, Being faithful to partners and Condom use for those who could not abstain.

The World Health Organization recommends that all pregnant women eligible for ART must have access to it if the goal of eliminating HIV infection in infants and young children is to be achieved.

Prevention of Mother-To-Child Transmission (PMTCT) services started in 2002 in Ghana and a significant increase in service utilization was observed between 2002 and 2007 (Ghana AIDS Commission, 2007). A total of 407 PMTCT sites had been established in 138 districts and a total of 635 service providers trained by September 2007. Persons receiving PMTCT services hit a total of 20,296 in 2005 out of which 748 representing 3.7% were HIV positive with 584 of these receiving Anti-Retroviral Therapy (ART). An increase to 36,155 individuals received PMTCT services in 2006 and out of this, 1,378 or 3.8% were HIV positive and 1,239 received ART. A five-fold increase in the number of clients accessing PMTCT was recorded from 2005 to 2007 thus 109,334 received PMTCT services of 3250 were positive and 2011 received ART in 2007 (Ghana AIDS Commission, 2007). By the end of 2014, ART coverage among women was 38% with an estimated 8,299 pregnant women who needed ART for PMTCT covered. In general, adult ART coverage was 34% in 2014 (GAC, 2014b). The Ghana AIDS Commission indicated that 798,763 people were tested for HIV and received their reports, a total of 916,608 people were reached with various HIV interventions and over 20,880,654 condoms distributed (GAC, 2014b).

The Brong Ahafo regional health directorate (RHD) adopted the National Strategic Plan for HIV/AIDS which focuses on new HIV infections prevention and virtual elimination of MTCT. The plan outlines policies to optimize, sustain and scale up treatment, care and support for PLHIV and leverage treatment as a prevention strategy. The programme coordinates the provision of essential technical support to all Municipal and District Assemblies (MDAs) in the region in the implementation of HIV programmes. In 2015, the RHD instituted an intensive advocacy, communication and social mobilization activities aimed at reducing the regional HIV prevalence (RHD, 2015). These activities included; provision of consistent structured and targeted health

education on radio stations and community information centers, posting of health educational materials at vantage points in the communities, durbars to create awareness on HIV/AIDS on World AIDS days, condom use demonstrations and free distribution of condoms (RHD, 2015).



CHAPTER THREE

3.0 METHODOLOGY

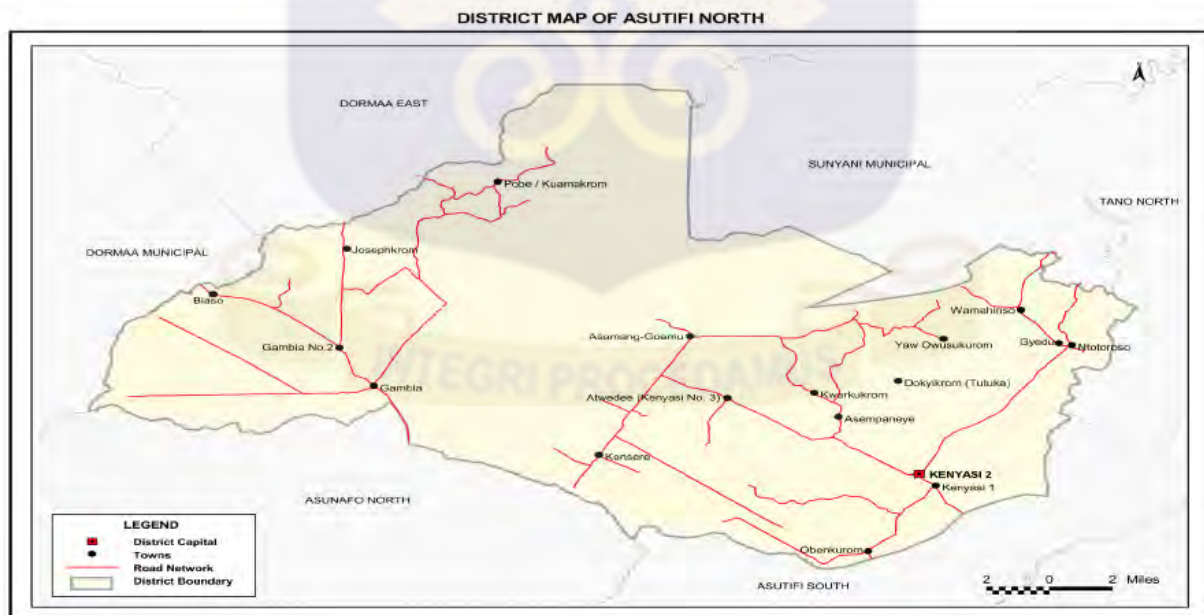
3.1 Study Design

The study was a descriptive cross sectional design using secondary data. Routine records of HIV cases were reviewed from the district health facility. Information were collected on age, sex, date of HIV screening, location and screening results.

3.2 Study Site

The study was conducted in the Asutifi North District in the Brong Ahafo region with Kenyasi II as the capital. It has a population of 52,259 representing 2.9% of the total regional population of which 26,761 are males and 25,498 are females (GSS, 2010) with 6 health facilities (4 government owned and 2 privately owned). The St. Elizabeth Catholic Hospital at Hwidiem serves as the main district and referral hospital offering ART and VCT/PMTCT services for both Asutifi North and South districts as well as neighboring districts. The district hosts Newmont Ghana Gold Ltd., a gold mining firm which began its commercial work in 2006 with 760 operations staff and as of December, 2016 had 2500 employees and contractors operating all year round (www.newmont.com). The district shares boundaries with Sunyani Municipal on the North, Tano South District on the North East, Dormaa East District to North West, Asutifi South District in the West, Asunafo North Municipal and South Districts in the South West and Ahafo Ano South and North Districts (Ashanti Region) in the South East. With a total land surface area of 1500 sq.km, the district is one of the smallest in the Brong Ahafo Region. There are a total of 117 settlements in the District with major towns as Kenyasi I, Kenyasi II, Ntotroso, Wamahinso and Gambia I.

(Asutifi North District, 2016). The district is predominantly rural with a population of 35, 468 and an urban population of 16,791 thus every 8 out of 10 people live in a rural area. The 2010 Population and Housing Census shows that 20,236 persons representing 38.7% of the entire district population were migrants. Less than one-third, 27.3% of the migrants were born elsewhere in the Brong Ahafo region (intra-regional migrants). A total of 14,273 migrants representing 70.5% were born in other regions of Ghana and 2.2% were born outside Ghana (GSS, 2010). Majority of the residents in the district are within the ages of 15-64 years with a population of 29,394. Males account for 15,064 (51.25%) while the 14,330 (48.75%) are females. Persons aged 0-14 years are 20,765 out of this, 10,689 (51.48%) are males and 10,076(48.52%) being females. The population above 65 years is made up of 1,008 males and 1,092 females representing 48% and 52% respectively (GSS, 2010).



Source: Ghana Statistical Service, GIS

Figure 2: Map of Asutifi North District

3.3 Study Population

Records of all individuals screened or confirmed for HIV in the Asutifi North district from 2011 to 2015 at the St. Elizabeth Catholic hospital serving as a district hospital.

3.4 Sample Size

Records of a total of 1125 individuals and 6626 pregnant women screened or confirmed for HIV from January 2011 to December 2015 at the St. Elizabeth Catholic Hospital and these were extracted for analysis in this study.

3.5 Variables

The dependent variable in this study was HIV prevalence and the independent variables were socio-demographic characteristics (age, sex and location), date of HIV screening and HIV screening results that were already in the secondary data analyzed.

Table 1: Variable definition.

Variable	Operational Definition	Scale of Measurement
Age	Individual ages to be grouped subsequently	Ordinal
Sex	Male or female	Nominal
Date of HIV screening	The day, month and year of screening	Interval
Prevalence	Positive or Negative	Ordinal
Location	Place of residence prior to test	Nominal

3.6 Data Collection

Purposive sampling of the district hospital was done as this hospital is the ART centre. Five year records were reviewed and data extracted from hospital registers unto a data capture sheet which was entered electronically for analysis. The data capture sheet had six separate columns for unique identification number, age, sex, date of HIV screening, screening results and location.

Age was entered in years and months. Sex was entered as male or female.

Date of screening was entered as dd/mm/yyyy. Months and year of screening were grouped separately.

3.7 Data Analysis

Data analysis was done using Microsoft Excel 2013 and STATA VERSION 14. All variables in the study except date of screening had missing variables among HCT cases. The highest proportion of missing data was recorded for the variable location (0.8%) and the lowest was for variables age and sex (0.1%). A new variable 'agegrp' was created and the ages were subsequently grouped. There were 9 age groups; 0-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49 and 50+ for HCT cases based on the categorization adopted by (Amornkul, Vandenhoudt, Nasokho, & Odhiambo, 2009; Sia et al., 2016; Welz, Hosegood, & Jaffar, 2007; Ziraba et al., 2011) with a little modification to include the minimum age recorded and 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49 and 50+ for PMTCT cases based on the age categorization for reporting at the Asutifi North district. A new sex label was created and coded as '1' for male and '2' for females.

Results of the screening was entered and coded as '0' for negative and '1' for positive.

Location referred to the usual place of residence prior to the screening. Towns within the district were classified under rural or urban using a guide. Rural location was coded '1' and urban location was coded '2'.

Descriptive statistics of the data are in graphical representations.

Univariate analysis: Frequencies and proportions were run to obtain the proportion of HIV by age group, the proportion of HIV by sex and proportion of HIV by location (rural or urban).

Distribution of HIV: General trends in the distribution of HIV and trends in location by year over the five year period were displayed as graphs.

3.8 Ethical Considerations

A proposal was submitted to the Ghana Health Service Ethical Review Board and clearance was obtained before the commencement of the study. A written permission was sought from the District health directorate and permission was sought from the St. Elizabeth Catholic Hospital administration before the study started. Data obtained were transformed into an electronic form using Microsoft Excel 2013 which was password encrypted. The data obtained were used only for the purpose of this research and only accessible to the principal investigator.

3.9 Quality Control

Research assistants were trained on appropriate data collection skills and data entry to ensure uniformity and accuracy of data collected. Data cleaning was done by deleting all double entries and correcting spelling mistakes. Validation was ensured during data collection by the system to not allow any entry of values outside the acceptable limit

3.10 Conflict of Interest

The principal researcher has no potential conflict of interest with respect to the study.



CHAPTER FOUR

4.0 RESULTS

A total of 1225 records on HIV Counselling and Testing (HCT) cases from January 2011 to December 2015 were reviewed and a total of 6626 Prevention of Mother-To-Child Transmission (PMTCT) cases were recorded between the same period were reviewed. The total number of HCT cases screened decreased consistently across all the 5 years from 315 cases screened in 2011 to 179 cases in 2015.

4.1 Coverage and distribution of HIV by sex.

The number of females screened in each year was higher than males except in 2015 where equal number of males and females were screened. Females generally recorded the highest positive cases for the five year period as well as the individual years.

Table 2: Coverage of HCT Screening by sex

Year	Sex		Total
	Male	Female	
2011	135	180	315
2012	109	144	253
2013	94	146	240
2014	101	137	238
2015	89	89	178
Total	528	696	1224

Table 3: Distribution of HIV (HCT) by Sex

Year	Sex		Total
	Male	Female	
2011	51 (38.35%)	82 (61.65%)	133
2012	41 (38.32%)	66 (61.68%)	107
2013	40 (35.09%)	74 (64.91%)	114
2014	31 (33%)	63 (67%)	94
2015	14 (29.79%)	33 (70.21%)	47
Total	177 (35.76%)	318 (64.24%)	495



4.2 Distribution of HIV (HCT) by Age.

The mean age of individuals tested for HIV from 2011 to 2015 is 31.26 years. HIV prevalence of 6.2% was recorded for the age groups 20-25 and also for those 50+ for the five year period (Table 4) for HCT. Across all the age groups, prevalence was highest among females than males with prevalence of HIV among females being two-thirds higher than males except for age group 0-14 and 45-49 have equal prevalence of HIV between males and females. However, among those 15-19 years, HIV prevalence was 91% among females than males (Table 4).



Table 4: Distribution of HIV (HCT) by age 2011-2015

AGE GROUP (2011-2015)	NO. TESTED	RESULTS		SEX DISTRIBUTION FOR POSITIVES		PROPORTION OF POSITIVE PER TOTAL NO. TESTED
				MALE	FEMALE	
0-14	170	NEGATIVE	126			
		POSITIVE	42	22	20	3.43
		MISSING	2			
15-19	42	NEGATIVE	30			
		POSITIVE	12	1	11	0.98
		MISSING	0			
20-24	154	NEGATIVE	112			
		POSITIVE	42	8	34	3.43
		MISSING	0			
25-29	201	NEGATIVE	125			
		POSITIVE	76	21	55	6.2
		MISSING	0			
30-34	161	NEGATIVE	87			
		POSITIVE	73	24	49	5.96
		MISSING	1			
35-39	150	NEGATIVE	77			
		POSITIVE	73	26	47	5.96
		MISSING	0			
40-44	99	NEGATIVE	51			
		POSITIVE	48	22	26	3.92
		MISSING	0			
45-49	107	NEGATIVE	54			
		POSITIVE	52	26	26	4.24
		MISSING	1			
50+	140	NEGATIVE	63			
		POSITIVE	76	27	49	6.2
		MISSING	1			
MISSING AGE	1	NEGATIVE	0			
		POSITIVE	1	0	1	0.08
		MISSING	0			
TOTAL	1224					

4.3 Distribution of PMTCT from 2011-2015

A total of 6626 PMTCT screenings were recorded from 2011 to 2015. The highest number of 1801 PMTCT screenings was recorded in 2011 and the lowest of 914 in 2012. The highest HIV prevalence 2.8% (51) among PMTCT cases was also recorded in 2011 but the lowest 0.9% (13) in 2015 (Table 5)

Table 5: Distribution of HIV (PMTCT) by age 2011-2015

AGE GROUPS (2011-2015)	NO. TESTED	RESULTS		PROPORTION OF POSITIVE PER TOTAL NO. TESTED
		NEGATIVE	POSITIVE	
10-14	34	NEGATIVE	34	0
		POSITIVE	0	
15-19	1004	NEGATIVE	1001	0.05
		POSITIVE	3	
20-24	1691	NEGATIVE	1669	0.33
		POSITIVE	22	
25-29	1671	NEGATIVE	1649	0.33
		POSITIVE	22	
30-34	1250	NEGATIVE	1219	0.47
		POSITIVE	31	
35-39	777	NEGATIVE	762	0.23
		POSITIVE	15	
40-44	171	NEGATIVE	160	0.17
		POSITIVE	11	
45-49	22	NEGATIVE	22	0
		POSITIVE	0	
50+	6	NEGATIVE	5	0.02
		POSITIVE	1	
TOTAL	6626		105	

4.4 Seasonal variations in HIV distribution.

The highest number of positive cases for the 5 year period was recorded in July (58) followed by April (54). A significant number of 51 positive cases are also recorded in January with the lowest number 26 of positive cases seen in September (Table 6). There appears to be a yearly and quarterly trend in which most HIV positive cases were recorded except for the last quarter of the year.

Table 6: Seasonal variations in HIV distribution.

MONTH	YEARS					TOTAL POSITIVES
	2011	2012	2013	2014	2015	
JANUARY	13	14	12	9	3	51
FEBRUARY	9	1	6	12	4	32
MARCH	11	4	6	9	2	32
APRIL	14	14	15	7	4	54
MAY	15	7	9	10	2	43
JUNE	3	13	4	12	3	35
JULY	13	17	18	8	2	58
AUGUST	14	9	11	8	2	44
SEPTEMBER	6	0	10	4	6	26
OCTOBER	12	10	2	3	11	38
NOVEMBER	9	10	13	6	4	42
DECEMBER	14	8	8	6	4	40
TOTAL						495

4.5 Distribution of HIV by location.

Urban dwellers recorded the highest number of cases (615) tested than rural dwellers (596) within the 5 year period. However rural dwellers recorded the highest HIV cases 268 (54.69%) as against 222 (45.31%) for urban dwellers (Table 7). Rural dwellers consistently recorded the highest number of HIV cases for all the years except for 2014 (Table 8).

Table 7: Distribution of HIV (HCT) by location 2011-2015

LOCATION	RESULTS		TOTAL	PROPORTION OF POSITIVES
	NEGATIVE	POSITIVE		
RURAL	328	268	596	54.69
URBAN	393	222	615	45.31

Table 8: Distribution of HIV by year

YEAR	POSITIVE RESULTS	
	RURAL	URBAN
2011	71	59
2012	62	44
2013	64	50
2014	46	48
2015	25	21
TOTAL	268	222

4.6 Trends in HIV prevalence (HCT)

The overall trend in HIV prevalence from 2011 to 2015 was not consistent as it showed an increase in 2013 (47.5%) from a rather steady state of 42.7% in 2011 and 42.9% in 2012. However there was a decrease in 2014 (39.5%) and 26.4% in 2015 (Figure 3).

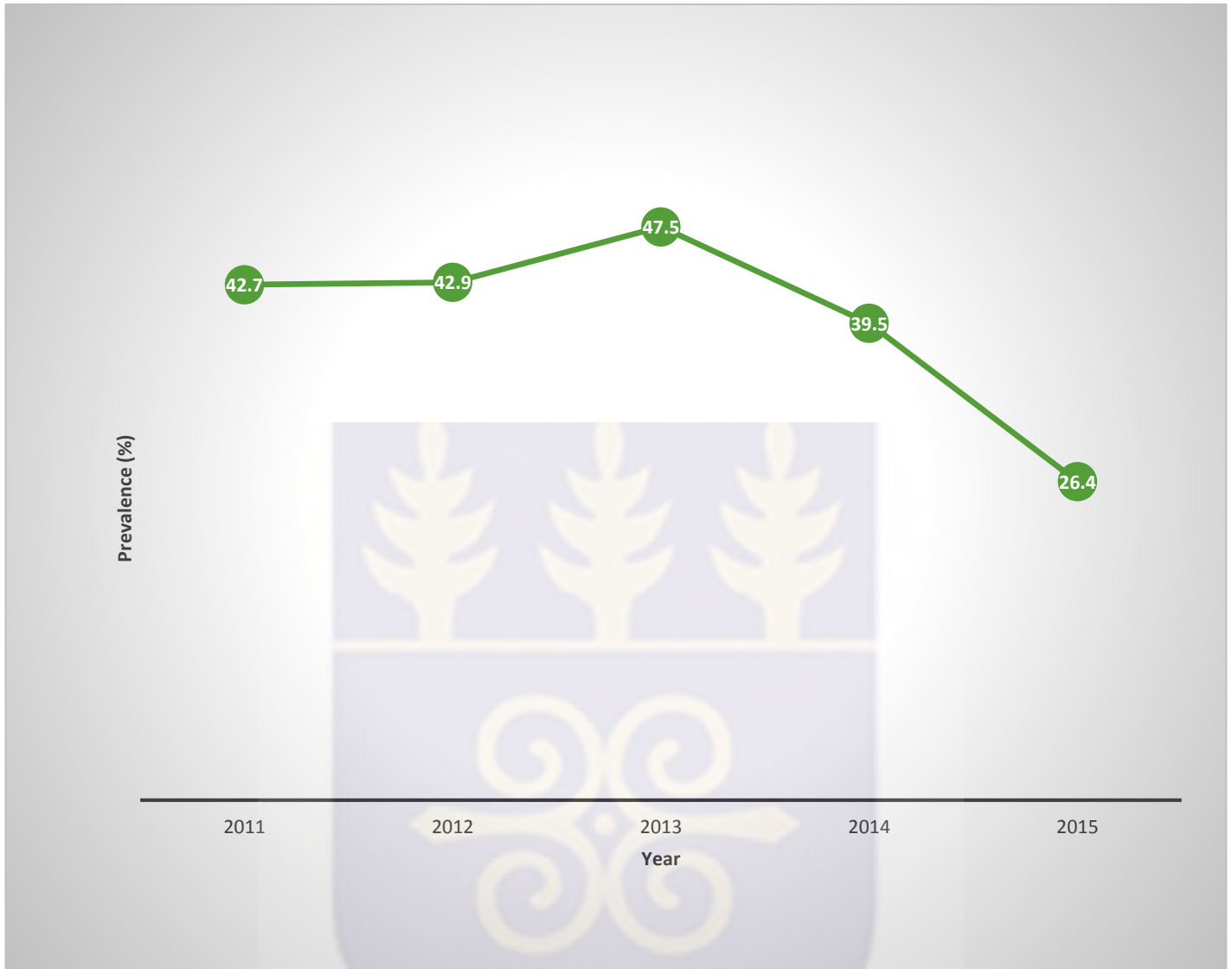


Figure 3: Trends in HIV Prevalence for HCT cases from 2011 to 2015

4.7 Trends in HIV Prevalence (PMTCT)

There was a sharp decline in prevalence of HIV among PMTCT clients from 2.83% in 2011 to 1.09% in 2012. Thereafter a consistent decline in HIV prevalence was observed from 2013-2015 (Figure 4)



Figure 4: Trends in HIV Prevalence (PMTCT) from 2011 to 2015

4.8 Trends in HIV (HCT) prevalence by location from 2011 to 2015

The overall trend in HIV prevalence in HCT by area of residence showed consistently high prevalence for rural dwellers across the years except for 2014 where urban dwellers recorded higher prevalence in HIV than rural dwellers (Figure 5).

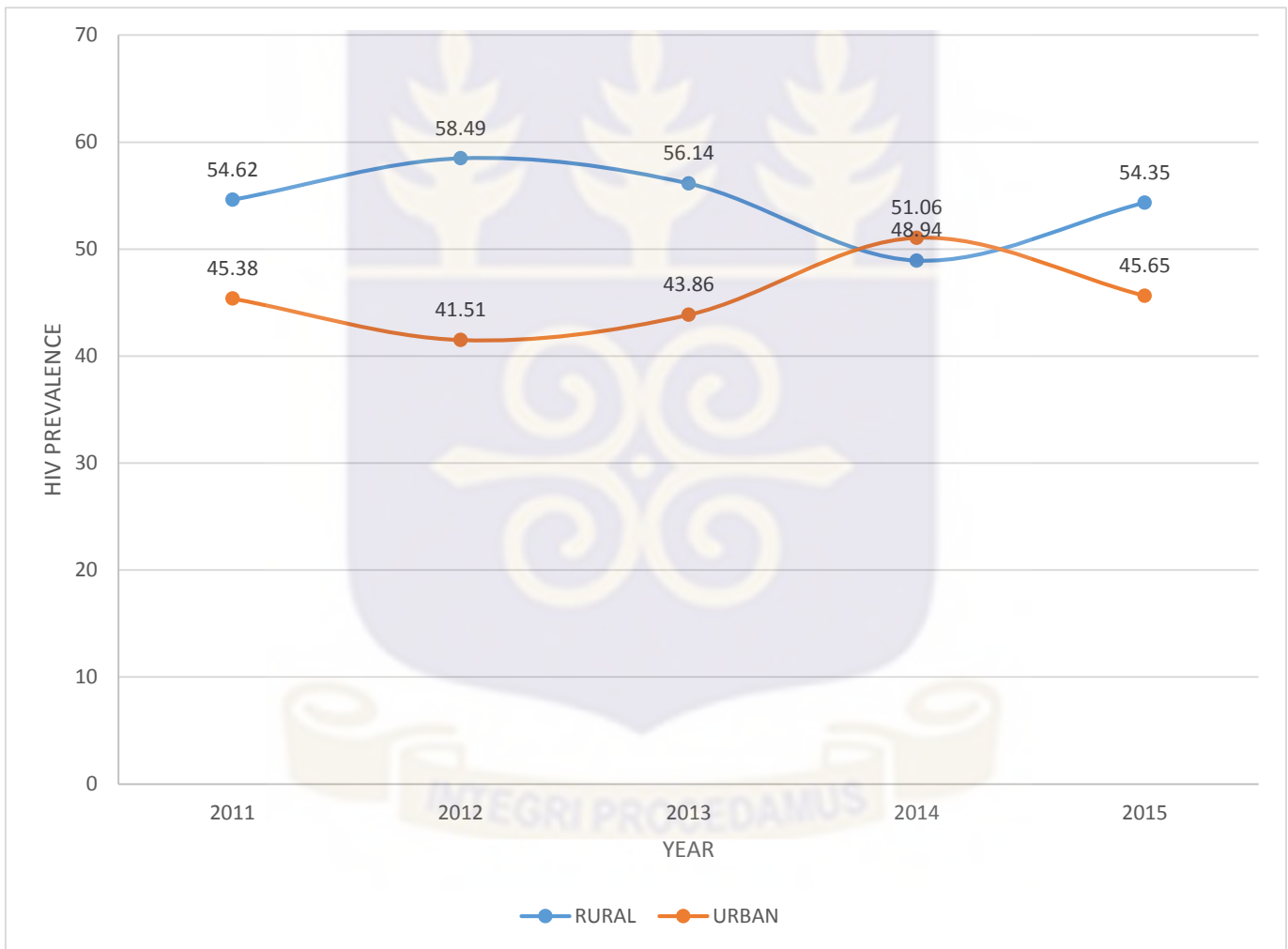


Figure 5: Trends in HIV (HCT) prevalence by location and year from 2011 to 2015

CHAPTER FIVE

5.0 DISCUSSION

The comprehensive strategy to address HIV in Ghana sets testing and counselling as a core intervention. HIV Counseling and Testing (HCT) and Prevention of Mother To Child Transmission (PMTCT) are the key models used in most health facilities. However, routine and diagnostic HCT are the widely used approaches at the St. Elizabeth Catholic Hospital, Hwidiem.

Over half (56.8%) of the people routinely testing for HIV between 2011 and 2015 at the hospital are females regardless of location. This finding is consistent for all years except 2015. Some women may depend on migrants, expatriates and mine workers for livelihood through commercial sexual activities which put them at risk of HIV infection. However, they take advantage of the Newmont Mining Company's periodic campaign for HIV counseling and testing at the hospital which explains the high proportion of women testing than men. Several studies (Amornkul, Vandenhoudt, Nasokho, & Odhiambo, 2009; Dicarlo et al., 2014; Mills et al., 2012; Takarinda et al., 2016) suggest that females are more likely to yield to HIV testing as compared to males. The finding of this study highlights that people within the age group 25-29 have the highest number 201 (16.4%) of people testing for HIV. HIV testing is associated with sexual risk behaviors and educational levels (Amornkul et al., 2009; Takarinda et al., 2016). The 2010 census report for the Asutifi North district suggests that majority (45.9%) of those unemployed or economically inactive mostly individuals within this age group are not married (Ghana Statistical Service, 2010) which could be the basis for the practice of transactional sex for a living mostly patronized by migrants and mine workers (Welz et al., 2007). The knowledge of risk of HIV infection may prompt voluntary screening to know one's status. Also, this may be as a result of most people within the

category getting married and the increasing requirement of pre-marital testing by churches, families and would be spouses (Baffour-Awuah, 2014).

5.1 General Trends in HIV Prevalence

The trends in HIV prevalence generally shows a declining trend between 2011 and 2015 which is consistent with findings of UNICEF 2015; Alvarez-uria et al., 2012 in which a 24% global decline in HIV prevalence was observed from 2000-2009 and 45% from 2009-2014 and a significant decline in HIV prevalence in rural India from 1.22-0.35%. There is no particular trend in HIV prevalence among PMTCT cases in the findings of this study. From a higher prevalence in 2011, a sharp decline is recorded in 2012 and gradual increase in 2013 and 2014 with a slow decrease in 2015. This is contrary to the HIV Sentinel Survey reports for the same years in which prevalence remained static in 2011 and 2012 and uniformly decreased in 2013 and 2014 with a gradual rise in 2015 (NACP, 2016).

The coverage of HIV testing and its prevalence vary among sex for various reasons. Studies have reported high prevalence among females than males. A study by Sia et al., 2016 assessed the gender inequalities in HIV and AIDS prevalence in sub Saharan Africa and reported high prevalence among females compared to males. In a similar study by Amornkul et al., (2009) in Kenya, females comprised more than half of HIV study participants and had twice the prevalence of male counterparts.

This study assesses the coverage and distribution of HIV by sex. In both cases the number of females are higher than males in each of the years (2011-2015). The overall number of female HIV positives (318) over the five year period is almost twice of that of the male figures (177). This finding agrees with studies by Amornkul et al., (2009); Gouws & Ghys, (2006); Kapata et al.,

(2016); Sia et al., (2016) in which more women than men participated in HIV testing and also had higher prevalence. Biological and social factors are identified as accounting for women's higher risks of HIV infection relative to men, especially within the context of generalized HIV/AIDS epidemics where heterosexual sex is the main mode of HIV transmission (Hertog, 2008). The disparities are attributable to differential distribution of risk factors among males and females such as socioeconomic status, cultural and social norms, educational levels, unequal power in relationships and female subordinate positions (Sia et al., 2016; Gillespie, 2008; Njue, Voeten & Remes, 2011). The educational levels of women in the district remain low (Ghana Statistical Service, 2010) with low socio economic status. Among sexually active women, HIV is associated with income through regular or intermittent employment, marital status and number of sexual partners (Amornkul et al., 2009). A study by Tiruneh, Wasie, & Gonzalez, (2015) indicated that 77% of migrant workers had sex out of which 74% was with commercial sex workers. This implies that the higher prevalence of HIV among women in this study is as a result transactional sex especially with migrant mine workers.

This study determines the distribution of HIV by age for both HCT and PMTCT cases. The findings show that HIV is higher (6.2%) among age groups 20-25 and 50+. Consistently, the following age groups 25-29, 30-34, 35-39 and 50+ report higher positives for HIV. However, age groups 0-14 and 20-24 rather record significant number of HIV positives in 2014. Studies have assigned possible reasons for the high prevalence of HIV among certain age groups. Adamson, (2008) attributed the high prevalence of HIV in the age group 15-24 in South Africa to poverty, violence against women, cultural limitations that promote intergenerational sex, non-condom use and preference for "dry sex," and challenges that possibly prevented an aggressive response

against HIV, recreational drug use, and biological factors such as high prevalence of sexually transmitted infections (STI). Available unemployment data indicates a higher unemployment rate among the younger age group of 15-24 and a considerably high rate in age group 25-44 in Ghana (GSS, 2013). Unemployment in a predominantly rural mining district creates an avenue for prostitution mostly among young females to earn a living and this may account for the general high prevalence of HIV among women observed in this study (Akabzaa, 2001). The high prevalence of HIV among those aged 50+ (6.2%) who are recognized as the stable working class may give credence to the assertion of the younger age groups' indulgence of transactional sexual promiscuity for a living with the older generation who may be HIV positive (Amornkul et al., 2009).

The findings among the PMTCT cases correspond with that of HCT. Pregnant women within the age groups 20-24 and 25-29 record a prevalence of 0.33% second to the age group 30-34 with a prevalence of 0.47% which is consistent with a study in Western Kenya (Amornkul et al., 2009) in which highest HIV prevalence was reported among the age groups 25-29 and 30-34.

5.2 Seasonal Variations in HIV distribution.

Although the incidence and prevalence of HIV are relatively constant throughout a year, this study **assesses** the general monthly variations for the study period. From a minimum of 26 (5.26%) positive cases in September, the highest number of positive cases 58 (11.72%) is recorded in July. September is an early harvest season in which there is abundance of food hence there is a minimal rate of sickness which may prompt health seeking behaviors leading to HIV testing unlike the month of July (rainy and planting season) which is characterized with food scarcities especially in the farming communities.

This finding is in agreement with (Bo et al., 2013; Thurstans, Kerac, Maleta, Banda, & Nesbitt, 2008) which reported a higher prevalence among children in Nigeria and Malawi during rainy seasons and hunger seasons respectively. The seasonal variations of HIV also highlight January with a high numbers of positive cases 51 (10.30%). The intensity of the harmattan (dry season) is seen in January with associated conditions like cough, flu, meningitis, etc. Several hospital records indicate a high number of out-patient and in-patient cases in the dry season. Symptoms of HIV may also present along other cases which may lead to a high detection rates (Thurstans et al., 2008).

The early rainy season (April) shows high numbers of positive cases 54 (10.9%) which agrees with Bo et al., 2013 which reported a significant increase in HIV infection in Abeokuta, Nigeria at the early rainy season though their findings did not show any consistent pattern in HIV infection in relation to seasonality.

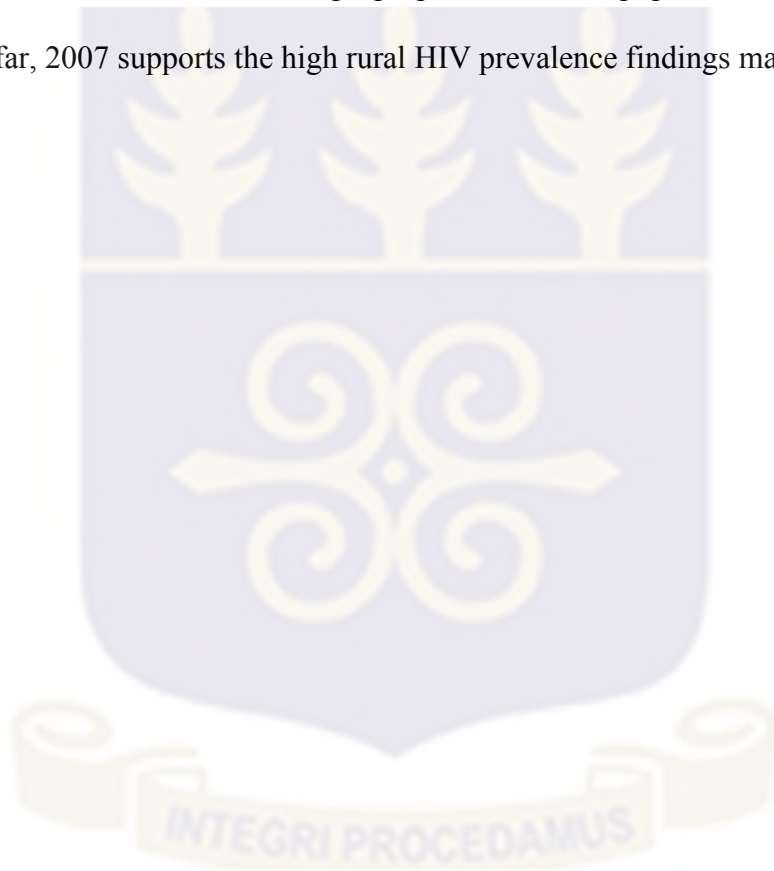
Two major traditional festivals are celebrated in the district. The annual 'Apomasu' and 'Akwasidae Tuntum' festivals celebrated within the first quarter of the year and January by the chiefs and people of Ntotroso and Kenyasi No 1 respectively and draw people from all parts of the region and the nation.

Though recruitments at the Newmont Mining Company occur throughout the year, most subcontractors recruit at the beginning of the year and mid-year. Migrants and other job seekers throng the district during these periods in search of jobs.

5.3 Distribution by geographical location.

HIV prevalence has been found to be high in urban areas in many studies (Arroyo et al., 2005; Gouws & Ghys, 2006; Hall, Espinoza, Benbow, & Hu, 2010). Contrary to the findings of these

studies and many others, the findings from this study shows a high proportion of HIV in rural areas (54.69%) compared to 45.31% in urban areas for the study period. This finding could be attributed to the fact that the district is predominantly rural with every 8 in 10 resident being in a rural area (Asutifi North District, 2016) and the presence of mine migrants and illegal miners (galamsey) in the rural areas of the district for their operations (GSS, 2010). Studies have linked HIV to low socioeconomic status and as such, poor rural areas are invariably affected by HIV especially in Africa where it continues to affect a large proportion of the population. A study by Welz, Hosegood, & Jaffar, 2007 supports the high rural HIV prevalence findings made in this study.



CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion:

HIV prevalence continues to be high in the Asutifi North District. The younger generations both in routine cases and pregnant cases, females and inhabitants of rural areas are mostly affected. HIV screening consistently decreased throughout the years studied which indicates that a little effort is being made towards the campaign against HIV infections. The decline in HIV testing may remain a barrier to early HIV treatment and care among positive individuals which could impact negatively on their survival after late discovery of HIV status.

6.2 Recommendations:

The decreasing numbers of people testing for HIV and the high prevalence in the district suggests a need for more HIV campaigns, screening and prevention in the district. HIV counselling and testing should be made easily available and accessible to all especially people at risk and rural communities by the district health directorate and also harness the Newmont Mining Company's social responsibilities in the control and prevention of HIV.

Mobile HIV counseling and testing model could be adopted to reach out to a larger proportion of the population and people at risk.

The district health directorate should endeavor to tailor public health efforts for voluntary testing, treatment and prevention of HIV.

Further studies should explore factors contributing to the decline of routine HCT and determine the effectiveness of HIV prevention and control interventions by the district health directorate and Newmont Ghana Gold.



REFERENCE

- Aboagye-Sarfo, P., Cross, J., & Mueller, U. (2010). Trend analysis and short-term forecast of incident HIV infection in Ghana, 37–41.
<http://doi.org/10.2989/16085906.2010.517485>
- Aboagye-sarfo, P., Cross, J., & Mueller, U. (n.d.). Trend analysis and short-term forecast of incident HIV infection in Ghana, (October 2014), 37–41. <http://doi.org/10.2989/16085906.2010.517485>
- Adamson, M. S. (2008). HIV Infection and AIDS Among Young Women in South Africa, 423–435. <http://doi.org/10.3325/cmj.2008.3.423>
- Akabzaa, T. (2001). *IMPACT OF MINING SECTOR INVESTMENT IN GHANA : A STUDY OF THE TARKWA MINING REGION.*
- Alvarez-uria, G., Midde, M., & Naik, P. K. (2012). International Journal of Infectious Diseases Trends and risk factors for HIV infection among young pregnant women in rural India. *International Journal of Infectious Diseases*, 16(2), e121–e123.
<http://doi.org/10.1016/j.ijid.2011.10.003>
- Amornkul, P. N., Vandenhoudt, H., Nasokho, P., & Odhiambo, F. (2009). HIV Prevalence and Associated Risk Factors among Individuals Aged 13-34 Years in Rural Western Kenya, 4(7). <http://doi.org/10.1371/journal.pone.0006470>
- Arroyo, M. A., Hoelscher, M., Sateren, W., Maboko, L., Hoffmann, O., Kijak, G., ... Mccutchan, F. E. (2005). HIV-1 diversity and prevalence differ between urban and rural areas in the Mbeya region of Tanzania, (February), 1517–1524.
- Asare, P. (2012). Labour Migration in Ghana, (October), 1–15.

Baffour-Awuah, E. (2014). Of Marriage , HIV-test Certificate , and the Church : What does the Youth Say ?, *4*(26), 176–192.

Bank of Ghana (2003). *REPORT ON THE MINING SECTOR, 1*(2).

Bo, M., Usen, U., Bo, F., Po, O., Hc, I., & Io, O. (2013). Prevalence and Seasonal Variations of HIV 1 and 2 Infection among Children in Abeokuta , South West Nigeria, *3*(3), 107–110.
<http://doi.org/10.5923/j.microbiology.20130303.01>

Brummer, D. (2002). Labor Migration and HIV/AIDS in Southern Africa. Pretoria, South Africa: International Organization for Migration Regional Office for South Africa.

Cleland, J., Boerma, J.T., Carael, M. & Weir, S.S. (2004). "Monitoring Sexual Behaviour in General Populations: A Synthesis of Lessons of the Past Decade." *Sexually Transmitted Infection* *8*(Suppl II): ii1-7.

Coughlin, J. (2016). Teenage pregnancy in Ghana: Assessing situation and moving forward. Ministry of Gender, Children and Social Protection. Retrieved from: graphic.com.gh/news/general.new.html (20/10/16)

Delpech, V., & Asia, E. (2013). The HIV epidemic : global and UK trends. *Medicine*, *41*(8), 417–419. <http://doi.org/10.1016/j.mpmed.2013.05.005>

Dicarlo, A. L., Mantell, J. E., Remien, R. H., Morris, D., Pitt, B., & Abrams, E. J. (2014). *Culture , Health & Sexuality : An International Journal for Research , Intervention and Care* “ Men usually say that HIV testing is for women ”: gender dynamics and perceptions of HIV testing in Lesotho, (February 2015), 37–41.
<http://doi.org/10.1080/13691058.2014.913812>

- Dye, C. (2014). After 2015: infectious diseases in a new era of health and development. *Philos. Trans. R. Soc. Lond. B Biol. Sci.* 369 (1645), 20130426. Environmental Foundation for Africa and Foundation, 2015. Ebola Virus Disease and Forest Fragmentation in Africa
- G. A. P. Report (2014). Gay men and other men who have sex with men.
- Ghana Statistical Service. (2010). District Assembly Census Report, Asutifi North District.
- Ghana AIDS Commission. (2014a): STATUS REPORT.pdf_2014.
- Ghana AIDS Commission. (2014b). Fact Sheet.
- Ghana AIDS Commission (2013). Summary of the 2013 HIV Sentinel survey report.
- Ghana AIDS Commission (2012). Ghana Country AIDS Progress Report (January 2010 – December 2011).
- Ghana AIDS Commission (2007): National Report on Progress of United Nations General
- Ghana AIDS Commission (2001). *Ghana HIV/AIDS strategic framework (2001-2005)*. Accra: Ghana AIDS Commission.
- Ghana Health Service (2013). HIV Sentinel Survey Report. National AIDS/STI control program 2014, Accra-Ghana.
- Ghana Immigration Service (GIS) (2008). Migration to and from Ghana (compilation from 2000 to 2008).
- Ghana National Report on SAGE Wave 1. University of Ghana, Department of Community Health (2013). Ghana National Report on World Health Organization's Study on global AGEing and adult health (SAGE) in Ghana, Wave 1. Geneva:WHO. 2014.
- Ghana Statistical Service (2010). Population and Housing Census.

Ghana Statistical Service. (2010). District Assembly Census Report, Asutifi North District.

Gouws, E., & Ghys, P. D. (2006). sub-Saharan Africa : results and implications for HIV and, 64–70. <http://doi.org/10.1136/sti.2006.019901>

Gregson, S., Garnett, G.P., Nyamukapa, C.A., Hallett, T.B., Lewis, J.J., Mason, P.R., Chandiwana, S.K., & Anderson, R.M. (2006). "HIV Decline Associated with Behaviour Change in Eastern Zimbabwe." *Science* 311(5761): 664-6.

GSS. (2013). GHANA LIVING STANDARDS SURVEY 6.

Hall, H. I., Espinoza, L., Benbow, N., & Hu, Y. W. (2010). Epidemiology of HIV Infection in Large Urban Areas in the United States, 5(9). <http://doi.org/10.1371/journal.pone.0012756>

Hertog, S. (2008). Sex ratios of HIV prevalence : evidence from the DHS Sara Hertog United Nations Population Division Paper prepared for the 2008 Meetings of the Population Association of America 17-19 April 2008 , New Orleans USA, (April).

<http://www.newmont.com>. Accessed 20/10/16

<http://mobile.ghanaweb.com>. Accessed 20/10/16.

<http://www.iom.int/labour-migration>. Accessed 20/10/16

<http://www.dhsprogram.com/pubs/hiv-prevalence-15chapter15.pdf> Accessed 20/10/16

<http://www.newmont.com/operations-and-projects/africa/ahafo-ghana/operation-facts/default.aspx>
Accessed 20/06/17.

Ismi, A. (2003). “Canadian Mining Companies Destroy Environment and Community Resources in Ghana.” Cambridge University Press, USA.

Kapata, P. C., Kapata, N., Klinkenberg, E., William, N., Mazyanga, L., Musukwa, K., ...

Mwaba, P. (2016). The adult prevalence of HIV in Zambia : results from a population based mobile testing survey conducted in 2013 – 2014. *AIDS Research and Therapy*, 1–9.

<http://doi.org/10.1186/s12981-015-0088-1>

Lozano, R. & Naghavi, M. (2012). Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the global burden of disease study 2010. *Lancet* 380 (9859), 2095–2128.

Mann, J.M. (1989). AIDS: A worldwide pandemic in current topics in AIDS. Volume 2, edited by Gottlieb, M.S. et al. John Wiley & Sons.

Magadi M. A. (2013) “The Disproportionate High Risk of HIV Infection Among the Urban Poor in Sub-Saharan Africa” *AIDS and Behaviour*,17(5):1645-1654.
<http://www.springerlink.com/content/1638220387j6l364/fulltext.pdf>. Accessed 20/10/16

Mmbaga, E.J., Hussain, A., Leyna, G.H., Holm-Hansen, C. K., Mnyika, S., Sam, N.E., Klouman, E., & Klepp. K.I. (2007) "Trends in HIV-1 Prevalence and Risk Behaviours over 15 Years in a Rural Population in Kilimanjaro, Tanzania." *AIDS Research and Therapy* 4: 23.

Mills, E. J., Beyrer, C., Birungi, J., & Dybul, M. R. (2012). Engaging Men in Prevention and Care for HIV / AIDS in Africa, *9*(2), 1–4. <http://doi.org/10.1371/journal.pmed.1001167>

NARHS Plus II (2012). National HIV/AIDS and Reproductive Health Survey, Federal Republic of Nigeria Federal Ministry of Health, Abuja, Nigeria. Available at:<http://nascp.gov.ng/demo/wpcontent/uploads/2014/02/NARHS-Plus-2012-Final18112013.pdf>.

National AIDS / STI Control Programme (2012). 2011 HIV Sentinel Survey Report. Accra: National AIDS/STI Control Programme, Ghana Health Service, Ministry of Health, Accra Ghana.

National AIDS / STI Control Programme (2010). 2009 HIV Sentinel Survey Report. Accra: National AIDS/STI Control Programme, Ghana Health Service, Ministry of Health, Accra Ghana.

National AIDS / STI Control Programme (2016). 2015 HIV Sentinel Survey Report. Accra: National AIDS/STI Control Programme, Ghana Health Service, Ministry of Health, Accra Ghana

National AIDS/ STI Control Programme (2009). National HIV prevalence and AIDS Estimates Reports 2008 - 2015. Accra: National AIDS Control Programme, Ghana Health Service, Ministry of Health.

National AIDS/ STI Control Programme (2008). 2007 HIV Sentinel Survey Report. Accra: Ghana Health Service, Ghana AIDS Commission, World Health Organisation, Department of International Development.

Ofosu-mensah, A. E. (2010). Traditional Gold Mining in Adanse *, 2(2), 124–147.

Opoku-Ware, J. (2010). THE SOCIAL AND ENVIRONMENTAL IMPACTS OF MINING ACTIVITIES ON INDIGENIOUS COMMUNITIES: The case of Newmont Gold (Gh) Limited (Kenyasi) in Ghana. Unpublished Master Thesis in Development Management, University of Agder.

Regional Health Directorate, GHS, Brong Ahafo region (2015). Annual Report, pg 1-143.

Sia, D., Onadja, Y., Hajizadeh, M., Heymann, S. J., Brewer, T. F., & Nandi, A. (2016). What explains gender inequalities in HIV / AIDS prevalence in sub-Saharan Africa ? Evidence from the demographic and health surveys. *BMC Public Health*, 1–18.

<http://doi.org/10.1186/s12889-016-3783-5>

Stuckler, D., Basu, S., Mckee, M., & Lurie, M. (2011). Mining and Risk of Tuberculosis in Sub-Saharan Africa, *101*(3), 524–530. <http://doi.org/10.2105/AJPH.2009.175646>

Takarinda, K. C., Madyira, L. K., Mhangara, M., Makaza, V., Maphosa-mutsaka, M., & Rusakaniko, S. (2016). Factors Associated with Ever Being HIV- Tested in Zimbabwe : An Extended Analysis of the Zimbabwe Demographic and Health Survey (2010 – 2011), (Ci), 1–18. <http://doi.org/10.1371/journal.pone.0147828>

Thurstans, S., Kerac, M., Maleta, K., Banda, T., & Nesbitt, A. (2008). HIV prevalence in severely malnourished children admitted to nutrition rehabilitation units in Malawi : Geographical & seasonal variations a cross-sectional study, *7*, 1–7. <http://doi.org/10.1186/1471-2431-8-22>

Tiruneh, K., Wasie, B., & Gonzalez, H. (2015). Sexual behavior and vulnerability to HIV infection among seasonal migrant laborers in Metema district , northwest Ethiopia : a cross-sectional study, 1–10. <http://doi.org/10.1186/s12889-015-1468-0>

UNAIDS (2012). UNAIDS World AIDS Day Report 2012. Available at: <http://www.unaids.org/>. Accessed 20/10/16

UNAIDS (2011). ‘World AIDS Day Report 2011’

UNAIDS/WHO. (2009). AIDS epidemic updates 2009. UNAIDS. Geneva.

UNAIDS/WHO (2007). AIDS epidemic update 2007. UNAIDS/07.27E/ JC1322E, Geneva.

UNAIDS (2004): Epidemiological Fact Sheets on HIV/AIDS and STI: Ghana 2004 update,

Geneva

UNICEF (2015). UNICEF analysis of UNAIDS 2014 HIV/AIDS estimates.

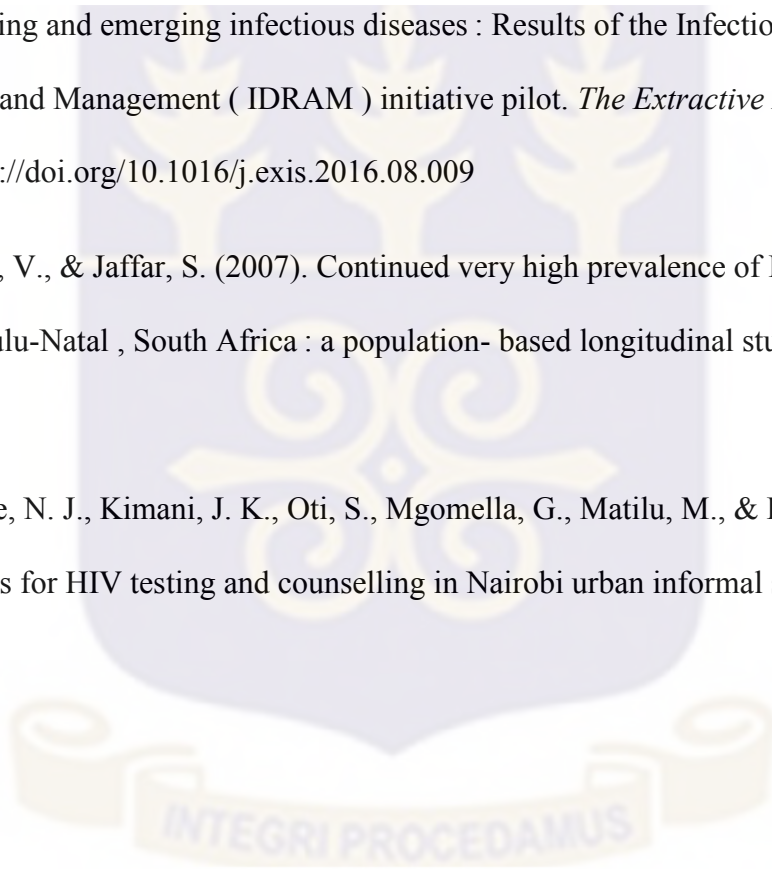
<http://data.unicef.org/topic/hivaids/global-regional-trends-#> (Accessed 07/11/2016)

USAID (2005): An In-depth Analysis of HIV prevalence in Ghana: further Analysis of Demographic and Health surveys data, Carvelton, ORC Macro.

Viliani, F., Edelstein, M., Buckley, E., Llamas, A., & Dar, O. (2016). The Extractive Industries and Society Mining and emerging infectious diseases : Results of the Infectious Disease Risk Assessment and Management (IDRAM) initiative pilot. *The Extractive Industries and Society*. <http://doi.org/10.1016/j.exis.2016.08.009>

Welz, T., Hosegood, V., & Jaffar, S. (2007). Continued very high prevalence of HIV infection in rural KwaZulu-Natal , South Africa : a population- based longitudinal study, (October 2006).

Ziraba, A. K., Madise, N. J., Kimani, J. K., Oti, S., Mgomella, G., Matilu, M., & Ezeh, A. (2011). Determinants for HIV testing and counselling in Nairobi urban informal settlements.



APPENDICES

APPENDIX A

P. O. Box GP1555

Accra-Ghana

27th January, 2017.

The District Director of Health

Asutifi North District

Kenyasi-B/A

Dear Sir,

PERMISSION TO CONDUCT ACADEMIC RESEARCH

I, the undersigned, a postgraduate student in the School of Public Health, University of Ghana, Legon wish to conduct a three month study in partial fulfilment of the requirements leading to the award of a Master of Public Health degree in the Asutifi North District, from April to June, 2017 on the topic: **TRENDS IN HIV PREVALENCE IN HEALTH FACILITIES IN A MINING DISTRICT OF BRONG AHAFO REGION FROM 2011-2015.**

I am by this letter seeking your approval for this project to be conducted in your district. The project proposal has been submitted to the Ethical Review Committee of Ghana Health Service for approval and shall be under the supervision of Dr. Patricia Akweongo, School of Public Health, University of Ghana (0243138376).

Counting on your assistance.

Thank you.

.....

Richard Osei-Yeboah

Student/Principal Investigator

(10376845)

Email: myroy2008@yahoo.com

rosei-yeboah@st.ug.edu.gh

Tel.: 0243933028

APPENDIX B

P. O. Box GP1555

Accra-Ghana

27th January, 2017.

The Administrator

St. Elizabeth Catholic Hospital

P. O. Box 4

Hwidiem-B/A

Dear Sir,

PERMISSION TO CONDUCT ACADEMIC RESEARCH

I, the undersigned, a postgraduate student in the School of Public Health, University of Ghana, Legon wish to conduct a three month study in partial fulfilment of the requirements leading to the award of a Master of Public Health degree from April to June, 2017 on the topic: **TRENDS IN HIV PREVALENCE IN HEALTH FACILITIES IN A MINING DISTRICT OF BRONG AHAFO REGION FROM 2011-2015.**

I am by this letter seeking your approval to use your facility **St. Elizabeth Catholic Hospital-Hwidiem** for this project. The project proposal has been submitted to the Ethical Review Committee of Ghana Health Service for approval and shall be under the supervision of Dr. Patricia Akweongo, School of Public Health, University of Ghana (0243138376).

Counting on your assistance.

Thank you.

.....

Richard Osei-Yeboah

Student/Principal Investigator

(10376845)

Email: myroy2008@yahoo.com

rosei-yeboah@st.ug.edu.gh

Tel.: 0243933028

APPENDIX C



NATIONAL CATHOLIC HEALTH SERVICE

(CATHOLIC DIOCESE OF GOASO)

Tel: 0322298428
Email: stelizabethhospital@yahoo.com
info@sech-gh.org
Website: www.sech-gh.org

St. Elizabeth Catholic Hospital
P. O. Box 4, Hwidiem
Brong-Ahafo Region
Ghana, West Africa

13TH APRIL, 2017

Our Ref: SEH/PER/ROY/17
Your Ref: SPH/AA/2017 (1)

MR. RICHARD OSEI-YEBOAH
POST OFFICE BOX GP1555
ACCRA-GHANA

Dear Mr. Osei-Yeboah,

RE: PERMISSION TO CONDUCT ACADEMIC RESEARCH

Greetings from the family of St. Elizabeth Catholic Hospital to you.

Your letter dated 27th January, 2017 on the above subject was received on 9th March, 2017.

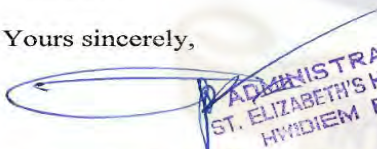
The Management of the hospital has granted you the permission to conduct academic research in our facility on the topic '**Trends in HIV incidence in Health Facilities in a mining district of Brong Ahafo from 2011-2015**'.

Kindly submit a copy of the research to the hospital.

We wish you the best in your research.

Thank you.

Yours sincerely,


ADMINISTRATOR
ST. ELIZABETH'S HOSPITAL
HWIDIEM B/A

Sr. Comfort Michelle Apedzi
(Administrator)

APPENDIX D

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.



Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
Fax + 233-302-685424
Email: ghserc@gmail.com

MyRef. GHS/RDD/ERC/Admin/App/473
Your Ref. No.

Osei-Yeboah Richard
University of Ghana
School of Public Health
Legon, Accra

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC: 37/12/16
Project Title	Trends in HIV Prevalence in Health Facilities in a Mining District of Brong Ahafo Region from 2011-2015
Approval Date	16 th May, 2017
Expiry Date	15 th May, 2018
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report **after completion** of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra