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ASSESSMENT OF CERVICAL LESIONS AMONG HIV POSITIVE WOMEN USING MOBILE COLPOSCOPY IN BATTOR – GHANA

BY

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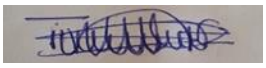
DECLARATION

I, Ethel Tekpor, hereby declare that with the exception of referenced works of other people, which have been cited and duly acknowledged, this work is an output of my own initiative. This research work has neither in whole nor in part been presented for an award or a degree elsewhere.



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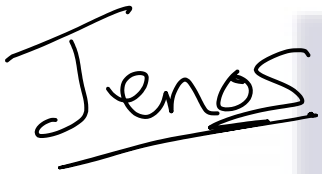

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DEDICATION

I dedicate this dissertation to the almighty God through whose grace I am alive to present this work, my family and the entire team of the Cervical Cancer Prevention and Training Centre of Catholic Hospital Battor for their support during my entire Master of Public Health programme.

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LIST OF ABBREVIATIONS

AIDS	-	Acquired Immunodeficiency Syndrome
EVA	-	Enhanced Visual Assessment
HIV	-	Acquired Immunodeficiency Virus
HPV	-	Human Papilloma Virus
ICC	-	Invasive Cervical Cancer
LMICs	-	Low- and Middle-Income Countries
STI	-	Sexually Transmitted Infection
WHO	-	World Health Organization
VIA	-	Visual Inspection with Acetic Acid

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ABSTRACT

Background: One of the major public health concerns in recent times has been the increasing rate of cervical cancer in developing countries. In an assessment of major health problems among women, cervical cancer was determined as the fourth leading cancer in women globally with over 570,000 cases been recorded annually. In Ghana, the prevalence of cervical cancer remains the 2nd highest cases of cancer among females.

In sub-Saharan Africa, cervical cancer is an intersecting epidemic with HIV and it is the second most common cause of cancer-related deaths in women. The risk of a woman developing cervical cancer is six times higher among women who are HIV positive compared to women are HIV negative.

Cervical cancer develops as a result of the change in the cervix's normal cells. The changes in the cells make it precancerous or premalignant lesion. This can then lead to it being cancerous. The existence of cervical leukoplakia which is white patches on the cervix before application of acetic acid has also proven to be symptom of cervical cancer.

Objective: This study therefore sought to assess the risk factors associated with cervical lesions and leukoplakia formation among HIV positive women using mobile colposcopy in Catholic Hospital Battor, Ghana.

Methods: A facility-based retrospective complete census was conducted among HIV positive women who went for cervical screening services at Catholic Hospital, Battor. The study reviewed hospital records of HIV positive women who had been screened using mobile colposcopy for the period of February 2018 to July 2021. Regression analysis was conducted to determine the

significant factors associated with cervical lesions and leukoplakia at 95% confidence interval. Results of regression analysis was reported as odds ratios.

Results: With a mean age of 42.5 years, the study observed cervical lesions and leukoplakia prevalence rates of 21.8% and 11.2% respectively. There was no significant association between leukoplakia and potential risk factors for cervical cancer. The prevalence of cervical lesion showed significant association with risk factors such as age, marital status and duration of HIV diagnosis among HIV positive women.

Conclusion: The estimated prevalence of cervical lesions among HIV positive women was similar to observed rates across developing countries. The risk of cervical lesion is prominent when women who are HIV positive are older. The use of mobile colposcopy proved to be feasible, effective, objective and less time consuming and can be incorporated into routine HIV care to screen for cervical lesions among HIV positive women.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

One of the major public health concerns in recent times has been the increasing rate of cervical cancer in developing countries. In an assessment of major health problems among women, cervical cancer was determined as the fourth leading cancer in women globally with over 570,000 cases been recorded annually. (Bray et al., 2018). Sung et al., (2020) estimated in their study noted that nearly 604 000 cases of cervical cancer are recorded annually globally with more than half of these cases resulting in death. According to Murthy et al., (2016), the risk of death among women with cervical cancer is relatively higher among women in developing countries compared to those in developed countries. Murthy et al., (2016) explained that women in developing countries do not have easy access to screening and treatment services and that, before a cervical condition is detected, the woman might have passed all stages to the point of death. Forhan et al., (2015) have estimated that 9 in 10 of all cervical deaths occur in low- and middle-income countries. However, for those in developed countries, access to screening services helps in early detection and appropriate treatment provided. The prevalence of cervical cancer and its associated mortalities in Ghana have consistently remained one of the highest prevalence globally (WHO/ICO, 2018; Lingwood et al., 2017). While the incidence of cervical cancer and related mortalities continues to increase in Ghana, the corresponding rates in global context have been decreasing in developed countries (Murthy et al., 2017).

In Ghana, cervical cancer remains the 2nd highest among females (HPV Information Centre, 2019). Although cases of cervical cancer continue to increase in Ghana, little attention has been

given to it. Domfeh et al., (2015) explained that emphasis in the health sector in preventive campaigns have centred on other public health cases such as tuberculosis, HIV/AIDS, malaria and to some extent breast cancer. These rates of cervical cancer have prompted the need to expedite screening for women. The importance of screening in cervical cancer management process is key. Luciani et al., (2015) indicated that through screening, any form abnormality on the cervix cell is detected. The screening helps to identify cases of precancerous cervical lesions. Thus, cervical cancer screening is a method of detecting abnormal cervical cells, such as precancerous cervical lesions and early cervical malignancies. (Luciani et al., 2014).

Cervical cancer, according to clinical studies and scholarly works from Juckett and Hartman-Adams (2015), is caused by human papillomavirus. There is a relationship between cervical cancer, human papilloma virus, human immunodeficiency virus and the susceptibility to cervical cancer by HIV-Positive women. According to a meta-analysis of 24 studies, the risk of cervical cancer developing in HIV positive women is six times higher than women who are HIV negative (Stelzle et al., 2021). Cervical cancer among HIV clients in sub-Saharan Africa is considered a major epidemic with increased consequences. In sub-Saharan Africa, cervical cancer is an intersecting epidemic with HIV and it is the second most common cause of cancer-related deaths in women. (Adanu, 2015; WHO /ICO, 2016). Typically, cervical precancer can be detected by acetowhitening (whitening on the cervix after application of acetic acid) during screening. Rarely there are white patches on the cervix before application of acetic acid and this is termed Leukoplakia. The existence of Leukoplakia have proven to be a symptom to the high incidence of cervical cancer (Rosentine and Acquah, 2015). There are varied types of leukoplakia, however, the leukoplakia of the cervix is a precancerous lesion (Martison, 2012). Leukoplakia is visible as whitish patches on the mucosal surface of the cervix (Martison and

Geoma, 2015). Consequently, leukoplakia can be induced by HPV infection or may be idiopathic. Hence, the need for early screening which in recent times have proven to be important (WHO, 2018).

1.2 Problem statement

According to the Ghana Health Service (2019), the prevalence and trend of cervical cancer in Ghana is worrying and recording a 15% increase yearly since 2013. Annually, about 2,797 new cervical cancer cases are diagnosed and it rank as the 2nd leading cause of female cancer in Ghana (HPV Information Centre, 2019). In Ghana, it is noted that the cervical cancer mortality rate with age specifics is relatively higher than the estimated global mortality rates. Ghana's cervical cancer mortality rate is estimated at 27 deaths per 100 000 women while lower rates of 8 deaths per 100 000 women is recorded in developed countries (HPV Information Centre, 2019). Existing evidence suggests a close association between Human Papilloma Virus (HPV) and susceptibility to cervical cancer, which is exacerbated by HIV infection (Stelzle et al., 2021). Although the widespread availability of combination antiretroviral therapy (cART) has extended the lives of HIV-positive women, they are still at risk of developing cervical cancer caused by HPV (Forhan et al., 2015). As a result of these precarious health situation, screening for early detection of precancerous lesions in HIV positive women should be of highest public health importance and urgency. Cervical cancer is preventable with immunization, however, Ghana's immunization program does not cover HPV (Bruni et al., 2019). Bruni et al., (2019) further explains that screening services and treatment are mostly available to women who are educated and wealthy in the urban areas and are able to access the services irrespective of the cost and geographical location. This makes cervical cancer screening mostly inaccessible or unavailable to women living in poor rural settings.

As part of the National Cancer Prevention Strategy, a national policy was introduced in 2011. For women aged 25–45 years, the policy recommends Visual Inspection with Acetic Acid and cryotherapy as a treatment for women who are found to have a pre-malignant lesion. For women who are 45 years and older, cytology is recommended (MoH, 2016). Cervical cancer screening is done visually with acetic acid (VIA) in many developing countries. To supplement VIA procedures in low-resource settings, an enhanced visual assessment (EVA) system which is a mobile colposcope was developed by mobile ODT, Israel (Peterson et al., 2016). There is also an information/data gap about the prevalence of cervical lesions and also the factors that contribute to the development and severity of cervical lesions among HIV positive women.

While there are studies concerning cervical lesions among HIV positive women in other countries, limited studies have been conducted in Ghana. However, the studies that have been carried in Ghana have been limited to the tertiary hospitals with no available scholarly article in the Volta region. This is a huge challenge when furthering or advising stakeholders on the way forward in curbing the scourge of cervical cancer. One notable challenge is the paucity of information or literature on leukoplakia among HIV positive patients and its effects. The data obtained will contribute to the knowledge base about cervical lesions among HIV positive women in Ghana and inform national strategy on prevention and treatment of cervical cancer in Ghana. The result of the study would further enhance the development of appropriate strategies and methodology addressing HIV situation in Ghana, not limiting the focus on key population but broadening the approach to include other effect that are increasingly becoming a major public health concern. In the Volta Region where this study was carried out, there never been any published study on cervical lesions among HIV positive women. It was therefore

imperative that this was conducted to provide some basis on the existing conditions of cervical lesions.

1.3 Justification of the study

Cervical cancer incidence has been increasing in Ghana since 2013. It is estimated that by end of 2025, Ghana is likely to record over 5,000 new cases of cervical cancer with more than 3,000 of these cases resulting in death (WHO/ICO, 2018). Instead of the current screening systems that are in place within the sub-Sahara Africa region, it has been recommended that each country in the region needs to establish and implement sustainable preventive and screening programs using any of the available methods suitable and appropriate for their own environment (Ntekim, 2012). Early detection and treatment of precancerous cervical lesion at the early or non–critical stages of development has been identified as an important strategy that helps to save lives. A key justification for the study is to ensure that the presence of cervical lesions and leukoplakia on the cervix of HIV positive women can be properly assessed using mobile colposcopy and documented to augment the data deficit of women with cervical cancer. This study therefore sought to assess the prevalence and risk factors that contribute to the development of cervical lesions and leukoplakia using mobile colposcopy in HIV positive women in Catholic Hospital, Battor.

1.4 Research Questions

The research questions guiding the study are as follows:

1. What is the prevalence of cervical lesions and leukoplakia in HIV positive women using mobile colposcopy in Catholic Hospital, Battor?
2. What are the factors associated with the development of leukoplakia among HIV positive women in Catholic Hospital, Battor?

3. What are the risk factors for cervical lesions among HIV positive women in Catholic Hospital, Battor?

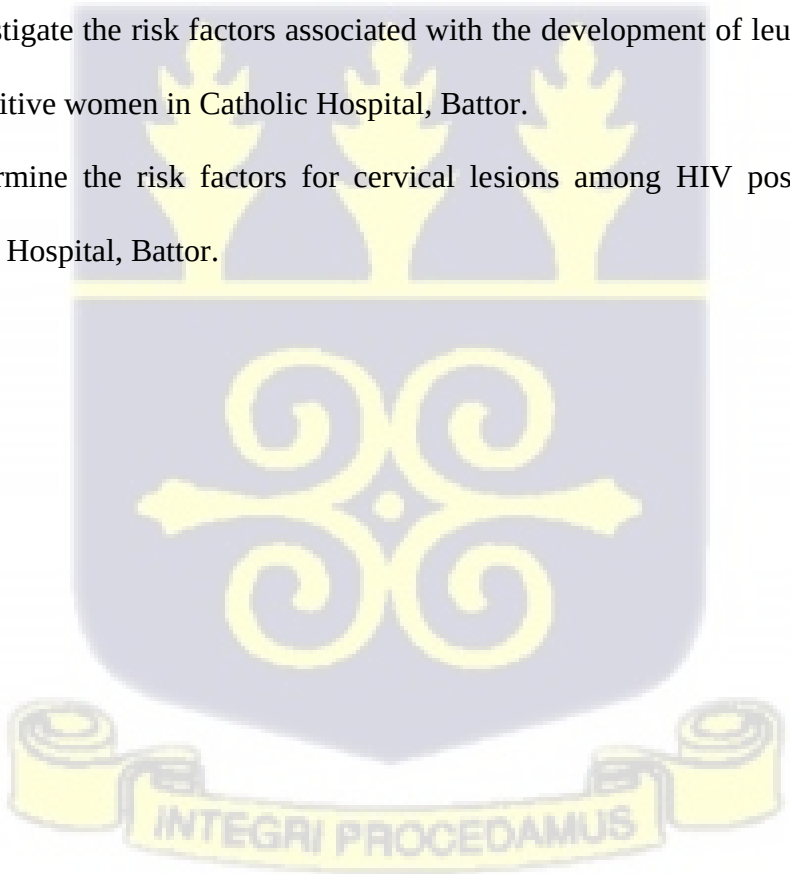
1.5 General Objective and Specific Objectives

1.5.1 General Objective

The main objective of the study was to assess the risk factors associated with cervical lesions and the factors associated with leukoplakia formation among HIV positive women in Catholic Hospital Battor, Ghana.

1.5.2 Specific objectives

1. To determine the prevalence of cervical lesions and leukoplakia in HIV positive women using mobile colposcopy in Catholic Hospital Battor.
2. To investigate the risk factors associated with the development of leukoplakia among HIV positive women in Catholic Hospital, Battor.
3. To determine the risk factors for cervical lesions among HIV positive women in Catholic Hospital, Battor.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter presents the various concepts and literature on the subject of study. In this chapter, the study discusses the general concept on of cervical cancer as well as leukoplakia. Further discussions are done on the various occurrence of cervical cancer and its relationship with HIV. Discussions are centred on the objectives of the study to understand the prevalence and risk factors associated with cervical lesions. The chapter concludes with a summary of key highlights of the literature discussed and the gaps that have been identified in each of the key sections discussed. The main source of information for this literature included PubMed, Google Scholar, African Journal online and other reports of World Health Organization.

2.2 The Concept of Cervical Cancer

Cervical Cancer occurs when anomalous cells on the cervix develop uncontrollably (Journal on Women's Health Care (2018). The lower part of the uterus that opens into the vagina is called the cervix. The presence of cervical cancer is high among HIV positive women largely because the persistence of the high-risk HPV around the cervix weakens the cervical cells causing pre-malignment lesions. The screening of cervical cancer in most low- and middle-income countries is done using visual inspections with acetic acid which is described as an operator-associated technique (WHO, 2012). Vermund et al., (2016) explains that the use of HPV-based detection is sometimes considered as an option because of its better performance and allows for self-sampling.

Globally, HIV infection has been noted as one of the major health burdens that affects the health of women (WHO, 2017). Reichenbach, (2013) indicated that because of its health impact on women, cervical cancer was classified as one of the diseases among acquired immunodeficiency syndrome (AIDS) in 1993. Human immunodeficiency virus (HIV), the virus that causes AIDS, weakens the immune system and makes people vulnerable to HPV infections. A premalignant lesion is a change in the cervical cells that has the potential to become cancer.

Pre-cancerous lesion conditions have been classified into three different stages, depending on the severity of the condition (Frisch, Biggar and Goedert, 2010). The classification was done based on international consensus. The three categorised stages of lesions include lesions with mild dysplasia, lesions with moderate dysplasia and lesions with severe dysplasia. For those with mild dysplasia (LSIL or CIN I), it is indicated this category was initially not considered as a main condition when the classification was first done by the National Health Laboratory Service. The moderate and severe dysplasia were classified as HSIL or CIN II and HSL or CIN III respectively. Johnson et al., (2017) indicated that the analysis by the National Health Laboratory Science further categorised cervical lesions into other groups which were initially included in the earlier assessment and classification. One of such classification was severe dysplasia with or without HPV.

According to Vermund and Kelley (2015), explained that the risk of a woman with precancerous cervical lesion (otherwise called intraepithelial) developing into cervical cancer is significantly high and this may happen when the cell in the cervix is destroyed, causing some

level of abnormality. Squamous and glandular have been classified as the two main types of cervical cells that may be destroyed by the presence of the HPV.

- **Atypical squamous cells.** Atypical squamous cells determined when abnormalities are detected in squamous cell of the cervix. When atypical squamous is detected, the presence of HPV is eminent and may cause other series of abnormalities (Wright et al.,2016). Further assessment may be conducted to test whether severity of the condition before any judgement can be made. Atypical squamous assessment may be done with a pap test to determine whether the cells is of significance and the outcome may be abbreviated as ASCUS (Wright et al., 2016).
- **Squamous intraepithelial lesion (SIL).** The SIL type of lesion may define the presence of precancerous lesion and may be classified into either a low grade or high grade. High grade type of SIL which is defined as precancerous may progress into cervical cancer (Wright et al., 2016).
    - **Atypical glandular cells.** These indicators point to a premalignant lesion in the upper cervix or within the uterus. (Wright et al., 2016).

The cervix has several different linings and can be found in three different transformation zones. The transformation zone is the area between the original squamocolumnar junction and the new squamocolumnar junction. The transformation zone is an area of changing cells, and it is the most common place on the cervix for abnormal cells to develop. The three types of transformation zone can be categorised as being completely ectocervical (zone 1), fully visible with an endo-cervical component (zone 2) and not fully visible (zone 3).

2.3 Cervical Cancer Screening

Cervical screening is done using various methods. They include HPV DNA testing, PAP smear/Cytology, Visual inspection with acetic acid (VIA), Visual inspection with lugol's iodine (VILLI). However, the use of mobile technologies in screening for cervical cancer have proven to be a positive timely intervention in reducing the cases of cancer among women and many other factors (Denny et al., 2016). An example is the Enhanced Visual Assessment (EVA) system which is a type of mobile colposcope illustrated in figure 1 below. Using mobile colposcopy focuses on to equip women's healthcare providers with advanced Artificial Intelligence (AI) medical device technologies for the detection of cervical cancer (https://www.mobileodt.com/). The EVA System comprises of a mobile colposcope powered by a smartphone and an internet picture site for saving and interpreting photos. To monitor the handheld colposcope and upload pictures to the image portal, a smartphone app is used.(Peterson et al., 2016)

Mobile colposcopy is an improved method of screening using mobile technology in giving positive timely result and intervention. It is a visual inspection method which can be used for primary screening and follow up of screen positives for HPV DNA testing and abnormal PAP smears, and also for medico legal issues example documentation during assessment of rape or defiled victims. The mobile colposcope (EVA system) is portable, provides confidence in diagnosis, and allows experts that are not on site to direct procedures in real time when necessary. Because middle cadre workers like nurses can use a mobile colposcope to follow up on high risk HPV positive cases and abnormal PAP smears, it frees up medical professionals and specialists to care for more patients. It also allows for quality assurance or research

following screenings. Because seeing photos of their own images makes cervical cancer and pre-cancer tangible, mobile colposcopy encourages patients to follow up on positive results.

As a result of evidential data in context of the relationship between HIV and cervical cancer/leukoplakia, the researcher found the need to initiate this study into the clinical study on cervical pre-cancer detection and screening results among women who are HIV positive.

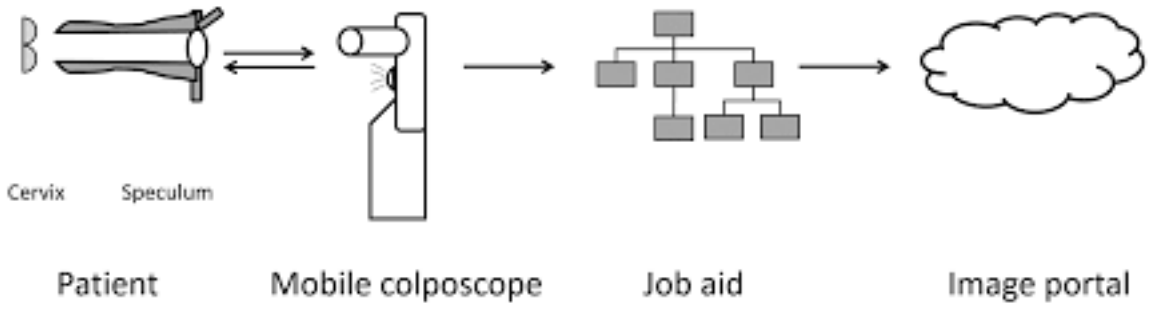


Figure 1: Mobile Colposcope

Sun et al., (2017) in a cohort study in South Africa and Europe among women who are infected with HIV to assess the efficacy of the Pap testing method comparative to the gold standard biopsy. The study observed that the Pap testing method was more efficient in detecting high grade cervical intraepithelial compared to the use of gold standard of biopsy. Pecorelli et al., (2013) in their study among a population of women with cervical lesion noted that the progression of high-grade lesion mostly take an average median time of 27 years. However, the rate of progression was not clearly outlined among HIV positive women. The assumption is that the progression rate may be relatively lower in HIV positive women compared to HIV negative women. Wright et al., (2016) have argued that the treatment of cervical lesion is possible at early stage of development (premalignant cervical lesion) and are often done with local excision. However, the condition when diagnosed late, becomes difficult to treat. Early

screening is therefore key in addressing the management of cervical lesion. Because high-risk HPV (hrHPV) strains are linked to the development of ICC, cervical HPV testing has been advocated to supplement or even replace cytology as a primary technique of screening. (Mbulaiteye et al., 2011).

A systematic review of the effects of VIA, Cryotherapy, and Loop Electrosurgical Excision Procedures for Cervical Dysplasia in HIV-Infected Women in Low- and Middle-Income Countries revealed that the prevalence and frequency of dysplasia were greater in women infected with HIV than women not infected with HIV. Furthermore, the dysplastic lesions are larger and more numerous, as well as more likely to recur after treatment (Forhan et al., 2015). Prospective cohort study done in Cambodian for HIV positive and HIV-negative women comparing human papilloma virus testing, visualization with acetic acid and digital colposcopy indicates that the CIN2+ and CIN1 lesions in 30 women who had biopsies were well differentiated with the provider impressions with the digital colposcopic (DC) images. The prevalence of reported cervical dysplasia in HIV-positive women was 20/129 (15.5%), compared to just 10/121 (8.26%) in HIV-negative women (p=0.0291) (Thay et al., 2019)

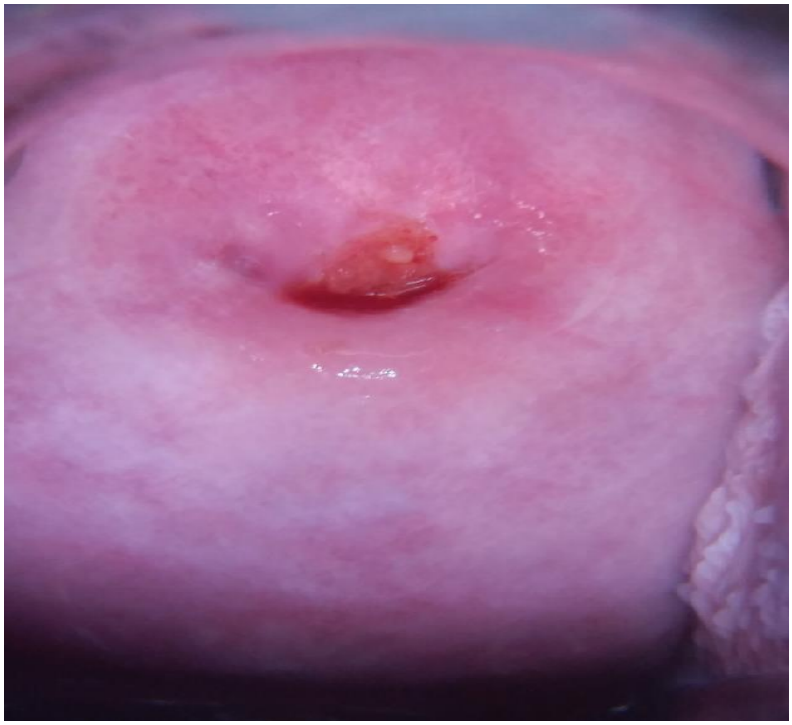


Figure 2: Normal Cervix in an HIV positive client.

Source: Cervical Cancer Prevention and Training Centre (CCPTC), Battor.

Figure 3: Cervical lesions in an HIV positive client**.**

Source: Cervical Cancer Prevention and Training Centre (CCPTC), Battor.

2.4 Leukoplakia Lesion

Leukoplakia is a firmly adherent white patch on a mucosal surface that has been linked to a higher cancer risk. (Remy & Feuer, 2018). According to the WHO (2018) Leukoplakia of the cervix is detected most of reported gynaecologic patients. One of the physical symptoms of leukoplakia is as a result of it showing at the edges of the lesion are typically abrupt and the lesion changes with time. The lesion appears as a slightly elevated white plaque. This is showed in the figure 3 below while a normal cervix of an HIV patient is shown in Figure 2.

Leukoplakia is a white plaque caused by decreased transparency of the squamous epithelium due to hyper-keratinization. Because it's a hyperkeratotic lesion, the cells' glycogen storage capacity is low, hence Lugol's iodine stain is negative. The plaque's edges are normally sharp. (Smithson, 2017). The advanced forms may develop red patches (WHO, 2017). According to Lang (2012), Leukoplakia can be divided into three (3) categories: (1) clinical leukoplakia, (2) histologic leukoplakia and (3) colposcopy leukoplakia. It's usually a discrete lesion on the cervix, though it can sometimes be observed on the outside. Leukoplakia is a firmly adherent white patch on a mucous membrane that has been linked to a higher cancer risk. (Maiman et al., 2018). Histologic examination reveals hyperkeratosis. The determination of Leukoplakia comes from the white patch on the cervix before application of acetic acid.

According to the study conducted by Yeung and Smith (2010), in testing about 200 patients for leukoplakia, although 40 per cent of the patients have no complaint at all. However, they were prevalent and hence, entering into the canal. When Lugol's iodine solution is applied, the lesion does not absorb the iodine. Once leukoplakia is found on the cervix, a diagnostic conization is required, regardless of the Papanicolaou smear results. Because the more

substantial abnormality is present in the endocervix, a punch biopsy of the white plaque frequently results in an incorrect diagnosis. Even if extensive dysplasia is evident, cytologic results may be mistakenly negative. As are result of these findings from earlier studies and data provided, the need to go further and fill these knowledge gap through screening of HIV positive women for leukoplakia and cervical lesions have become very critical.

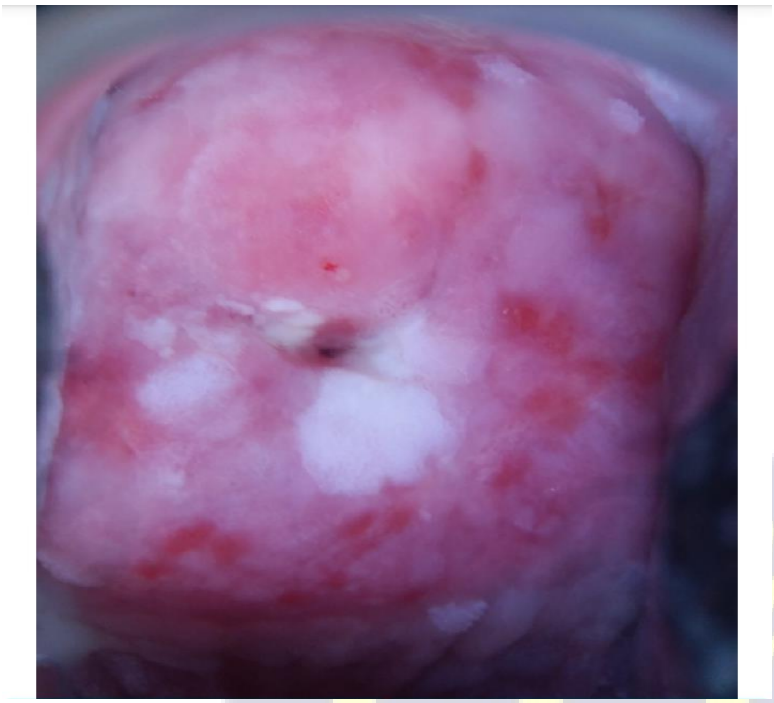


Figure 4: Leukoplakia of the Cervix in an HIV positive client

Source: Cervical cancer Prevention and Training Centre (CCPTC), Battor

2.5 Prevalence of cervical lesions and leukoplakia in HIV positive women

Denslow et al., (2017) conducted a global assessment of various data from different countries on cervical lesion incidence and progression in HIV positive women as a means of understanding the natural history of cervical neoplasia. The study, which was mainly a systematic review analysed data from 15 different studies using a sampled data of 5,882 HIV-

positive women. The prevalence/incidence of cervical lesion among the HIV patients were observed to be between 4.9 to 21.1 cases per 100-woman years for any cervical lesion. However, for high cases of cervical lesions, incidence rates of 0.4 to 8.8 per 100-woman years were observed among the sampled women. The further noted that the incidence of cervical lesion was 3-fold higher among women who were HIV positive compared to women who were HIV negative. A thorough review of 11 of the 15 studies further showed that the progression of cervical lesion increased significantly from a ranged of 1.2 to 26.2 cases per 100-woman years among 1,099 HIV positive women.

Jolly et al., (2017) conducted a cross-sectional case-control study on screening, prevalence and risk factors associated with cervical lesions among HIV patients on Swaziland. The assessment of screening and prevalence was determined using VIA. Women with HIV were used as cases while women with HIV negative status were used as control group. The age group of the women were between 18-69 years. The study noted that the prevalence of cervical lesion was significantly higher (22.9%) among women who were HIV positive with HIV negative women recording a prevalence of 5.7%. After conducting further regression analysis of the data, the results showed that women with HIV had 5.24 times higher the risk of developing cervical lesion compared to women who were HIV negative. Mekuria et al., (2021) also conducted an institutional-based cross sectional study in Ethiopia to assess the prevalence of cervical cancer among HIV patients and women in general. With a sample of over 400 women, the study observed a prevalence of 23.5% with 10.1% been identified as women with high grade cervical cancer. Weldegebreal & Worku, (2019) also conducted a meta-analysis of various studies that have been conducted in sub-Saharan Africa on the prevalence of cervical cancer among HIV

patients. The study observed a prevalence of 25.6% with some studies recording as high as 31.8% (McKenzie et al., 2011).

2.5 Risk factors associated with cervical cancer and leukoplakia

Mekuria et al., (2021) in their study observed that the risk of cervical cancer increases with the presence of HIV infection. There are, however, other significant factors that influenced the outcome of cervical cancer prevalence. The study noted that women who had multiple sexual partners had higher risk of developing cervical cancer compared to women with single sexual partners. Again, women had history of sexual transmitted infection (STI) had higher risk of developing cervical cancer than those who had never experienced any sexual transmitted infections. The study further observed that women who begun sexual intercourse at early age had higher risk of developing cervical cancer compared to women with delayed age at first sexual intercourse.

The study by Weldegebreal & Worku, (2019) also observed some significant factors that influenced the incidence of cervical cancer in their meta-analysis study. Recording a pooled prevalence of 25.6%, Weldegebreal & Worku, (2019) noted that women who had more than 2 lifetime sexual partners were four times more higher the risk of developing cervical cancer compared to women with had single sexual partners in their lifetime. The risk of cervical cancer was twice higher among women with history of sexual transmitted infections compared to women who had no history of STIs. Again, the risk of cervical cancer was significantly higher among women who had more than two births compared to women who had at most two births. Though the risk of cervical cancer was significantly higher among women with HIV, the level of risk of cervical cancer infection however differed among the HIV patients. Women who had

lower CD count (less than 200 cells/mm³) had higher risk of developing cervical cancer compared to women with higher CD count.

Jolly et al., (2017) also analysed the prevalence of cervical lesion and its associated risk. The study noted that apart from the risk of HIV prevalence increasing the risk of cervical lesion, there are other related risk. The risk of cervical lesion among the HIV women was significantly influenced by maternal age. Women who had multiple sexual partners had higher risk of cervical lesion compared to women who had single sexual partners. Similarly, women with history of STI had higher risk of developing cervical lesion compared to women with no history of STI. The risk of cervical lesion was also significantly higher among women who had previous cancer cervical exam compared to women who did not have cervical exam in the past.

Denslow et al., (2017) in their study also noted that the level of an HIV patient's CD4 count determines the risk level of cervical lesion. It was noted that HIV positive women with low CD4 count had higher risk of cervical lesion compared to HIV positive women with higher CD4 count. Kiros et al., (2021) conducted a comparative retrospective cross-sectional study among HIV infected on the prevalence and determinants of pre-cancerous cervical lesions and human papillomavirus. The study which observed a prevalence of 8.8% for cervical lesion noted that women who were aged 45+ years were at a higher risk of developing cervical lesion than women who were below 20 years. Additionally, HIV positive women who were widowed and multiparous had significant higher risk of developing cervical lesion than those with who were married and nulliparous. Another significant factor that contributed to the risk of cervical lesion was the educational status of the HIV positive women. The risk was significantly lower among women who had attained higher education (tertiary).

The review of the various risk factors has shown that prevalence of cervical lesion among HIV positive women is largely determined by history of STI, maternal age, number of sexual partners and the level of CD4 count in an HIV positive woman.

2.6 Conceptual Framework

A review of different studies on socio-demographic and clinical factors from different perspectives across the globe has shown that the development of cervical lesions and leukoplakia are not dependent on one single factor but a number of factors. While socio-demographic factors become a general link to cervical lesions, other factors such as risk-related factors and clinical conditions may contribute to the outcome. Getinet et al., (2021) had argued that cervical lesions and leukoplakia are increasing steadily in Africa. However, a few studies have been done to estimate how the rate has been increasing over time. The study had further argued that cervical lesions and leukoplakia are linked to several factors. The conceptual framework for this study was developed using the root-cause analysis model. The root cause analysis model explains that most health problems may be related to several factors, however, there is an underpinning factor that may cause the main problem. The model strives on a continuous diagnosis of the problem to unearth the causes and provides an appropriate solution to the problem.

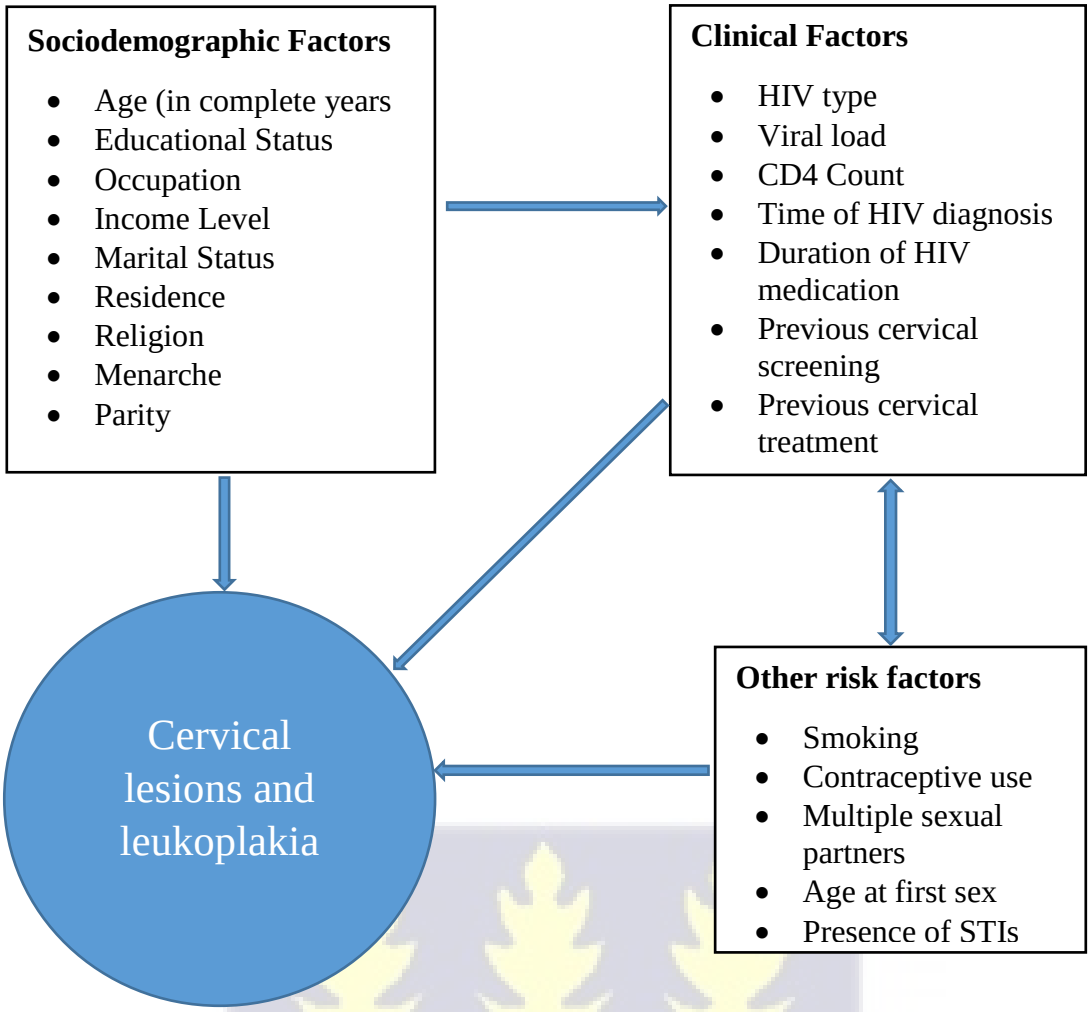


Figure 5: Conceptual framework showing factors associated with cervical lesions and leukoplakia among HIV positive women using mobile colposcopy.

The conceptual framework (figure 1) predicts that cervical lesions and leukoplakia are likely to be influenced by three main factors: socio-demographic, clinical and other risk-related factors. For socio-demographic factors, the framework identifies factors such as age, menarche, educational status, occupation, income level and marital status. Other socio-demographic factors that have been considered in the development of the conceptual framework are number of children, residence and religion. The use of contraceptives and smoking among the women have been categorised as risk-related factors that be linked to the socio-demographic factors of

the women. The risk-related factors have a directly relationship with the clinical factors in that, the higher the risk factors, the higher the occurrence of the some of the clinical conditions such as HIV type and viral load, medication, etc.

Clinical factors have also been considered as another set of factors that have direct relationship with the development of cervical lesions among HIV positive women. Variables such as HIV type, viral load, duration of HIV diagnosis and duration of HIV medication. Other clinical factors include previous cervical screening and previous cervical treatment.

Studies from different literature as demonstrated in earlier discussions have shown a strong relationship between socio-demographic factors and the development of cervical lesions among HIV positive women. Under the socio-demographic factors, variables such as multiparity, maternal age and educational status have been considered. These variables are more likely to predict the outcome variable, which is the presence of cervical lesions and leukoplakia. The framework further establishes a direct relationship between clinical factors and the development of cervical lesions. The framework further explains that the sociodemographic factors or outcomes could be influenced by some clinical factors. For instance, the previous cervical screening as well as previous cervical treatment are likely to be influenced by some sociodemographic factors (educational status, occupation, income level). Similarly, education and marital status under the socio-demographic factors are more likely to influence the duration of HIV diagnosis, duration of HIV medication and viral load. There is also similar relationship between parity and other demographic factors such as marital status, educational status and occupation.

METHODOLOGY

3.1 Introduction

The method employed in this study is explained in details in this chapter. The presentation includes the study design employed for this study, study area, target population and sampling techniques. Other methods discussed in this chapter include methods of data collection and tools, quality control, variables and analysis of data. The chapter concludes with highlights of the key ethical issues that are addressed in this study.

3.2 Study design

The study employed a facility-based retrospective complete census of HIV positive women attending the facility during the period between February 2018 and July 2021, who were screened using mobile colposcopy. The quantitative data helped to estimate the prevalence of cervical lesions and leukoplakia among the HIV positive women attending the facility and to determine the significant factors associated with the prevalence of cervical lesion and leukoplakia. All cervical screening done by mobile colposcopy were performed by trained nurses.

3.3 Study area

The study was conducted at Catholic Hospital, Battor of the North Tongu district of Volta Region. The hospital is situated on the western shores of the Volta River about 30 kilometres upstream from the Ada Estuary and about 100 kilometres from Accra. It is about 18km off the Accra-Aflao highway from Sege in the Ada East District of the Greater Accra Region. According to the 2010 population census, the immediate catchment population is about 41,437inhabitants. The hospital, however, has a wider catchment beyond the district with Ada East and West that have capitals as Ada and Sege respectively with a population of over

107,986 and Shai-Osudoku with a population of about 112,486 according to the Statistical Service Records measured by the 4% population growth projection. Battor-Dugame is the capital of the North Tongu District in the Volta Region and Catholic Hospital Battor is the District Hospital of the North Tongu District.

Catholic Hospital, Battor was visioned by the late Bishop Emeritus Joseph Oliver Bowers through whose efforts four (4) Dominican sisters from Speyer, Germany in the persons of Sr. Victricia Koch, Sr. Edeltrudis Berberich, Sr. Caritas Eisenbarth and Sr. Inclinata Harter arrived in Ghana in February 1957 to start a small Maternity Home that has transformed into the edifice of international repute today. The technical ownership of the hospital continues to be vested in the Metropolitan Archbishop of Accra, Most Rev. Bonaventure Kwofie. The hospital has facilities for the following services; out-patient services (General O.P.D, Eye Clinic, Laboratory, Pharmacy, Radiology, Anaesthesia, Cervical Cancer Prevention and Training Centre), In-Patient Care Services (Medical ward, Surgical Ward, Post Natal Ward, Pediatric ward, Labour Ward, Theatre, Emergency).

The Cervical Cancer Prevention and Training Centre, Battor was set up on 31st May 2017. It is a centre recognized for cervical cancer prevention by rendering services such as vaccination against HPV, screening, treatment of cervical precancers and surgery for early cancers. The centre also trains health workers in cervical cancer prevention nationally and internationally.

The current staff strength in the hospital is 457.

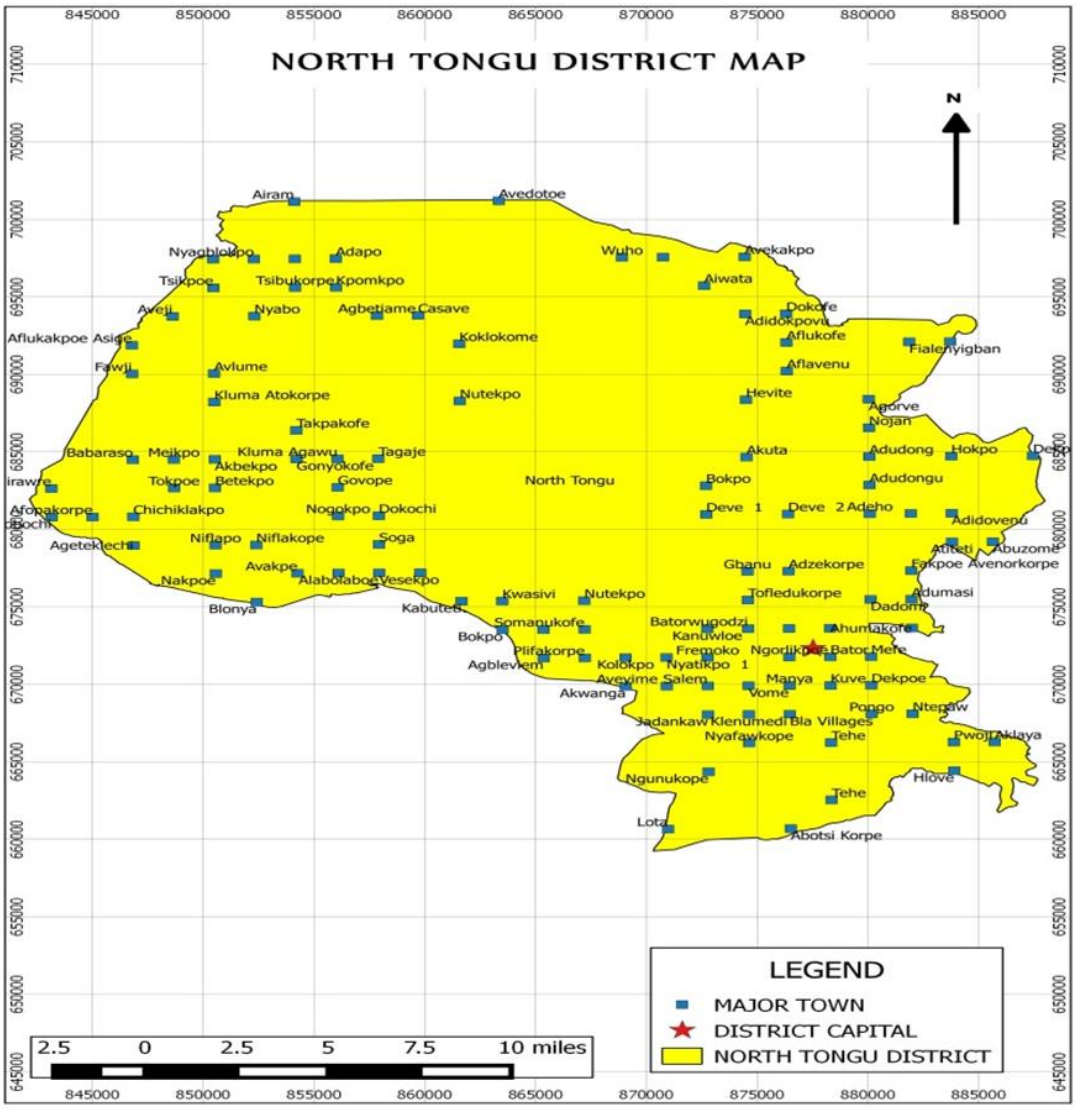


Figure 6: Map of North Tongu District

3.4 Target and study population

The study population were women who were HIV positive and had been screened at the Cervical Cancer and Training Centre using mobile colposcopy with the EVA system from the period of February 2018 to July 2021. The records of these women were picked and analysed.

3.5 Inclusion Criteria

Participants for this study included:

a. All HIV positive women who were screened or followed up with colposcopy using the EVA system within the study period.
b. HIV positive women with cervical lesions
c. HIV positive women aged 21 years and above.

However, the following women were excluded from the study:

a. Women who tested negative for HIV or do not know their HIV status.
b. HIV positive women who were not screened with mobile colposcopy with the EVA system.
c. HIV positive women who had hysterectomy.

3.6 Sample Size determination

The study sample size included all HIV positive women who were screened during the period as stipulated in the inclusion criteria. The records of all HIV positive women who were screened with mobile colposcopy with the EVA system during the study period were used for the study. The total of 206 women were all used for the study.

3.7 Sampling Method

The study employed a complete census approach. The records of colposcopies done for HIV positive women for the study period were retrieved from the cervical screening forms and client's folders and reviewed in charts. The available records of HIV positive women were all used for the study. No statistical sampling approach was used to select participants since all

HIV positive were included in the study. However, records of HIV positive women, which were incomplete were not included in the study.

3.8 Study variables

The study explored the relationship that exist between the following variables;

i. Dependent

• Cervical lesions and leukoplakia among HIV positive women.

ii. Independent variables

• Socio demographic variables (age, place of residence, marital status, educational level, occupation, level of income, smoking, contraceptive use, parity and menarche)

- Clinical variables (HIV type, previous cervical screening, previous cervical treatment, number of years diagnosed of HIV, number of years on HIV medication)

3.9 Analysis of Data

The retrospective data was retrieved and entered onto MS Excel. Data cleaning was done by removing duplicated and invalid data using unique patients' identifiers and hospital identity number and exported into STATA Version 16.1 software. Data was analyzed for 206 HIV positive women aged 24 to 86 years. Colposcopy results were available for all 206 HIV positive women. Socio demographic and clinical characteristics of women who were screened with mobile colposcopy were tabulated. The variables were subjected to descriptive statistics (frequencies, percentages, and means) in order to describe the clinical and socio demographic characteristics.

Bivariate relationship between cervical lesion, leukoplakia and their potential risk factors were compared using Chi Square. Multivariate models were created using variables that were associated to cervical lesions. The odds ratio and 95 % confidence intervals for the risk of cervical lesions were calculated using logistic regression after controlling for age, marital status, and the duration of HIV diagnosis. All statistical test of p-value of <0.05 were considered significant.

3.10 Ethical Issues

Ethical clearance was sought from Christian Health Association of Ghana (CHAG) Research Unit in Accra, Labone with the code CHAG-IRB02052021 as requirement for the conduct of this study. Consent of the hospital and the Head of Department of the Cervical Cancer Prevention and Training Centre was sought before commencing the study for accessing data to conduct this research. With this clearance, a formal approval was sought from the Catholic Hospital Battor Administration. No informed consent was sought from clients as this is a chart review and no names of clients was used in the analysis and reporting of research findings. However, informed consent was sought from clients whose images were used in the study.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the analysis of the results of the study. The descriptive statistics of the study results are presented for each of the study objectives. Results of the binary regression analysis of the study outcome is presented. Further analysis using multiple regression provides results on predictors of the outcome.

4.2 Socio-demographic characteristics of HIV positive women screened using mobile colposcopy

A total of 206 women were screened and all were included in the study. The women were aged between 24 to 86 years with mean age 42.5years (Table 1). Of these, 38.0% had secondary education. 36.9% were married, 51.5% had parity of 1 to 3, 30.6% had parity of 4 and above and 18.0% of the women had parity of 0. Majority of the women earned an income (73.3%). Most of the women were Christians, 85.4%. Very few women were currently on contraception 7.3% with majority not on any form of contraceptive, 92.7%. Most of the clients resided in the Greater Accra Region, 60.2% and the remaining 39.8% residing in Volta and other regions.

Table1: Demographic and social characteristics of HIV positive women screened using mobile colposcopy

Client Characteristic	Estimate
Age, Mean (Standard Deviation)	42.5 (11.0)
Age, Median (minimum, maximum)	(24, 86)
Region of residence, % (n)	
Volta Region	39.8% (82)
Greater Accra Region	60.2% (124)
Marital Status, % (n)	
Single	12.6 (26)
Has a steady partner	19.4 (40)
Married	36.9 (76)
Divorced	11.2 (23)
Widowed	19.4 (40)
Number of children, % (n)	
0	18.0 (37)
1	17.5 (36)
2	22.3 (46)
3	11.7 (24)
4+	30.6 (63)
Highest Level of Education, % (n)	
No formal education	41 (19.9)
Elementary education	54 (26.2)
Secondary education	80 (38.8)
Tertiary education	10 (4.9)
Missing	21 (10.2)
Income, % (n)	
Yes	73.3 (151)
No	15.5 (32)
Missing	11.2 (23)
Monthly income*, % (n)	
< GHS 100	37.1 (56)
GHS 100 to < GHS 250	26.5 (40)
GHS 250 to < GHS 500	21.8 (33)
GHS 500 or more	10.6 (16)
Prefer not to answer	3.3 (5)
Religious Faith, % (n)	
Christianity	85.4 (176)
Islam	4.4 (9)
African Traditional Religion	1.0 (2)
Missing	9.2 (19)
Current Contraceptive Use, % (n)	
Yes	7.3 (15)
No	92.7 (191)

*Only those who indicated they have a source of income are considered (n=151)

4.3 Clinical characteristics of HIV positive women screened using mobile colposcopy

A total of 206 HIV positive women were screened for cervical lesions and leukoplakia using mobile colposcopy (Enhanced Visual Assessment System - EVA). Of the women screened, 45(21.8%) had cervical lesions and 23(11.2%) had leukoplakia as shown in Table 2.

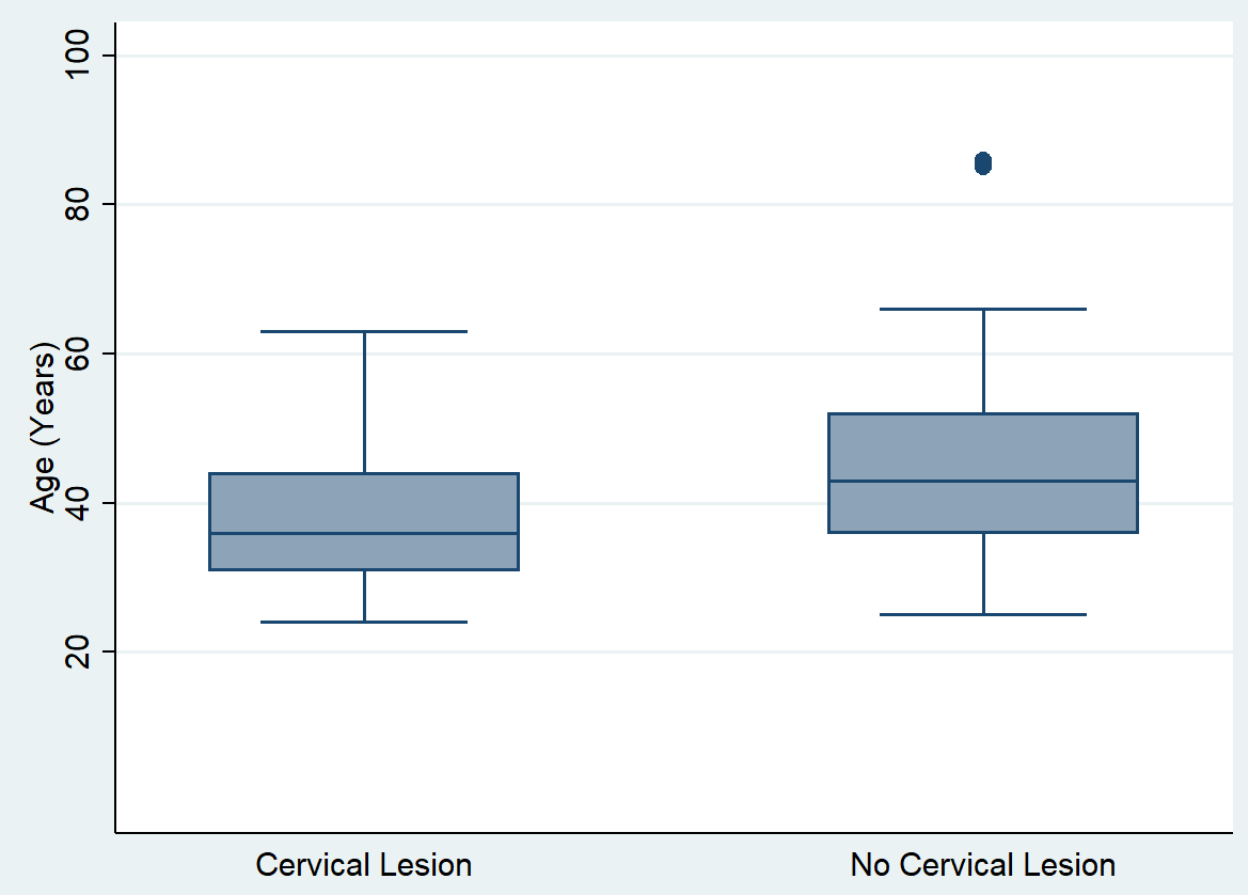


Figure 7: Distribution of age by presence of cervical lesion among HIV positive clients.

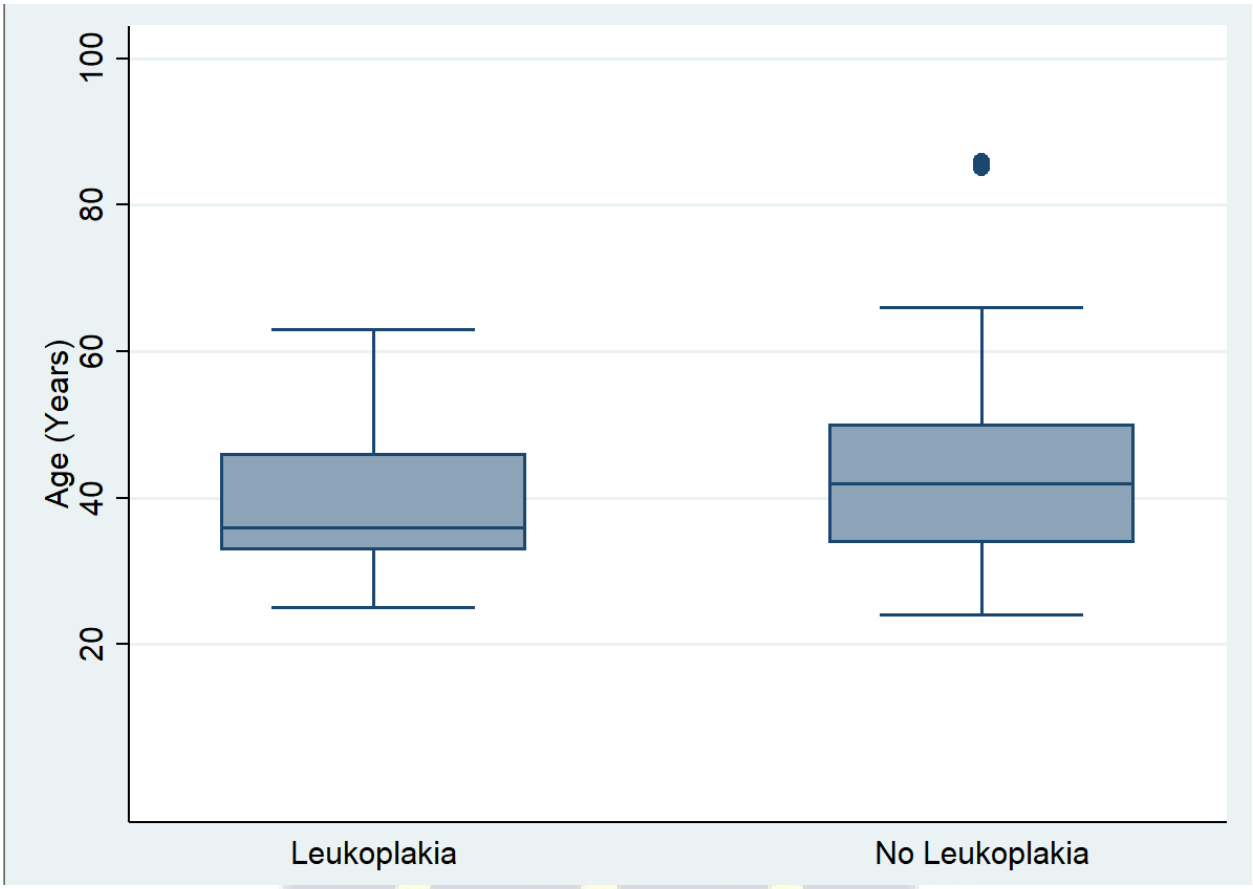


Figure 8: Distribution of age by presence of leukoplakia among HIV positive clients.

Few of the women had previous cervical screening, 18.5% with very few having previous treatment, 2.9%. Most of the women were positive for HIV type 1(97.6%) and 1.0% positive for type 2 and 1.5 % for both type 1 and 2. Women on HIV medication for > 3 years were 32.0%, between 1- 3 years, 39.3% and <1 year, 11.7%. Majority of the women, 78.2% had no lesion on colposcopy, 12.1% had minor changes and 9.7% had major changes. Majority of women, 71.1% had their lesion size percentage <25. Most of the women with cervical lesions had lesions covering 4 quadrants of the cervix, 67.5%, 3 quadrants 7.5% and 2 quadrants, 25%.

Majority of the women had a transformation zone type 3, 76.2% and 23.8% had transformation zone type 1 and 2. Women who had leukoplakia were 11.2% and 88.8% were without leukoplakia.

Table 2: Clinical characteristics of HIV positive women screened using mobile colposcopy

Client Characteristic	Estimate
Previous cervical screening, % (n)	
Yes	18.5 (38)
No	81.5 (168)
Previous cervical treatment, % (n)	
Yes	2.9 (6)
No	97.1 (200)
Previous cervical treatment type*, % (n)	
LEEP	83.3 (5)
Thermal coagulation	16.7 (1)
HIV type, % (n)	
Type 1	97.6 (201)
Type 2	1.0 (2)
Both	1.5 (3)
Viral load, % (n)	
< 20	23.8 (49)
>= 20	5.8 (12)
RNI	3.4 (7)
TND	31.6 (65)
Not done	35.4 (73)
Time on HIV medication, % (n)	
< 1 year	11.7 (24)
1 year	9.7 (20)
2 years	6.8 (14)
3 years	22.8 (47)
>3 years	32.0 (66)
Non-compliant	0.5 (1)
Not started	11.2 (23)
Not available	5.3 (11)
Type of cervical screening, % (n)	
Primary	93.2 (192)
Follow up	6.8 (14)
Vulva inspection, % (n)	
Abnormal	7.8 (16)
Normal	92.2 (190)
Vaginal inspection, % (n)	
Abnormal	3.4 (7)
Normal	96.6 (199)
Cervical inspection, % (n)	
Abnormal	13.6 (28)
Normal	86.4 (178)
Colposcopy findings, % (n)	
Adequate with major changes	9.7 (20)
Adequate with minor changes	12.1 (25)
Adequate without lesion	78.2 (161)

Lesion size percentage, % (n)**	
<25	71.1 (32)
25-50	11.1 (5)
51-75	4.4 (2)
>75	2.2 (1)
Missing image	11.1 (5)
Lesion quadrants, % (n)	
2	25 (10)
3	7.5 (3)
4	67.5 (27)
Transformation zone type, % (n)	
T1	7.3 (15)
T2	16.5 (34)
T3	76.2 (157)
Leukoplakia, % (n)	
Yes	11.2 (23)
No	88.8 (183)

*Only those who had a previous cervical treatment are considered (n=6)

**Only those who had lesions are considered (n=45)

4.4 Bivariate relationship between leukoplakia and cervical lesion and their potential risk factors

Results of the bivariate analysis of the relationship between leukoplakia and potential risk factors reported in the patient records showed no statistically significant association. However, statistically significant associations were found among the identified factors such as age (p-value = 0.005), marital status (p-value = 0.021), duration of HIV diagnosis (p-value = 0.001) and duration of HIV medication (p-value = 0.006) showed significant relationship with cervical lesions.

Table 3: Bivariate analysis of relationships between potential risk factors and leukoplakia

	LEUKOPLAKIA			
RISK FACTOR	YES	NO	CHI SQUARE	P- VALUE
AGE			1.7023	0.192
Less than 41	14	9		
41 and above	85	8		
MENARCHE			1.5639	0.458
14 or less	2 (6.7)	28		
15-17	11 (12.8)	75		
18 and above	8 (16.3)	41		
EDUCATION			1.5916	0.661
No school	3 (7.3)	10		
Tertiary	0 (0.0)	38		
Elementary	5 (9.3)	49		
Secondary	9 (11.3)	71		
OCCUPATION			5.6705	0.225
Artisan	5 (17.2)	24		
Farmer	2 (10.0)	18		
Formally Employed	2 (22.2)	7		
Trader	7 (7.2)	90		
Unemployed	1 (3.5)	28		
ADDRESS			1.2732	0.529
Greater Accra	13 (10.5)	111		
Volta	7 (10.5)	60		
Other	3 (20.0)	12		
MARITAL STATUS			4.1690	0.384
Divorced	4 (17.4)	19		
Has a steady partner	7 (17.5)	33		
Married	5 (6.6)	71		
Single	3 (11.5)	23		
Widowed	4 (10.0)	36		
INCOME LEVEL			1.7490	0.186
No	1 (3.1)	31		
Yes	16 (10.6)	135		
CURRENT CONTRACEPTIVE			0.3301	0.566
No	22 (11.5)	169		
Yes	1 (6.7)	14		
PAST CONTRACEPTIVE			2.9267	0.087
No	17 (14.4)	101		
Yes	6 (6.8)	82		
DURATION OF HIV DIAGNOSIS			8.1975	0.085
< 1 year	10 (20.8)	38		
1 year	2 (10.5)	17		
2 years	2 (14.3)	12		
3 years	4 (8.3)	44		
>3 years	3 (4.6)	63		
DURATION OF HIV MEDICATION			10.0793	0.121
< 1 year	4 (16.7)	20		
1 year	3 (15.0)	17		
2 years	1 (7.1)	13		
3 years	4 (8.5)	43		
>3 years	3 (4.6)	63		
Noncompliant	0 (0.0)	1		

Not started	6 (26.1)	17		

Table 4: Bivariate analyses of relationship between potential risk factors and cervical lesions

	CERVICAL LESIONS			
RISK FACTOR	**YES (%)**	**NO**	**CHI SQUARE**	**P- VALUE**
AGE			**7.9871**	**0.005**
Less than 41	30	15		
41 and above	69	92		
MENARCHE			2.3256	0.313
14 or less	6 (20.0)	24		
15-17	19 (22.1)	67 33		
18+	16 (32.7)			
EDUCATION			3.9258	0.270
No school	7 (17.1)	34		
Tertiary	0 (0.0)	10		
Elementary	14 (25.9)	40		
Secondary	18 (22.5)	62		
OCCUPATION			3.7639	0.439
Artisan	10 (34.5)	19		
Farmer	4 (20.0)	16		
Formally Employed	2 (22.2)	7		
Trader	18 (18.6)	79		
Unemployed	5 (17.2)	24		
ADDRESS			0.7243	0.696
Greater Accra	25 (20.2)	99		
Volta	17 (25.4)	50		
Other	3 (20.0)	12		
MARITAL STATUS			**11.5756**	**0.021**
Divorced	8 (34.8)	15		
Has a steady partner	15 (37.5)	25		
Married	11 (14.5)	65		
Single	5 (19.2)	21		
Widowed	6 (15.0)	34		
INCOME LEVEL			0.7478	0.387
No	5 (15.6)	27		
Yes	34 (22.5)	117		
CURRENT CONTRACEPTIVE			0.6865	0.407
No	43 (22.5)	148		
Yes	2 (13.3)	13		
PAST CONTRACEPTIVE			1.2073	0.272
No	29 (24.6)	89		
Yes	16 (18.2)	72		
DURATION OF HIV DIAGNOSIS			**18.9845**	**0.001**
< 1 year	21 (43.8)	27		
1 year	4 (21.1)	15		
2 years	2 (14.3)	12		
3 years	9 (18.8)	39		
>3 years	7 (10.6)	59		
DURATION OF HIV MEDICATION			**18.0112**	**0.006**
< 1 year	11 (45.8)	13		
1 year	5 (25.0)	15		
2 years	1 (7.1)	13		

3 years	9 (19.2)	38		
>3 years	8 (12.1)	58		
Noncompliant	0 (0.0)	1		
Not started	9 (39.1)	14		

4.5 Logistic regression models for the predictors of cervical lesions among HIV positive women

Among the group of female HIV patients studied, the odds of having a cervical lesion among those who were diagnosed of HIV in the last 1 year was 3.72 (95% CI: 1.78 to 7.76) times higher than the odds of cervical lesions among those who were diagnosed more than 1 year prior, after adjusting for age and marital status. Among the group of female HIV patients studied, the odds of having a cervical lesion among those not married is 2.98 (95% CI: 1.3 to 6.8) times higher than the odds of cervical lesions among those who were married, after adjusting for age and duration of diagnosis. Among the group of female HIV patients studied, the odds of having a cervical lesion among those less than 41 years of age is 2.74 (95% CI: 1.28 to 5.89) times the odds of cervical lesions among those who are at least 41 years old.

Table 5: Logistic regression models for the predictors of cervical lesions among HIV positive women

Risk Factor	Odds Ratio (95% Confidence Interval)	P-value
Age Less than 41 years 41 years or more	2.74 (1.28 to 5.89)	0.010
Marital Status Not Married Married (reference group)	2.98 (1.30 to 6.80)	0.010
Duration of HIV Diagnosis Up to 1 year Over 1 year (reference group)	3.7 (1.78 to 7.76)	<0.001

CHAPTER FIVE

DISCUSSIONS

5.1 Introduction

The study, as per the outlined objectives, obtained the findings that answers the set of the research questions for this study. The discussion compares the observed results with some of the studies reviewed and the related reasons behind some of the observed results.

5.2 Prevalence of cervical lesions and leukoplakia in HIV positive women

The study observed a cervical lesion prevalence of 21.8% and leukoplakia prevalence of 11.2% among the HIV positive women. The observed prevalence among the two key indicators for this study was relatively similar to most of the studies that have been reviewed and discussed below. Largely, as postulated by Gedefaw et al., (2013) in a global review of PEPFAR report and global intervention analysis noted that prevalence of cervical lesions in developing countries have ranged between 20-25% with an average pooled prevalence of 22.1% in a report from different countries. Denslow et al., (2017) in another meta-analysis of a sampled data of 5,882 HIV-positive women observed a prevalence/incidence of cervical lesion among the HIV patients to be between 4.9 to 21.1 cases per 100-woman years for any cervical lesion.

The study by Jolly et al., (2017) in a cross-sectional case-control study on screening, prevalence and risk factors associated with cervical lesions among HIV patients on Swaziland observed a similar results as was obtained in this study. In their study, Jolly et al., (2017) observed that 22.9% of the HIV positive women were having cervical lesion.

Mekuria et al., (2021) also conducted an institutional-based cross sectional study in Ethiopia to assess the prevalence of cervical cancer among HIV patients and women in general. With a

sample of over 400 women, the study observed a prevalence of 23.5% with 10.1% been identified as women with high grade cervical cancer. Weldegebreal & Worku, (2019) also conducted a meta-analysis of various studies that have been conducted in sub-Saharan Africa on the prevalence of cervical cancer among HIV patients. The study observed a prevalence of 25.6% with some studies recording as high as 31.8% (McKenzie et al., 2011).

It is evident from all these studies that the prevalence of cervical lesion in most developing countries have hinge around 20-30% with few of them exceeding 30%. Though the measurement and screening approach may differ from one site to the other, it prevalence of cervical lesion continues to remain a major challenge in developing countries.

On the other part, the observed leukoplakia prevalence of 11.2% among the HIV positive women in the study in Battor Hospital was lower compared to other results. For instance, Naidu et al., (2013) in a study in developing countries noted that more than 60% of the HIV positive women had leukoplakia. Sontakke et al., (2011) also in another study among HIV positive women observed that 32.2% of the women had leukoplakia.

5.3 Risk factors associated with cervical lesions among HIV positive women

The observed results in this study on the risk factors were in conformity with other studies that were reviewed in the literature session of this study. Among the group of female HIV patients studied, the odds of having a cervical lesion were significantly higher among women who were above 40years, women who were not married and duration of HIV diagnosis.

The review of the various risk factors in series of studies showed that prevalence of cervical lesion among HIV positive women is largely determined by maternal age, number of sexual partners, marital status, number of sexual partners and the level of CD4 count in an HIV

positive woman. In reference to this study, risk factors such as number of sexual partners and the level of CD4 count were not observed in this. However, the duration of HIV diagnosis showed significant relation with cervical lesion.

The study by Weldegebreal & Worku, (2019) observed that women who were above 40 years were four times more higher the risk of developing cervical cancer compared to women who were below 20 years. Jolly et al., (2017) also observed that the risk of cervical lesion among the HIV women was significantly influenced by maternal age as observed in this study at North Tongu. Women who were 40+ had higher risk of developing cervical lesion than their colleague women with lower maternal age.

Kiros et al., (2021) also observed that cervical lesion was higher among women who were aged 45+ years compared to women who were below 20 years. Kiros et al., further noted that women who were single and were widowed had higher risk of developing cervical lesion than their colleague women who were married. This result corroborated with the findings in my study where it was noted that HIV positive women who were married had lower risk of cervical lesion. Simo et al., (2021) also did analysis of cervical lesion presence in HIV women and its associated risk factors. The study noted that married women had lower risk of getting cervical lesion than those who were single and married.

Though most of the studies had shown similar risk factors, there was no record of duration of HIV diagnosis showing significance association with cervical lesion among HIV patients. However, the CD4 count had significant relation with cervical lesion. In almost all the studies reviewed, the history of STI and the number of sexual partners had strong relationship with cervical lesion among HIV patients. However, in this, study, these key risk factors were not observed. This was as a result of the absence of these key indicators on the cervical screening

form. The form did not capture information related to the sexual relations (age at first sex and number of sexual partners) and STIs presence. These indicators are regarded as sensitive and may not be responded by the women.

CHAPTER SIX
CONCLUSION AND RECOMMENDATION

6. 1 Major findings and Conclusion

The prevalence of cervical pre-cancer lesions among HIV positive women who were screened with mobile colposcopy in Battor was relatively similar to results observed in other studies in Africa. However, for leukoplakia, the prevalence was relatively lower than the observed results from other studies. Out of the 206 women screened with mobile colposcopy 45 (21.84%) had cervical pre-cancer lesions and 23(11.17%) had leukoplakia. There was a statistically significant association between cervical lesion and risk factors such age, marital status, duration of HIV diagnosis and duration of HIV medications. There was no statistically significant association between leukoplakia and potential risk factors. Mobile colposcopy which is a visual inspection method is feasible, effective, objective and less time consuming and can be used by middle cadre health staff like nurses to prevent cervical cancer among women who test positive.

6.2 Recommendations

Referencing from the outcome of this study, the study proposes the following recommendations in addressing the challenges associated with the high prevalence of cervical lesion among HIV positive women.

Public Health/Clinical Practice:

1. HIV positive women should be counselled about their increased risk of cervical pre-cancer and cancer so that they seek cervical pre-cancer screening services.

2. Mobile colposcopy should be incorporated into cervical cancer screening services especially for HIV positive women to help with objective assessment and quality assurance.

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APPENDIX 1: CONSENT FORM

(Download CHAG-IRB Consent form template)

CATHOLIC HOSPITAL- BATTOR

CONSENT FORM – USE OF INFORMATION / IMAGES IN PUBLICATIONS AND TEACHING

For a patient's consent to publication of information about them and use of information about them in teaching

Name of person described in the report: ……..……..

Doctor In-charge:
…….……..……

I …….... (INSERT FULL NAME) give my consent for information/images about (1) Myself / (2) My relative (DELETE AS APPROPRIATE) to appear in medical publications and in teaching materials.

Understand the following:

1. Every attempt to ensure my anonymity will be taken, including removing my name from publications/scripts. I understand, however, that complete anonymity cannot be fully guaranteed [for example, those who looked after me in hospital or a relative maybe able to identify me from the details of my case].

2. The information will not be used for advertising purposes nor used out of context.

3. I can revoke my consent but only before the information has been sent to the publisher, uploaded to a website or in any other way e-published.

Signed…….

Date……

APPENDIX 2: INTRODUCTORY LETTER

UNIVERSITY OF GHANA
DEPARTMENT OF POPULATION, FAMILY AND REPRODUCTIVE HEALTH
SCHOOL OF PUBLIC HEALTH

Ref No.: .....

9th August, 2021

The Medical Superintendent
Catholic Hospital
Battor

Dear Sir/Madam,

LETTER OF INTRODUCTION
ETHEL TEKPOR

I write to introduce to you **Ethel Tekpor,** an MPH Student with the Department of Population, Family and Reproductive Health, School of Public Health, University of Ghana, Legon.

As part of her academic requirement, she is undertaking a research on the topic **"Assessment of Cervical Lesions among HIV Positive Women Using Mobile Colposcopy in Battor, Ghana".**

She would need assistance on pertinent information in your facility to enable her carry out her research work successfully.

Your cooperation would be very much appreciated.

Thank you.

Yours faithfully,

Prof Kwasi Torpey
(Head of Department)

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APPENDIX 3: ETHICAL APPROVAL