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FACTORS CONTRIBUTING TO ANTIRETROVIRAL THERAPY ADHERENCE AMONG ADOLESCENTS AND YOUNG PERSONS LIVING WITH HIV IN FIVE HEALTHCARE SETTINGS IN GREATER ACCRA REGION

BY

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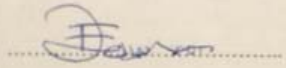
DECLARATION

I, Frances Odofuorkor Lawson hereby declare that this dissertation is my work and that all literature used have been duly acknowledged. This study has not been submitted to any institution for the award of any certificate.



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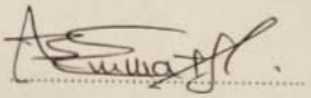

18th October, 2021

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DEDICATION

I dedicate this work to the Almighty God for the grace, good health and strength to be able to conduct this research.

ACKNOWLEDGEMENTS

I am most grateful to the Almighty God for the guidance and good health throughout my studies. I extend my appreciation to my academic supervisor for his time, guidance and contribution to this work. Finally, I sincerely thank my husband, children, friends and all others who also contributed, I say thank you and God bless you.

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LIST OF ABBREVIATIONS

AIDS	-	Acquired Immune Deficiency Syndrome
ALHIV	-	Adolescents Living with HIV
ART	-	Antiretroviral Therapy
CI	-	Confidence Interval
HIV	-	Human Immunodeficiency Virus
NACP	-	National AIDS Control Programme
PI	-	Principal Investigator
PLHIV	-	People Living with HIV
SDGs	-	Sustainable Development Goals
STI	-	Sexually Transmitted Infection
UNICEF	-	United Nations International Children Emergency Fund
USAID	-	United States Agency for International Development
WHO	-	World Health Organisation

DEFINITION OF TERMS

- Adolescence is a period of evolution from childhood to adulthood.
- Adolescent: Any individual who is aged 10 to 19 years.
- Early adolescence: This is individuals aged 10 to14 years.
- Late Adolescence: This is individuals aged 15 to 19 years.
- Post Adolescence: This is individual aged 20 to 24 years.
- Young persons: This term refers to individuals between age10 and 24 years.
- Adherence to antiretroviral therapy: This refers to a client's capability to observe treatment regimen as prescribed to achieve viral load count of 1000 copies/ml or less.

ABSTRACT

Objective: Non-adherence with antiretroviral therapy among adolescents remains a major global challenge. This study sought to determine factors contributing to antiretroviral adherence amongst adolescent and young people living with HIV in five healthcare settings within the greater Accra region of Ghana.

Methods: Cross-sectional design was employed and a structured questionnaire was used to collect data on participants' sociodemographic factors, sexual characteristics, individual clinical factors, health facility-related factors, and community factors. All adolescents and young people living with HIV, aged 10 – 24 years, who were on ART for 6 months or more and had Viral load test done within the past 12 months were included in the study upon personal and parental consent. ART Adherence was determined using a recent viral load count of fewer than 1000 copies/mL. Bivariate analyses were conducted and significant variables were included in binary logistic regression analysis at a 95% confidence interval.

Results: There were 215 adolescents and young people involved in this study. Their median age was 17 years (interquartile range: 13-23 years). There were more females (52.6%) than males (47.4%). Adherence to ART using recent viral load counts was 69.9% (95% CI: 59.5% - 79.0%). The means of follow up was contributing to antiretroviral therapy adherence amongst adolescent and young people living with HIV (AOR=2.32, 95% CI: 1.19-4.47, p=0.013).

Conclusion: Adherence to antiretroviral therapy was suboptimal (<95%). Follow-ups should be intensified among adolescents and young people living with HIV to improve the effectiveness of antiretroviral therapy in achieving viral suppression.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

One of the major public health challenges distressing people both young and old globally in their industrious stage of life is the Human Immunodeficiency Virus (HIV) or Acquired Immune Deficiency Syndrome (AIDS) (WHO, 2019). The introduction of the Sustainable Development Goals (SDGs) has inspired new energies to bring an end to the over 40 years HIV/AIDS epidemic that was responsible for an estimated 770,000 (570, 000 – 1,100,000) deaths globally in 2018 (WHO, 2019). Meanwhile, 75 million people have been infected with the virus and about 32 million people have died since the beginning of the HIV/AIDs epidemic (WHO, 2019). Even though there is a continuously varied burden of epidemics between countries and regions, 37.9 million (32.7 – 44.0 million) people were living with HIV globally of which an estimated 0.8% (0.6-0.9%) were adults aged 15–49 years as at the end of 2018 (WHO, 2019). In Ghana 330,000 adults and children were estimated to be living with HIV of which 310,000 (260 000-350 000) were adolescents and adults representing 93.9% of HIV infections (UNAIDS, 2018).

The World Health Organization (WHO) describes adolescents as "individuals aged 10-19 and young persons as those aged 10-24 years". Early adolescents refer to individuals aged 10-14 years while late adolescents and post adolescents refer to those aged 15-19 years and 20-24 respectively (WHO, 2011). Adolescence was defined as "a period of transition from childhood to adulthood during which adolescents develop biologically and psychologically and move towards independence" (WHO, 2011). It is identified as the "period of mental, physical, and emotional state changes, that is commonly marked by behavioral experimentation, identity formation, risk-taking, and difficult choices on romantic

relationships, sexual behavior, alcohol and recreational drug use" (Mwale & Muula, 2017; Mavedzenge, Doyle, & Ross, 2011).

Although adolescents are seen as healthy people, they are vulnerable to sexual violence as well as peer pressure. Their vulnerability has made them the "center of the HIV/AIDS epidemic" (Kim et al., 2014). Many of them also die prematurely through accidents, suicide, violence, and pregnancy-related complications (WHO, 2011). Sexually transmitted infections (STIs), like HIV, have their roots in adolescents' behavior (WHO, 2011).

Adolescents and young people represent a growing share of people living with HIV worldwide (UNICEF & UNAIDS, 2016). In 2018 alone, 510,000 (300,000-740,000) young people aged 10 to 24 were infected with HIV anew, of whom 190,000 (59,000-380,000) were adolescents between the ages of 10 and 19 (UNICEF/UNAIDS, 2018). Approximately 6.1% of the 1.6 million adolescents living with HIV/AIDS were female living in sub-Saharan Africa (UNAIDS, 2017). Also, according to Dowshen, Kuhns, Johnson, Holoyda, and Garofalo (2012), the number continues to grow higher mainly due to ongoing mother-to-child transmission, increased survival as a result of antiretroviral therapy (ART), and sexual transmission among adolescents. While mortality in people living with HIV (PLHIV) in all other age groups is decreasing, that of adolescents living with HIV is increasing (Dowshen et al., 2012). While HIV-related health outcomes had improved for other age groups, they had worsened for adolescents. Another study also indicated that whilst there has been an improvement in other age groups with HIV related health problem that of adolescents is worse. (UNICEF/USAID 2018).

Suddenly everyone, from local-level programmers to national policymakers, is discussing how to do more for adolescents, so that young boys and girls could avoid HIV infection or live positive, healthy lives with HIV (WHO, 2011). Anti-Retroviral Therapy (ART) has been

noted to improve the quality of life of PLHIV worldwide (WHO, 2011). In countries where ART has been widely made available, drastic reduction in HIV-related morbidity and mortality has been notices. According to the WHO, Acquired immunodeficiency syndrome (AIDS) is now a manageable chronic illness according (WHO, 2011). To achieve optimal results from ART, high levels of patient adherence to ART is essential. High levels of adherence to ART (at least 95%) are needed to ensure optimal benefits (Achappa et al., 2013).

Adherence has been defined as a patient's ability to follow a treatment plan, take medications at prescribed times and frequencies, and follow restrictions regarding food and other medications (Sahay et al., 2011). Suboptimal adherence to ART may ultimately lead to failure of the primary regimen. A systematic review suggests that adolescents have poor adherence to ART in Europe, America, Asia, and Africa, compared to adults (Kim et al., 2014).

Ameliorating the burden and toxicity of the ART medications would improve treatment adherence among adolescents (Kim et al., 2014). Among adolescents, non-adherence to antiretroviral therapy (ART) leads to too many challenging health outcomes. They become prone to secondary infections and subsequently develop resistance to viral strain, which reduces their life expectancy (Dowshen et al., 2012).

Some factors have been identified in studies to influence adolescents and young people's behavior and attitude towards antiretroviral therapies. A recent study suggested that unfavorable school timetables, peer influence, and lack of family support especially from caregivers are risk factors for loss to follow-up in HIV care in Tanzania (Mosha, Nsanzugwanko, Ezekiel, & Metta, 2018). Additionally, increasing age was associated with an elevated risk for loss to follow-up in HIV care in Zimbabwe (Mosha et al., 2017). However, a

study carried out to ascertain factors accounting for poor adherence in an urban health facility in Ghana mentioned being a Muslim, having CD4 count less than 250 cells/mm^3 and completing adherence counseling to be some risk factors influencing loss to follow-up in HIV care, but having good sources of health care funding and disclosure of one's disease status to individuals were found to be protective (Sifa et al., 2019). Also, children of caregivers with a higher level of education positively correlate with better adherence (Nichols et al., 2019). According to Cruz and his colleagues (2014), adolescents who did not adhere to ARTs were 22% and the most common factor that influenced adolescents' non-adherence was religious beliefs (Cruz, Cardoso, Darmont, Souza, Andrade, Fabbro, et al., 2014). Amid these findings, an online literature search suggests a lack of published data on the determinants of ART adherence among adolescents and young people living with HIV/AIDS in Ghana.

Ghana currently lacks a policy on how to retain HIV patients on treatment. The current policy only specifies how the ART should be administered without providing directives for improving ART compliance (UNAIDS, 2013). Additionally, the current guidelines for HIV Care in Ghana, states that any client whose Viral Load (VL) is not suppressed has to be assessed for adherence and given enhanced adherence counseling. Adherence should therefore be monitored using self-reports, pill counts, or pharmacy records. However, the levels of VL can be a good predictor of disease progression to AIDS and for those on Antiretrovirals (ARVS) as an indicator of response to Antiretroviral Therapy (ART) (Ghana Health Service & National AIDS/STI Control Programme, 2019). Despite these, there are interventions such as free ART, continuous counseling services, periodic monitoring of VL, case tracing, and role modeling that is being championed by the National AIDS Control Programme (NACP) all to ensure PLHIV achieve VL suppression which indicates their adherence level (Ghana Health Service & National AIDS/STI Control Programme, 2019). Unfortunately, there is a rising trend of non-adherence (Addo et al., 2014). The current trend

must therefore be halted and reversed to realize positive health outcomes. This study sought to identify factors contributing to ART adherence using VL among adolescents and young people living with HIV/AIDS in five healthcare settings in the Greater Accra region of Ghana.

1.2 Problem Statement

According to Joint United Nations Programme on HIV and AIDS (UNAIDS) "90-90-90" strategy to reduce the HIV pandemic by the year 2030, 90% of all people living with HIV must know their HIV status, 90% of those diagnosed with the disease must be on antiretroviral therapy (ART) and 90% of those on ART should achieve viral suppression (UNAIDS, 2014). However, by June 2019, 24.5 million (21.6 million - 25.5 million) people were accessing antiretroviral therapy though 37.9 million (32.7 million - 44.0 million) people globally were living with HIV (as of the end of 2018). This accounts for only 64% of people living with HIV (PLHIV) on ART (UNAIDS, 2019). In 2018, only 62% (47–74%) of all PLHIV were accessing ART treatment. Among these were adolescents aged 15 years and older and children aged 0–14 years (UNAIDS, 2019).

Worldwide HIV/AIDS remains the leading cause of death among adolescents, claiming the lives of 41,000 adolescents aged 10-19 in 2015. Weekly, it was estimated that 6000 young women aged 15–24 years become infected with HIV (UNICEF & UNAIDS, 2016).

In sub-Saharan Africa, four in five new infections among adolescents aged 15–19 years are girls, meanwhile young women aged 15–24 years are twice as likely to be living with HIV than boys (UNAIDS, 2019).

In Ghana, the 2014 national HIV prevalence among adolescents 15-19 years was 0.3% and 1.5% for young people aged 20-24 years (GSS; GHS; ICF International, 2015). However, HIV prevalence was 0.7% for adolescents aged 15-19 years, 1.3% for young people 20-24

years but 1.1% for those aged 15-24 years in 2015 (National AIDS/STI Control Programme & Ghana Health Service, 2016).

Furthermore, HIV/AIDS-related deaths among adolescents have increased over the past decade while decreasing among all other age groups (UNICEF & UNAIDS, 2016). It is worth noting that adolescents with HIV go through psychosocial stress that may be related to the initial diagnosis and disclosure of their HIV status. They are faced with challenges of stigma and discrimination as well as the emotional and financial strain of long care resulting in poor or non-adherence to ART treatment (Petse et al., 2018).

Although coverage of antiretroviral therapy has improved significantly, adherence to ART remains a challenge. Adolescents and young people living with HIV/AIDS, with non-adherence to ART can lead to poor health outcomes that significantly decrease life expectancy (Petse et al., 2018). It is recommended that more than 95% adherence to ART is required for effective therapy (UNAIDS, 2013). This study sought to identify factors contributing to ART adherence using Viral Load (VL) among adolescents and young people living with HIV/AIDS in five healthcare settings in the Greater Accra region of Ghana.

1.3 Justification for the study

Addressing adherence to ART is critical for eliminating the HIV/AIDS outbreak. It prevents drug resistance and reduces estimation biases (Van Cutsem et al., 2011). The study would add to the literature since the only available research article on adherence to ART in Ghana was carried out among children aged from 7-18 years which may not apply to adolescents and young people, despite the age classifications overlap.

The significance of this study is to add to the literature and inspire efforts to develop policies aimed at improving adherence since there is no policy guide on how to prevent or manage

non-adherence with ART in adolescents and young people living with HIV. Given this, the study findings will be disseminated to relevant stakeholders in the country.

In the same vein, the study forms the basis for further researches, especially at the national level. The findings of the study will be of immense benefit to the ART clinic in the hospital, NACP, and Ghana AIDS Commission, just to mention a few. Also, the research report will serve as a point of reference for learning institutions and health promotion activities.

1.4 Conceptual Framework

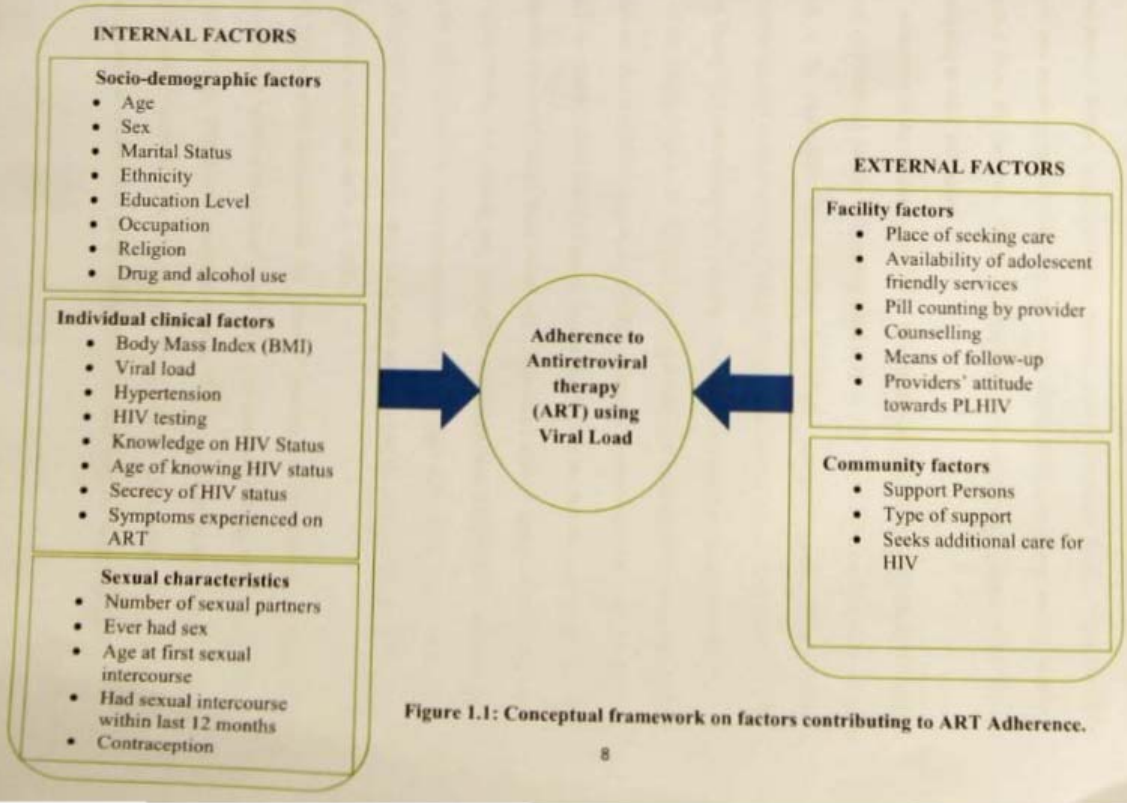

Figure 1.1: Conceptual framework on factors contributing to ART Adherence.

1.4.1 Description of the conceptual framework on adherence

The World Health Organization identifies five interacting dimensions of adherence including patient-related factors, social/economic factors, condition-related factors, therapy-related factors, and health system/healthcare team(WHO, 2003). With such factors and other factors identified from the literature, figure 1 above depicts the conceptual framework on factors contributing to ART adherence.

ART adherence is the outcome variable in this framework. This is directly affected by both internal and external factors influencing adherence to ART. The internal factors are closely related to the individual. These include individuals' sociodemographic factors, sexual characteristics, and clinical factors whereas the external factors include both health facility-related factors and community-level factors. The sociodemographic factors include age, sex, level of education, religion, working to earn money and type of occupation, drug, and alcohol use. Sexual characteristics include the number of sexual partners one has, ever having sex, age at first sexual intercourse, had sexual intercourse within the last 12 months, and the type of contraception used during such sexual act. Individual clinical factors such as their body mass index (BMI), VL counts, any comorbid conditions like hypertension, whether they tested for HIV voluntarily, their current knowledge on their HIV status, age at which they knew their HIV status, whether they want their status to remain secret or not and if they had experienced any changes while on ARVs.

Facility factors examined included the place of seeking care, availability of adolescent-friendly services, whether providers' count pills, provided counseling, and followed clients up as well as their attitude and reactions towards PLHIV. The Community factors included who their support persons were and the type of support the adolescents and young person receives as well as whether they sought care elsewhere apart from the health facilities.

1.5 Research Questions

1. What is the proportion of adolescents and young people adhering to ART?
2. What sociodemographic factors affect ART adherence among adolescents and young persons living with HIV?
3. What is the adolescent's opinion and knowledge level on HIV/AIDS?
4. What other factors contribute to adherence of ART among adolescents and young persons living with HIV?

1.6 General Objective

To identify factors contributing to ART adherence among adolescents and young persons living with HIV using viral load counts in five healthcare settings in the Greater Accra Region.

1.6.1 Specific Objectives

1. To determine the proportion of adolescents and young persons adhering to ART using viral load counts.
2. To assess the socio-demographic factors that affect ART adherence among adolescents and young persons living with HIV.
3. To assess knowledge and opinions on HIV/AIDS, among adolescents and young persons living wth HIV.
4. To determine other factors that contribute to ART adherence among adolescents and young persons living with HIV.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Brief history of HIV/AIDS

The earliest cases of HIV/AIDS were found in Los Angeles on June 5, 1981. The cases were initially suspected of Human-T-lymphotropic virus (HTLVI) and Cytomegalovirus (CMX) and were among white raced men who had sex with men with a history of multiple sexual partners and nitrite drug use (Kandwal et al., 2009). Within months of searching for its etiology, the syndrome was identified in heterosexuals, persons with hemophilia, blood transfusion recipients, injection drug users, child abuse, rape victims, health workers with a history of the needle prick, Africans, Latin Americans, Asians, just to mention a few (Weber, 2001). By 1985, over 17,000 cases were reported in over 71 countries to WHO in Geneva and the numbers kept increasing. Prevalence of the epidemic remains highest in men who have sex with men (Kandwal et al., 2009).

Africa recorded its first HIV/AIDs case in 1983. HIV/AIDS was however denied in many sub-Saharan countries till prominent people started dying of the disease (Kharsany & Karim, 2016). Before 2001, men bored the highest burden of the disease, however, the current trend shows women bearing about 61% of HIV/AIDS prevalence in sub-Saharan Africa. About 90% of all children living with the virus are found in the region; the virus was acquired from their mothers (Kabudula et al., 2016; Lewden et al., 2014).

Ghana recorded the first incidence of AIDS in 1986 (Photius, 2004). A detailed report in 1991 shows there were 107, 333, and 2,744 PLHIVs in 1987, 1988, and 1990 respectively (Photius, 2004). From WHO 1990 report, 1,224 people had contracted AIDS. By 1994, 12,500 AIDS cases and about 300,000 PLHIV were identified, with Ashanti Region bearing the highest burden. In terms of socio-demographic characteristics, 70% were female and

64% of AIDS cases were 15-45 years of age (Photius, 2004). Since then, the publicity on the epidemic was heightened. From 2004 to 2014, the prevalence of HIV has remained at 2% among 15-45 years (Photius, 2004).

2.2 Epidemiology of HIV/AIDS in Sub-Sahara Africa and Ghana

HIV/AIDS is caused by the human immunodeficiency virus (HIV) and has humans as its reservoir (Heymann, 2004). It is transmitted through unprotected intercourse, contact of abraded skin or mucosa with body secretions such as blood, CSF, or semen; the use of HIV contaminated needles and syringes including sharing intravenous drug users, and the transplantation of HIV-infected tissues or organs. HIV can also be transmitted from mother to child through the placenta and breastfeeding (Heymann, 2004).

With the introduction of ARVs and the expansion of ART programs, Sub-Saharan Africa has enjoyed decreasing incidence rates and AIDS-related deaths. Despite the achievements, sub-Saharan Africa accounts for 71% of PLHIV and 74% of AIDS-related deaths. South Africa (23%), Nigeria (15%), Uganda (10%), Mozambique (8%), and Kenya (7%) host the largest number of PLHIVs (Kharsany & Karim, 2016; UNAIDS, 2014). Women constitute 58% of PLHIVs and the majority of victims who died from HIV-related deaths. Most at risk also comprise of men who have sex with men(MSM), sex workers, and people who inject drugs (Kharsany & Karim, 2016).

The average prevalence of HIV in Ghana has remained at 2% since 2004 among the 14-45 years age population, with significant variations across the country. HIV prevalence among pregnant women has been above 1% over the past seven years. By the end of 2015, there were 274,562 PLHIVs, with women constituting about 60% and 89,113 people on ART. New HIV infections stood at 12,635 persons in 2015. The country recorded total annual AIDS deaths of 10,958 in the same year. HIV testing increased from 21% for women and 14% for

men in 2008 to 43% and 20% for women and men in 2014 respectively(Ghana AIDS Commission, 2016).

2.3 Adherence to antiretroviral therapy among adolescents and young people

A systematic review and meta-analysis using data from 50 countries suggest that the lowest average ART adherence was in North America, Europe, and South America and, with higher levels in Africa and Asia (Kim et al., 2014). In the same way, long-term adherence in adolescents was examined in Uganda. They carried out 24 in-depth interviews and 2 focus group discussions with a total of 33 health-care providers and expert clients (HIV patients on long-term ART who assist with adherence support of fellow patients). Challenges of adolescents adhering to ART were side effects, the supply of single tablets in place of fixed-dose combined drugs, the supply of drug brands with unfavorable taste, and missed opportunities for counseling due to shortage of staff (Inzaule et al., 2016).

The length and frequency dosing gaps were compared between boys and girls on ART in Botswana. They were monitored for 2 years with medication event monitoring systems (MEMS). Median adherence was 95.6 % for males and 95.7 % for females. There were no significant gender differences in the number of ≥7 days and ≥14-day ($p = 0.48$) dosing gaps. The median maximal gap was 7.7 days for males and 8.0 days for females ($p = 0.47$) (Ioannides et al., 2017).

A study examined the relationship between psychological distress and ART adherence, and the effect of psychosocial resources on ART adherence. The cross-sectional surveys included 464 adolescents living with the virus and were seeking HIV care at a large HIV treatment Centre in Kampala, Uganda. Psychosocial resources included spirituality, religiosity, optimism, social support, and coping strategies. It was found out that, the unit increasing in psychological distress was associated with increased odds of missing pills in the past 3 days

not following the prescribed regimen and lower self-rated adherence. Psychosocial resources were associated with lower odds for non- conducted in Korle- Bu Hospital to identify facilitators and barriers to adherence on all three self-report measures (Mutumba et al., 2016).

A study was conducted on antiretroviral treatment adherence among adolescents in Ghana. Using a cross-sectional qualitative study adopting semi-structured interviews for data collection was carried out among adolescents (aged 12–19 years). The study involved 19 interviews. The findings suggested that support from health care providers, parental support, patient's knowledge of disease and self-motivation, the patient's perceived positive outcomes, and dispensed formulation, contribute to ART adherence among adolescents and young persons living with HIV. The identified barriers were the patient's forgetfulness to take medicines, perceived stigmatization due to disclosure, financial barriers, and adverse effects of ART. Support from health care workers was the most frequently mentioned facilitator, and patient's forgetfulness and perceived stigmatization after the disclosure was the most frequently mentioned barriers (Ankrah et al., 2016).

Other studies on adherence show that accessing antiretroviral and adherence is found to be higher in the adult population than in adolescents (Kim et al., 2014). A previous review indicated that adherence to ART among HIV-infected youth ranges from 28.3 to 69.8% in the USA. This is an update use in finding adherence of adolescents and young people at a global level (Xu et al., 2017).

Drug adherence enhanced viral suppression when 95% required level of antiretroviral treatment are used as prescribed (ART Guidelines for Adult and Adolescents, 2016). Once initiated on treatment, enhanced adherence to ART for adolescents living with HIV is being stressed (Ghana Health Service & National AIDS/STI Control Programme, 2019). Evidence has proven that adherence is strongly correlated with viral suppression through achieving

ART adherence and viral suppression remains a challenge in LMIC. They also limit the rate of drug resistance and increase survival and life expectancy (Reif et al., 2020).

A study revealed that due to the availability and effectiveness of ART infected children are now continuing to live to adolescence and emerging as a new group in the global HIV/AIDS pandemic (Xu et al., 2017).

2.4 Socio-Demographic Factors Contributing to ART Adherence

Globally, in 2015, there were an estimated 250,000 new HIV infections in adolescents aged 15-19. Of these, nearly 220,000 or 86 percent were in the 25 lead countries in the ALL-IN initiatives. Both globally and across this set of 25 countries, the decline in new HIV infections in adolescents has been extremely slow since 2010 (UNICEF & UNAIDS, 2016). Into the third decade of the HIV/AIDS epidemic, 34 million people are living with HIV in the world, of whom five million are aged between 15 and 24 years (Kim et al., 2014). Globally, in 2015, an estimated 41,000 adolescents aged 10-19 died from AIDS-related illnesses. Of these, the overwhelming majority (nearly 36,000 or close to 83 percent) were in the 25 lead countries in the ALL IN initiative (UNICEF & UNAIDS, 2016).

Acquired immunodeficiency syndrome is the main reason for death in African adolescents aged 10-19 years. 1 out of 2 million human immunodeficiency virus (HIV)-positive adolescents worldwide, 82% live in Sub-Saharan Africa (SSA) (Kim et al., 2014).

Then in 2014, the HIV community was confronted by new modeling indicating that AIDS was the leading cause of death for the 10-to-19 age group in Africa, and the second most common cause of death among adolescents (UNICEF & UNAIDS, 2016). Adolescents acquire HIV either vertically from their mother or horizontally through sexual contact or risky behavior. Adolescent girls and young women (15-24 years) are twice as likely to be at

risk of HIV infection compared to boys and young men in the same age group worldwide (Wong et al., 2016).

As is the case throughout ESAR, the data indicated that from the age of 15, girls are significantly more likely to contract HIV than boys of the same age. It also revealed a growing number of AIDS-related deaths among adolescents aged 10 – 19, with 4,400 deaths in 2016, a 76 percent increase since 2010 (UNICEF & UNAIDS, 2016)

Similarly, a higher rate of HIV has been reported among females than males in Sub-Saharan Africa (Namoomba et al., 2019).

UNICEF reported that the Sub-Saharan region has a prevalence rate of HIV in females between the age of 15-17 years four times higher than among their male counterparts (UNICEF & UNAIDS, 2016). According to other findings of a study, in the United State and part of Europe, the highest prevalence rate of HIV was reported among males (UNICEF 2014). The prevalence rate among male adolescents could be higher in developed settings because of injectable illicit drug abuse using one needle by a group of peers. This practice contributes to the high rate of HIV among male adolescents (Centers for Disease Control and Prevention, 2014). The study discusses that 53.2% of the respondents were between the ages of 16-17 years and 52.6% had attained secondary school education (Namoomba et al., 2019). Though HIV-positive adolescents have a challenge living with their condition, a study cited that they have remained focus on their education(Xu et al., 2017). This study again cited that 99% of respondents were living with their family that is biological parents, grandparents, uncle, or aunty.

2.5 Knowledge about HIV/AIDS and ART Adherence

In a previous study, the findings suggested that support from health care providers, parental support, patient's knowledge of disease and self-motivation, perceived positive outcome

(Ankrah et al., 2016). According to Zambian Consolidated Treatment and Prevention Guideline, health education could easily be done at adolescents – friendly corner, but there is quite a limited number available in most of the care centers (MOH 2014). This may therefore lead to a low level of knowledge about HIV and other related diseases. Through the efforts of the Zambian Ministry of Health in collaboration with the International Center for AIDS Care and Treatment Program, a curriculum has been developed. This move could also mean that the process of intervening to promote adherence to ART among adolescent patients can easily be universally applied to improve knowledge on HIV/AIDS.

A study reported that the overall level of comprehensive knowledge of HIV/AIDS remains very low among older adolescents aged 15-19 (UNICEF, 2012). However, the findings of some studies indicated that HIV-infected adolescents prove good knowledge concerning the disease and ART and also the consequences of developing drug resistance with poor ART adherence (Xu et al., 2017).

Though some reports stated that HIV positive adolescents have good knowledge of HIV/AIDS, non-adherence and treatment failure have remained prevalent in this age group. They are therefore obliged to be adherent to their treatment to prevent the disease from progressing and also drug resistance (Namoomba et al., 2019). Another study also indicated that having an understanding of the importance of taking ART could have positively influenced adherence to ART among HIV-positive adolescents (Namoomba et al., 2019). Having understanding means adolescents being able to explain information about HIV better and also being able to predict any undesired results when there is poor adherence to ART (Namoomba et al., 2019). Caregiver support is also a major process that eases adherence among adolescents with chronic disease. This needs intensive education on the causes of their chronic disease (Mugo et al., 2016).

2.6 Clinical Factors Contributing to ART Adherence

Significant improvement has been made in age-disaggregated reporting on treatment coverage in adolescents over the last two years. At least 67 countries have now provided data on the proportion of adolescents (aged 10-19) living with HIV (ALHIV) that has been reached with ART. However, the median ART coverage in adolescents across these countries is only 20 percent, indicating once more the gap between the 90-90-90 target in adolescents and current program performance. Global scale-up and quality improvements in ART for pregnant mothers (currently at 77 percent) and pediatric ART (0-14 years, currently at 49 percent will lead to an increasing number of children) (UNICEF & UNAIDS, 2016).

The few studies on adherence show that access to antiretroviral and adherence is lower in adolescents than in the adult population. There has been one previous review of ART adherence among HIV-infected youth, which showed adherence rates ranging from 28.3 to 69.8% in the USA. A study report indicated that the long-term effects of antiretroviral medication exposure and multi-class drug experience - including implications for metabolism, growth, and development - are still poorly understood.

The nutritional needs of ALHIV are similar to those of other adolescents. Health providers noted that there is an increased caloric requirement in ALHIV due to their chronic illness. It was again noted that, since many ALHIV are orphans and/or living in poverty, they are also more prone to malnutrition. With informants' report that taking medication on an empty stomach is noted to have a great effect on adherence. Many ALHIV peers who can draw on their own experiences may stop taking their medications completely when they do not have enough food to eat. One physician in Mozambique highlighted the importance of proper nutrition for ALHIV.

Many programs have tried to curb these challenges by providing porridge or full meals during clinic appointments, and maize and soya flour for ALHIV to take home. For qualifying ALHIV who are malnourished, some clinic provides Plumpy Nut (a high-protein, high-energy with invaluable opportunities for training peanut-based paste) in the form of Ready to Use Therapeutic Feeding Packets (RUTF) (Pettit et al., 2016).

Given that inadequate resources often limit feeding of all patients, many programs provide complementary services like immunizations against vaccine-preventable diseases, vitamin supplementation, dietician consultation, nutrition education, and income-generating activities that can help adolescents access food (Pettit et al., 2016).

ALHIV often have complex medical histories and are prone to various acute HIV-associated medical disorders such as tuberculosis, lipodystrophy, nephropathy, and certain neuropathies. A study indicated that a peer educator who has long-term effects of ART and had experience multi-drug exposure was employed and put on salary at the center to provide peer counseling on implications and poor developments which is still not understood by adolescents (Pettit et al., 2016).

A study aimed to evaluate treatment adherence among perinatally HIV-infected children and adolescents based on viral suppression and ART missed doses outcome, and to explore possible barriers to satisfactory adherence among the Brazilian population (Cruz, Cardoso, Darmont, Souza, Andrade, D'Al Fabbro, et al., 2014). Many studies comparing viral suppression between adolescents and adults concluded that adolescents are less likely to achieve viral suppression than the adult population (Kim et al., 2014).

A systematic review identifying factors that enable and impede antiretroviral adherence among ALHIV in Sub-Saharan Africa indicated religious beliefs and intimate relationships as factors impacting ART adherence among ALHIV (Ammon et al., 2018).

2.7 Facility Level Factors Contributing to ART Adherence

In Zimbabwe, one out of every three adolescents living with HIV aged 15-19 feared being gossiped about, and adolescents were more likely than any other age group among PLHIV to feel ashamed of their infection, blame others for it, feel suicidal and exclude themselves from social gatherings with other adolescents (UNICEF & UNAIDS, 2016).

Results in Malawi showed high levels of self-stigma among young people living with HIV. However, they also showed that young people living with HIV aged 15-24 were more likely than other age groups to have been denied sexual and reproductive health services from ages 15-19 and to have had to change their place of residence (UNICEF & UNAIDS, 2016).

A 2015 report from Vietnam noted that much more effort was still needed to end stigma and ensure access to care and support for all at risk and affected by HIV. However, this report also showed that self-stigmatization and experiences of community and social stigma and discrimination had decreased significantly since the previous assessment in 2011. This report urged continued action in the form of community outreach, support groups, community education on rights, and the involvement of people living with HIV, to continue to reduce and work towards the elimination of stigma and discrimination (UNICEF & UNAIDS, 2016). They also have limited access to health facilities (Kim et al., 2014).

Besides, many aspects of the clinical care environment are seen to pose significant barriers to high-quality care for ALHIV, particularly providers with little ALHIV-specific training and services that are not adolescent-friendly (Pettit et al., 2016).

To address this gap, some institutions train all of their health care workers, regardless of whether they work in pediatrics or adult care, on how to provide optimal care for adolescents. Alongside ALHIV involvement, informants emphasized that institutions should look towards creating clinical environments that are adolescent-friendly. They explained that many ALHIV

no longer feel happy in pediatric clinic surrounded by children's books and toys, neither are they comfortable sitting in a waiting room alongside their elders. Many facilities interviewed have specific days for adolescents or have certain areas or hospital wings where adolescents can go to wait for care.

In addition to the traditional staff of doctors, nurses, and counselors, many facilities are also pushing for greater involvement of ALHIV expert patients and peer educators (Pettit et al., 2016).

All of the informants noted that non-adherence to medication is a key challenge faced by ALHIV who receive ART. They noted that many adolescents keep HIV a secret, making it difficult to find the privacy to take medication on time or when in public places. For those whose HIV status is known, they risk discrimination from peer's clinic, teachers, and other community members. Several peer educators interviewed discussed non-adherence as a direct impact of this type of discrimination. One physician discussed the facility- and provider-level challenges to supporting adolescents with adherence as huge which need to be addressed comprehensively with counseling (Pettit et al., 2016).

Indeed, both provider and peer educator stressed that many ALHIV is more comfortable and open discussing issues of adherence, alongside other sensitive issues, with peers who can draw on their own experiences during counseling. An informant from Zimbabwe described the impact of training community adolescent treatment supporters (CATS) on the provision of counseling and adherence monitoring for ALHIV.

Peer support is a view as a powerful mechanism and a key component of a holistic package of services for ALHIV. One of the most structured and widespread support groups mentioned by informants is the network of "Teens Clubs" operated through the Baylor International Paediatric AIDS Initiative. With a site in Botswana, Uganda, Malawi, Swaziland, Lesotho,

and Tanzania, it is described as the largest global network of peer support groups for ALHIV and was cited as a promising practice by multiple informants (Pettit et al., 2016).

In a finding of a study report, 94.8% of respondents had a quality and satisfactory social support. The report indicated that the clinic had resources and an encouraging environment that helps adolescents with the right skills to deal with challenges (Namoomba et al., 2019). Other scholars also reported adequate social support. They found out that the support that adolescents get enhanced their ability to adhere to ART the absence of social, physical, and psychological support will create difficulty for an adolescent to access health care services (Wood et al., 2018).

2.8 Community Level Factors Contributing to ART Adherence

Adolescence is a critical life stage characterized by rapid biological and social changes. Adolescents require targeted HIV programs, but as recently as 2014 many adolescents had only limited access to information, services, and testing. Sustained adherence to therapy is the most important determinant of successful treatment and is especially challenging among HIV-infected children and adolescents due to reasons such as dependency on caregivers, attitudes of defiance/denial, and delay in diagnosis disclosure to children (Cruz, Cardoso, Darmont, Souza, Andrade, Fabbro, et al., 2014).

Besides, countries lacked critical information and data on adolescent health, including the socio-economic factors that contribute to HIV infection, age- and sex-disaggregated data, modes of HIV transmission, barriers to treatment adherence, and access to antiretroviral therapy and other services (UNICEF & UNAIDS, 2016).

Some institutions however find a family-based approach to be most effective in providing clinical care and support for ALHIV. An informant from Uganda explained how the family model has helped to foster communication and bonding between parents and adolescent

children. Drug access is also constrained by patient-level factors with many clients lacking the money for transport, visitation fees, or other costs of attending clinic appointments. Some hospitals and clinics can subsidize adolescents' travel to and from services. Those organizations that can provide transportation assistance for their patients report substantial improvement in retention in care (Pettit et al., 2016).

Socio-cultural belief is said to harm conversational drug adherence which could result in poor treatment outcomes (Namoomba et al., 2019). Mugo and colleagues found that lack of social support for adolescents living with HIV from caregivers, friends, or clinicians could lead to non-adherence to ART and then result in virologic treatment failure (Mugo et al., 2016)

Adolescent feels cared for when they gain financial support as assistance for transportation and easy access for the refill and clinical follow-up appointment. Parental support was highly by respondents as positive in a study. Evidence proves by a study finding considered that adolescents with large and adequate social networks among health providers, peers, and relations, cope better with psychological challenges (Kim et al., 2014).

Religious beliefs have a very strong effect on behavior as well as an individual's life. This play important role in coping, survival, and maintenance of wellbeing within cultures and communities, especially when one is having a chronic disease like HIV/AIDS that affects both physically and mentally (Namoomba et al., 2019).

A study in Uganda Zambia reveals that 17% of participants believe that HIV can be cured by both prayers and ART (Nozaki et al., 2013). Another study in Uganda found that 6 out of 558(1.2%) adolescents on ART discontinued because they believed that their HIV could be cured by their pastor's prayers (Namoomba et al., 2019).

Discontinuation of ART is creating health problems and this is being reported gradually. A study finding stated that pastors or men of God who claim to be having healing powers need

to be issued HIV clearance certificates after offering prayers to cure HIV. This will protect at-risk clients from discontinuing treatment and from cure through prayers since this belief has led some adolescents to stop ART after being promised to gain healing through prayers and anointing oil (Namoomba et al., 2019).

In eastern and central Asia, a study documented a high level of stigmatization with 61% HIV positive adolescents. Consistent reports in the USA also stated that 76% related HIV stigmatization was experienced by adolescents (Rao et al., 2012). This negatively dominates their intake of routine ART. According to a WHO report, stigmatization leads to poor management of HIV/AIDS programs and it also violates human rights for adolescents living with HIV. A high level of stigmatization affects adolescents and they could easily stop taking ART as well as failing to follow up clinical visits (Joint United Nations Programme on HIV/AIDS (UNAIDS), 2013).

In a study report, Kenya and Uganda demonstrated a low level among adult patients after being on ART for a long time (Kaai et al., 2010). They observed that reducing stigma is a gradual process. This statement was backed by a study finding in Zimbabwe and South Africa among PLHIV who associate their improved self-image and well-being with ART adherence (Campbell et al., 2011). This expected adherence to ART for a long time will help adolescents attained a quality of life and stigmatization will not affect their adherence.

2.9 Interventions for non-adherence to HIV

HIV-positive adolescents and young adults often experience suboptimal medication adherence, yet few interventions to improve adherence in this group have shown evidence of efficacy. Researchers conducted a randomized trial of a two-way, personalized daily text messaging intervention to improve adherence to antiretroviral therapy (ART) among N = 105 poorly adherent HIV-positive adolescents and young adults, ages 16–29. Adherence to ART

was assessed via self-reported visual analog scale (VAS; 0–100 %) at 3 and 6-months for mean adherence level and proportion ≥90 % adherent. The average effect estimate over the 6-month intervention period was significant for ≥90 % adherence (OR = 2.12, 95 % CI 1.01–4.45, $p < 0.05$) and maintained at 12-months (6 months post-intervention). Satisfaction scores for the intervention were very high. These results suggest both the feasibility and initial efficacy of this approach (Garofalo et al., 2016).

Similarly, an intervention was the use of Short Message Service (SMS) reminder messages on antiretroviral and cotrimoxazole prophylaxis adherence among HIV-positive youths as well as the relative effectiveness of SMS with and without a response option. Eligible HIV-positive patients were aged 15 to 22 years at two HIV clinics in Kampala, Uganda, participated in a year-long parallel individual-randomized controlled trial, and were assigned in a 1-to-1 ratio to a weekly SMS message group, weekly SMS message with response option group, or a usual-care control group. Participants enrolled were 332. Electronically measured mean adherence was 67% in the control group, 64% in the 1-way (Linnemayr et al., 2017).

Eight studies, including 9 interventions, met inclusion criteria. Text-messaging interventions produced significantly improved adherence than control conditions (OR=1.39; 95% *CI*=1.18, 1.64). Sensitivity analyses of intervention characteristics suggested that studies had larger effects when interventions (1) were sent less frequently than daily, (2) supported bidirectional communication, (3) included personalized message content, and (4) were matched to participants' antiretroviral therapy dosing schedule. Interventions were also associated with improved viral load and/or CD4+ count (k=3; OR=1.56; 95% *CI*=1.11, 2.20) (Finitsis et al., 2014).

It was recommended that text-messaging should be less frequent messaging interventions with content and timing that is individually tailored and designed to evoke a reply from the

recipient. Following an assessment of forty-three interventions were conducted among adults, six included adults, and adolescents, and two were conducted among adolescents only(Ridgeway et al., 2018). All studies were conducted in low- and middle-income countries, most of these (n = 32) in sub-Saharan Africa. Individual or group adherence counseling (n = 12), mobile health (mHealth) interventions (n = 13), and community- and home-based care (n = 12) were the most common types of interventions reported. Methodological challenges plagued many studies, limiting the strength of the available evidence. However, task shifting, community-based adherence support, mHealth platforms, and group adherence counseling emerged as strategies used in adult populations that show promise for adaptation and testing among adolescents (Ridgeway et al., 2018).

2.10 Effects of ART non-adherence on adolescents

Inadequate retention and adherence lead to decreased health outcomes (morbidity, mortality, drug resistances, risk of transmission), and cost-effectiveness (increased costs and lower productivity) (Stricker et al., 2014).

Psychological distress is common among adolescents living with HIV (ALHIV) worldwide and has been associated with non-adherence to antiretroviral therapy (ART), leading to poor virologic suppression, drug resistance, and increased risk for AIDS morbidity and mortality (Mutumba et al., 2016).

Sub-Saharan Africa also reported poor adherence among adolescents living with HIV in several studies conducted. These reports were of notable concern given the limited ART options available and the risk of drug resistance (Kim et al., 2014). Non-adherence to ART has been recognizing as an emerging public health concern (Muri et al., 2017). Non-adherence to ART leads to the process of changing the virus into another form and later causes drug resistance (Agwu et al., 2012). Non-adherence to ART results in treatment failure

which prevents the primary goals of ART, providing the maximum viral load suppression, restoring it, and then preserving immunologic function, improving quality of life, and reducing HIV-related morbidity and mortality (UNAIDS, 2013).

CHAPTER THREE

3.0 METHODS

3.1 Study Design

This study employed a cross-sectional design within five hospitals in the Greater Accra region from August to October 2020. A quantitative approach for data collection was used through the administration of a structured questionnaire.

3.2 Study Location

The study was conducted in five health facilities located within the Greater Accra Region that offer ART services namely; Greater Accra Regional Hospital (GARH), Tema General Hospital (TGH), Shai Osu Doku District Hospital – Dodowa, Maamobi General Hospital (MGH), and Princess Marie Louise Children's Hospital (PML), Accra.

3.2.1 Greater Accra Regional Hospital

The Greater Accra Regional Hospital is believed to have been opened by the British around 1928. A considerable amount of renovation work, as well as new constructions, have been carried out over the years, but the Hospital still consists of a large number of individual buildings in different shades of quality, size, architecture, and appearance as part of Government efforts to improve health care infrastructure towards Universal Healthcare.

Departments and units include diagnostic and treatment block with 24-hour surgery department, delivering unit, accident and emergency unit, pharmacy, a logistic building, and ART clinic. As Regional Hospital for the Greater Accra Region, its catchment area is the whole of the Region with an estimated population of about 4,283,322 inhabitants. However, the immediate catchment area includes the following suburbs: Nima, Maamobi, Kanda, Accra New Town, Kotobabi, Osu, La, Adabraka, Achimota, Airport Residential Area, and Central Accra.

3.2.2 Maamobi General Hospital

Maamobi Hospital was established by the Government of Ghana in 1968. It started as a clinic that served the community but quickly developed into a hospital. It has been serving the people of Maamobi and the surrounding communities for the past 45 years. The major community zones of Maamobi are, Alajo, Nima, Legon, Kotobabi, and Westland. Maamobi Hospital's role is to provide quality and affordable health care to its clients. The hospital currently provides the following services; surgical services, general medicine, maternity care, dental care, ear nose, and throat care as well as eye care. They also run HIV and STI services (named Hope Clinic), nutrition services, and pharmacy.

3.2.3 Princess Marie Louise Children's Hospital

This is one of the few specialist children's hospitals in Western Africa and is where kwashiorkor and marasmus were first described. The hospital works in collaboration with UNICEF to combat the high level of child malnutrition in the area. In 2011 the hospital completed a new theatre block that incorporates theatres, anesthetists, an intensive care unit, and a recovery ward. The hospital also has an HIV/ART unit that provides services to children and adolescents with HIV. Their services cut across the whole of the country but mainly to communities such as Agbogbloshie, Komkomba, Timber, Makola, and other communities of Accra.

3.2.4 Tema General Hospital

The Tema General Hospital, which was built in 1954 to cater to workers who constructed the Tema harbor, was later handed over to the government for public use. The geographical location of the hospital, its surrounding road network, and the commercial nature of the metropolis has made the hospital one of the busiest in the country as it serves surrounding towns and villages. It is also the major referral point for all other clinics and hospitals in the metropolis and the first point of call for most of the numerous road traffic accidents

especially those that happen on the motorway and other industrial accidents. The catchment area of the hospital includes the whole of the Tema metropolis, its surrounding towns and villages, Sakumono, Lashibi, Nungua, Dangme West, and Dangme East districts.

3.2.5 Shai-Osudoku District Hospital, Dodowa

This hospital was established in 1970 as a health post. It advances from a health center in 1985 to a district hospital in 2009. It is a 52-bed capacity facility that provides medical, surgical, and specialist services such as ear nose, and throat services, dental services, psychiatric services, eye care, obstetric services, and ART care. The people of Dodowa, Ashaley Botwe, Adjiringanor, and Nmai-door benefit from this hospital.

3.3 Study Variables

3.3.1 Outcome Variable

The outcome variable for this study was ART Adherence determined from recent viral load counts. Study participants whose recent viral load count was 1000 copies per milliliter (copies/ml) or less were categorized as adherent and those with more than 1000 copies/ml were considered as non-adherent (Ghana Health Service & National AIDS/STI Control Programme, 2019).

3.3.2 Predictor variables

Predictor variables included sociodemographic variables, sexual characteristics, individual clinical factors, facility factors, and community factors.

The sociodemographic factors were age, sex, level of education, religion, working to earn money and type of occupation, drug, and alcohol use. Sexual characteristics included the number of sexual partners one has, ever having sex, age at first sexual intercourse, had sexual intercourse within the last 12 months, and the type of contraception used during such sexual act. Individual clinical factors such as their body mass index (BMI), VL counts, any

comorbid conditions like hypertension, whether they tested for HIV voluntarily, their current knowledge on their HIV status, age at which they knew their HIV status, whether they want their status to remain secret or not and if they had experienced any changes while on ARVs. Facility factors examined included the place of seeking care, availability of adolescent-friendly services, whether providers' count pills, provided counseling and followed clients up as well as their attitude and reactions towards PLHIV. The Community factors included who their support persons were and the type of support the adolescents and young person receives as well as whether they sought care elsewhere apart from the health facilities.

3.4 Sample Size Determination

The sample size was calculated using the Cochran's formula for a single population stated as $n = z^2 * p\ (1-p)/e^2$, where n represents sample size, p – the prevalence of ART adherence among adolescents, e – level of precision and z – the standard normal variate for 5% level of significance. There is no national data on the prevalence of ART adherence, however, a study showed that 47.5% of adolescents achieved 95% ART adherence in Ghana (Nichols et al., 2019). Therefore, this study used 47.5% to estimate its sample size; Thus $p = 47.5\% = 0.475$, $z = 1.96$ corresponding to 95% confidence interval, $e = 5\%$ ($e = 0.05$) and the proportion of non-adherence to ART = 1-0.50=0.525. Therefore $n = (1.96)^2 \times 0.475\ (1-0.475)/0.05^2 = 0.957999/0.0025 = 383.2 = 383$ adolescents. However, due to the limited number of adolescents and young people visiting the ART Centers within the Greater Accra Region, only those who were available and met the inclusion criteria were included in the study.

3.5 Study Population

Study subjects were young people aged 10 – 24 years, living with HIV, and attending ART clinics.

3.5.1 Inclusion criteria

All adolescents and young people aged 10 – 24 years living with HIV, who were on ART for 6months or more and had Viral load test done within the past 12 months.

3.5.2 Exclusion criteria

Adolescents and young persons living with HIV who was seriously ill at the time of the study.

3.6 Sampling Method

Consecutive sampling was used to collect data from participants where every subject that met the inclusion criteria was selected. At each study site participants who visited the ART clinics were screened using the inclusion criteria. Those who met the inclusion criteria and consented or their guardians assented to the study were included in the study.

3.7 Data Collection Method

Each young person living with HIV visiting the ART clinic was allowed to decide whether he/she will partake in the study after explaining the procedure the study objectives to them and their caregivers. The meetings were held on their various appointment days. Informed consent was sought and received from each participant. Parental consent was sought and received for those aged below 18 years. Consent was also sought to retrieve results of the recent viral load conducted from participants' ART clinic records. Through one-on-one interactions with each participant, a structured questionnaire was used to collect data over 30-45 minutes at the ART clinic. Participants were allowed to answer questions independently. Where they needed clarification, the same was provided in simple and clear language. Clinical assessment of temperature, heart rate, blood pressure, height, and weight was measured.

3.8 Data Collection Instrument

Self-administered structured questionnaires were provided to each participant. The structured questionnaire covered sociodemographic characteristics, sexual history, participants' knowledge and opinions on HIV, individual clinical factors, facility, and community factors. Height, weight, temperature, heart rate, and blood pressure measurement were assessed and recorded for each participant. Relevant data were retrieved from their health ART record booklets.

3.9 Data processing and analyses

Raw data collected were entered into Microsoft Excel 16 and later exported to Stata- 16 for analyses. Data were inspected for consistency and accuracy each day from the various study site.

Continuous variables were categorized for reporting descriptive statistics (frequencies and percentages). Bar graphs were also used to present some findings pictorially. Tests of independence were performed using Pearson' Chi-Square to examine the relationships between the outcome and predictor variables. All variables that were statistically significant at the bivariate analyses were included in a binomial logistic regression to determine factors contributing to ART adherence among participants. Statistical test "logistic" was used to develop the regression model. Odd ratios at 95% confidence interval were reported with p-values. Variables in the logistic regression with p-value (p) less than 0.05 at 95% confidence interval (CI) were considered predictors of ART adherence among young persons living with HIV.

3.10 Quality Control

In July 2020 at the GARH, five research assistants, each from the study sites were trained on research ethics, how to administer questionnaires, measure correctly vital signs and retrieve

accurate data from participants' health record booklet. Their capacities were strengthened on taking and recording correctly the weight and height of participants. Questionnaires were pretested at the Adabraka Polyclinic to help identify errors before the main study.

3.11 Pilot Study

The pretest was conducted at Adabraka Polyclinic in July 2020. Adabraka Polyclinic was established in 1945 and has since provided quality and comprehensive primary healthcare to people in Adabraka and the Osu-Klottey Sub Metropolitan areas. It is next to west Ridge and just opposite Accra Psychiatric Hospital. It provides general medical and surgical services as well as ART services to both young and old.

A total of 13 adolescents and young people were assessed with the structured questionnaire. The assessment revealed that some questions were ambiguous which were corrected to answer the objectives of the study. The pre-test ascertained the efficiency, reliability, and validity of the data collection tools and assessed respondents' understanding of the various questions.

3.12 Ethical Clearance

Ethical clearance numbered GHS-ERC 065/02/20 was received from the Ghana Health Service Ethical Clearance Review Committee in Accra. Permission was sought from the Management of all hospitals where the study was carried out. All information on the study was provided to participants and their caregivers (parents) individually and their written consent was obtained before administering questionnaires to them. Where participants declined to participate in the study, they were allowed to opt-out freely. Confidentiality and anonymity were maintained and participation was entirely voluntary.

Data collected were coded and kept confidential by the principal investigator. Data were password protected and backed up for safekeeping. Data will be destroyed after 5 years. The study was solely funded by the principal investigator and there was no conflict of interest.

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

A total of 215 adolescents and young people living with HIV partook in the study from 5 study sites. The majority of participants were from the Greater Accra Regional hospital (28.4%) followed by Tema General Hospital (27.4%) with the least participants from Maamobi General hospital (9.3%). Table 1 below shows the distribution of respondents from the various clinics.

Table 4.1: Distribution of respondents from study sites

ART Clinics	Number of clients interviewed	Percentage
Greater Accra Regional Hospital	61	28.37
Tema General Hospital	59	27.45
Princess Marie Louise Children's Hospital	38	17.67
Shai-Osudoku District Hospital, Dodowa	37	17.21
Maamobi General Hospital	20	9.30
Total	**215**	**100**

4.2 Sociodemographic characteristics

The median age of respondents was 17 years (interquartile range: 13-23 years). Among respondents, 38.1% (majority) were between 20-24 years old with 52.6% females than males (47.4%). Most (28.2%) respondents resided with their parents with only 7.9% being married at the time of the study but the majority (88.3%) were single. A majority (26.2%) were from the Ga-Dangme ethnic group followed by 25.2% Ewes and 22.9% Akan. With regards to respondents' education 96.3% ever attended school and 37.7% completed junior high education as their highest level of education. Most (65.6%) of them worked to earn money through trading (55.4%). Also, the majority (79.3%) of respondents were Christians.

Given respondents' social history, 5.1% drank alcoholic beverages at least once a week 1.9% smoked every day and 1% injected hard drugs occasionally within the last four weeks before

the study. Table 2 shows details of the sociodemographic characteristics of adolescents and young people.

Table 4.2: Sociodemographic characteristics of respondents

Variable	Frequency	Percentage
Age		
10-14 years	68	31.63
15-19 years	65	30.23
20-24 years	82	38.14
Sex		
Male	102	47.44
Female	113	52.56
Resides with		
Both Parents	60	28.17
Only Father	59	27.70
Only Mother	14	6.57
Siblings	7	3.29
No one (Lives alone)	20	9.39
Family Member	22	10.33
Non-family Members	31	14.55
Marital Status		
Single	189	88.32
Married	17	7.94
Cohabitating	8	3.74
Ethnicity		
Ga-Dangme	56	26.17
Ewe	54	25.23
Akan	49	22.90
Fante	17	7.94
Hausa	23	10.75
Mole-Dagbani	8	3.74
Grusi	2	0.93
Guan	5	2.34
Ever attended school		
No	8	3.72
Yes	207	96.28

Table 4.2: Sociodemographic characteristics of respondents continued

Variable	Frequency	Percentage
Highest level of education		
Primary	59	28.50
Junior High	78	37.68
Senior high/Vocational	55	26.57
Tertiary	15	7.25
Years of education		
1-5 years	38	19.69
6-10 years	89	46.11
11-15 years	58	30.05
16-20 years	8	4.15
Work to earn money		
No	141	65.58
Yes	74	34.42
Occupation		
Trading	41	55.41
Caterer	4	5.41
Shop Attendant	3	4.05
Community worker	5	6.76
Money Transfer agent	2	2.70
Waiter/Waitress	3	4.05
Apprentice	12	16.22
Laundering	4	5.41
Religion		
No religion	5	2.36
Christian	168	79.25
Islam	39	18.40
Drinks alcohol during the last 4 weeks		
Never	194	90.65
Everyday	3	1.40
At least once a week	11	5.14
More than once a week	1	0.47
Occasionally	5	2.34
Smoking during the last 4 weeks		
Never	206	97.17
Everyday	4	1.89
At least once a week	2	0.94
Use of hard drugs during the last 4 weeks		
Never	209	99.05
Occasionally	2	0.95

4.3 Sexual History

Among adolescents and young persons living with HIV, the median age at first sex was 18 years (interquartile range: 16-19 years). Those with one sexual partner were 27.1% young persons aged 15-24, while 41.9% of respondents ever had sex with the majority (63.1%) having their first sexual intercourse between 15-19 years. Within the last 12 months, 40.9% of respondents had sexual intercourse, of which 40.9% used condoms as a means of contraception. Table 3 explains the sexual characteristics of respondents.

Table 4.3: Sexual characteristics of respondents

Variable	Frequency	Percentage
Number of sexual partners		
None	147	68.69
One	58	27.10
Two	8	3.74
Three	1	0.47
Ever had sex		
No	125	58.14
Yes	90	41.86
Age at first sexual intercourse		
10-14 years	11	13.10
15-19 years	53	63.10
20-24 years	20	23.81
Had sexual intercourse within the last 12 months		
No	127	59.07
Yes	88	40.93
The contraceptive method used during last sexual intercourse		
No contraception	40	45.45
Emergency contraceptives	3	3.41
Condom	36	40.91
I am on pills	6	6.82
I am on injections	3	3.41

4.4 Knowledge and opinions about HIV/AIDS

Respondents' knowledge and opinions were assessed on HIV/AIDS. The majority (86.3%) confirmed ever hearing of HIV and AIDS and 43.9% knew someone who has HIV or died from AIDS. Among respondents, 80% responded that people can protect themselves from HIV infection when they use a condom correctly anytime, they have sex. On the mode of transmission, only 76.5% said that people cannot be infected with HIV through mosquito bites. Also, 74% agreed that when people abstain from sex, they will not contract HIV while 71% said HIV cannot be transmitted through the sharing of food but 77.9% of respondents agreed that, a person can contract HIV when they use a shared injection needle.

The majority (79.4%) of respondents agreed that a healthy-looking person could be infected with HIV, 78.5% also agreed that pregnant women infected with HIV could transmit the infection to their unborn children but 77.5% said lactating mothers with HIV could also transfer the infection through breastfeeding to their children. However, only 52.2% of respondents believed that it was possible to get confidential reports when in their localities if they test for HIV. Table 4 below describes the respondents' knowledge and opinions on HIV/AIDS.

Table 4.4: Knowledge and opinions about HIV/AIDS

Knowledge Statements	Don't know (%)	No (%)	Yes (%)
1. Ever heard of HIV or the disease called AIDS	5.19	8.49	86.32
2. Knows someone who is infected with HIV or who has died of AIDS	21.50	34.58	43.93
3. People can protect themselves from HIV using a condom correctly every time they have sex	17.67	2.33	80.00
4. A person can get HIV from mosquito bites	15.96	76.53	7.51
5. People protect themselves from HIV by having one uninfected faithful sex partner	30.20	7.43	62.38
6. People can protect themselves from HIV by abstaining from sexual intercourse	17.31	8.65	74.04
7. A person can get HIV by sharing a meal with someone infected	18.22	71.03	10.75
8. A person can get HIV by getting injections with a needle that was already used by someone else	18.31	3.76	77.93
9. A healthy-looking person can be infected with HIV, the virus that causes AIDS	16.75	3.83	79.43
10. A pregnant woman infected with HIV can transmit the virus to her unborn child	17.29	4.21	78.50
11. A woman with HIV or AIDS can transmit the virus to her newborn child through breastfeeding	17.84	4.69	77.46
12. It is possible in my community for someone to get a confidential test to find out if they are infected with HIV	36.36	11.48	52.15

4.5 Individual clinical characteristics of respondents

Among respondents, 49.8% had normal body mass index, 57.1% were hypothermic, 67.2% and 65.5% had normal systolic and diastolic blood pressure respectively. The majority (71.6%) attested that HIV testing was required for them when they felt ill and only 80.5% knew their HIV status. Among those who knew their HIV status, 36.1% became aware of their HIV status when they were 10-14 years old, however, the majority (87.1%) wants their HIV status to remain secret. Less than half (38.9%) of respondents, lost weight when they were diagnosed with HIV infection and 30.8% currently experience sore throat and cough.

Over three-fourths of the respondents (78.9%) were prescribed anti-retroviral medications a month to the study, however, 31.3% complained of weight gain while 14.8% complained of rashes and cough within the same period as reactions to the anti-retroviral medications. The majority received the first line of treatment (61.3%). The commonest antiretroviral medications prescribed were combinations of Tenofovir Lamivudine Dolutegravir (30.9%), Cotrimoxazole, and Tenofovir Lamivudine Dolutegravir (14.4%), and Tenofovir Lamivudine Efavirenz (12.9%). Table 5 explains the respondents' clinical factors in detail below.

Table 4.5: Individual clinical characteristics of respondents

Variable	Frequency	Percentage
Body Mass Index (BMI)		
Underweight (<18.50 kg/m^2)	65	32.30
Normal weight (18.50-24.99 kg/m^2)	100	49.80
Overweight (25.00-29.99 kg/m^2)	28	13.90
Obese (≥30 kg/m^2)	8	4.00
Temperature ranges		
Hypothermia (<36.4^{0}C)	116	57.10
Normal (36.5-37.5^{0}C)	86	42.40
Hyperthermia (37.6-38.9^{0}C)	1	0.50
Classification of Hypertension (Systolic BP)		
Hypotension (<90mmHg)	7	5.60
Normal (90-119mmHg)	84	67.20
Prehypertension (120-139mmHg)	29	23.20
Stage 1 hypertension (140-159mmHg)	2	1.60
Stage 2 hypertension (≥160mmHg)	3	2.40
HIV testing		
I have not done an HIV test before	16	7.70
I have done HIV test voluntarily	43	20.70
HIV test was required	149	71.60
Knows HIV Status		
No	41	19.50
Yes	169	80.50

Table 4.5: Clinical characteristics of respondents continued

Variable	Frequency	Percentage
Age of knowing HIV status		
Below 10 years	4	2.40
10-14years	61	36.10
15-19years	46	27.20
20-24years	58	34.30
Wants HIV status to remain secret		
No	26	12.90
Yes	176	87.10
Conditions ever experienced when tested positive for HIV		
No condition	42	21.20
Weight loss	77	38.90
Weight gain	39	19.70
Tuberculosis	9	4.60
TB and weight loss	31	15.70
Symptoms currently experienced		
Sore throat	57	30.80
Fever	39	21.10
Skin rashes	28	15.10
Cough	57	30.80
Dizziness	4	2.20
ART prescribed last month		
No	41	21.13
Yes	153	78.87
Reactions to ART within the past 4 weeks		
Rashes	23	13.07
Weight loss	23	13.07
Weight gain	55	31.25
Vomiting	3	1.70
Headache	15	8.52
Fever persistent	1	0.57
Cough	9	5.11
Rashes and Cough	26	14.77
Rashes, cough, and headache	21	11.93
Line of treatment		
Prophylaxis	13	6.70
The first line of treatment	119	61.34
The second line of treatment	62	31.96

4.6 Viral load testing and adherence to antiretroviral therapy

In this study, viral load count was used to assessing adherence to antiretroviral medications amongst respondents because the majority (86.8%) of the respondents conducted viral load testing once a year. The main means of assessing adherence to antiretroviral medication among respondents at the various hospitals were viral load testing (40.1%) followed by pill counting (23.7%). The adherence rate was defined as achieving a viral load count of 1000 counts per milliliter (c/ml) or less. The rate of adherence to antiretroviral medication among adolescents and young people using their recent viral load count was 69.9% (95% CI: 59.5% - 79.0%) as shown in table 6 below. ART Adherence rates were 24.6% among 10-14-year-old, 30.8% among 15-19-year-old, and 44.6% among those aged 20-24 years. More females (50.8%) than males (49.2%). ART adherence was also higher among those who completed junior high education (45%) than those who completed senior high or vocational education (23.4%), primary education (20.3%), and tertiary education (10.9%). It was also higher among Christians (73.4%) than Muslims (20.3%) and pagans (6.3%). At the various study sites, respondents who received care at Tema general hospital had the highest adherence rate of 29.2% followed by those who received care at Greater Accra regional hospital (27.7%) as shown in figure 2 below.

Table 4.6: Viral load testing and adherence to antiretroviral medication

Variable	Frequency	Percentage
Viral load testing frequency		
Once a year	165	86.80
Twice a year	25	13.20
Method of assessing ART adherence at HIV Clinics		
Pill counting	49	23.67
Care giver's report	16	7.73
State of health	41	19.81
Rate of default	16	7.73
Irregular visit	2	0.97
Viral load	83	40.10
Adherence to ART using viral load counts		
Non-Adherence (>1000copies/ml)	28	30.11
Adherence (<=1000 copies/ml)	65	69.89

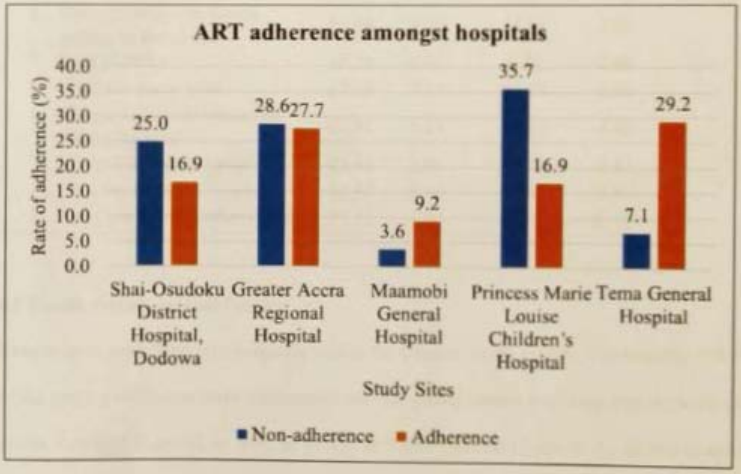

Figure 4.1: Adherence to antiretroviral medication among adolescents and young people at study sites

4.7 Reasons for missing anti-retroviral therapy

The main reason for missing antiretroviral medication amongst adolescents and young people was being busy (21.5%). Other reasons included wanting to avoid side effects (8.5%), not

fully understating the medications and their requirements (5.7%), and having some reactions towards the medications (4.5%). Table 7 below describes the reasons for missing antiretroviral medications in detail.

Table 4.7: Reasons for missing antiretroviral medications

Reasons for missing ART medication	Never (%)	Rarely (%)	Sometimes (%)	Often (%)
1. I wanted to avoid side effects	70.89	4.69	15.96	8.45
2. I shared anti-HIV medications with other family members and friends	95.33	0.93	3.27	0.47
3. Religious beliefs	87.79	2.82	7.51	1.88
4. I do not fully understand the anti-HIV medications and their requirements	72.17	2.83	19.34	5.66
5. I traveled away from home	80.75	3.29	15.49	0.47
6. Transportation problems getting to the clinic	80.00	3.81	13.33	2.86
7. Loss of pills	94.26	0.96	4.31	0.48
8. I had too many pills	67.63	7.25	23.19	1.93
9. I had a bad event related to taking the pills	67.82	8.91	18.81	4.46
10. I forgot to take my pills	45.15	2.91	49.51	2.43
11. I ran out of pills	82.52	6.80	9.71	0.97
12. I was busy doing other things	71.71	1.46	5.37	21.46

4.8 Health facility-related factors

Respondents were from five hospitals within the Greater Accra region. The majority (28.4%) of the study participants were adolescents and the young person receiving care at the Greater Accra Regional Hospital as well as 27.4% at Tema General Hospital. At all the hospitals, adolescent-friendly services were available but only 73.1% of the respondents agreed that they were present and functional. Most (81.7%) of the respondents confirmed healthcare providers at each ART Centre at the various hospitals count their medications to be sure they were adhering to the treatment regimen. Also, 93.9% of the respondents confirmed that they receive counseling from healthcare providers at the various ART centers while 56.2% said

they are followed up by these healthcare providers through appointments. Additionally, 72.8% of applauded healthcare providers' caring and compassionate care they provide to them. Table 8 describes the facility factors below.

Table 4.8: Health facility-related factors

Variables	Frequency	Percentage
Availability of adolescent-friendly services		
Don't know	6	2.83
No	51	24.06
Yes	155	73.11
Healthcare providers count my pills		
Don't know	18	8.65
No	20	9.62
Yes	170	81.73
Receives counseling from providers		
No	12	6.06
Yes	186	93.94
Means of follow-up		
Appointment Card	118	56.19
Phone call	37	17.62
Home Visit	5	2.38
Caregiver support	6	2.86
Appointment and phone call	1	0.48
A phone call and home visit	40	19.05
Appointment, phone call, and home visit	3	1.43
Healthcare worker behavior towards PLHIV		
Blaming for immoral behavior	8	3.76
Caring and compassionate care	155	72.77
Gloves and mask use for routine task	9	4.23
Gossip	4	1.88
I am not allowed to ask questions	5	2.35
Long waiting time	19	8.92
Name-calling	4	1.88
Status of HIV reveal to others	4	1.88
Unfriendly looks	5	2.35

4.9 Community Level Factors

In the community, only 32.7% of adolescents and young people receive support from parents and 31.6% received financial, psychological, and material support while 26.4% received mainly financial support. Adolescents and young people living with HIV seek additional

support to live healthier lives. Among them, 42.5% confirmed seeking additional care at churches while 35.1% sought such care from fetish priests. Community factors are elaborated in Table 9 below.

Table 4.9: Community factors

Variables	Frequency	Percentage
Support Persons		
No support	18	8.53
Parents	69	32.70
Family members	24	11.37
Friends	11	5.21
Parents and other family members	12	5.69
NGO and philanthropist	77	36.49
Type of support		
Financial support	51	26.42
Psychological support	44	22.80
Material support	3	1.55
Financial and Material support	2	1.04
Financial and psychological support	32	16.58
Financial, psychological, and material	61	31.61
Seeks additional care		
No additional care	22	12.64
Prayer camps	8	4.60
Herbalist	6	3.45
Fetish Priest	61	35.06
Churches	74	42.53
Mosque	3	1.72

4.10 Test Of Independence

The test of independence was performed using the Pearson Chi-square test of independence to determine the relationship between achieving adherence to antiretroviral mediations and sociodemographic characteristics, sexual characteristics, clinical factors, health facility-related factors, and community-related factors. A P-value of less than 0.05 was suggestive of factors related to ART adherence among adolescents and young people living with HIV. These were bolded in the tables below.

4.10.1 Sociodemographic characteristics and ART Adherence

Among sociodemographic variables examined against achieving ART adherence among adolescents and young people living with HIV in the 5 study sites, only respondents' age and their ability to work to earn money were significantly related to achieving ART adherence ($p<0.05$). Table 10 below explains the relationship between all sociodemographic variables and ART adherence below.

Table 4.10: Sociodemographic characteristics and ART Adherence

Variables	Adherence		Total n (%)	χ^2	P-value
	No, n (%)	Yes, n (%)			
Age				15.19	**0.001**
10-14 years	13(44.83)	16(55.17)	29(31.18)		
15-19 years	14(41.18)	20(58.82)	34(38.56)		
20-24 years	1(3.33)	29(96.67)	30(32.26)		
Sex				1.04	0.309
Male	17(34.69)	32(65.31)	49(52.69)		
Female	11(25.00)	33(75.00)	44(47.31)		
Resides with				5.78	0.448
Both Parents	8(42.11)	11(57.89)	19(20.43)		
Only Father	8(30.77)	18(69.23)	26(27.96)		
Only Mother	4(50.00)	4(50.00)	8(8.60)		
Siblings	0(0.00)	3(100.00)	3(3.23)		
No one (Lives alone)	1(12.50)	7(87.50)	8(8.60)		
Family Member	3(23.08)	10(76.92)	13(13.98)		
Non-family Members	4(25.00)	12(75.00)	16(17.20)		
Marital Status				3.66	0.161
Single	27(33.33)	54(66.67)	81(87.10)		
Married	0(0.00)	7(100.00)	7(7.53)		
Cohabitating	1(20.00)	4(80.00)	5(5.38)		
Ethnicity				7.96	0.336
Ga-Dangme	11(38.10)	15(57.69)	26(27.96)		
Ewe	8(38.10)	13(61.90)	21(22.58)		
Akan	7(28.00)	18(72.00)	25(26.88)		
Fante	0(0.00)	5(100.00)	5(5.38)		
Hausa	2(22.22)	7(77.78)	9(9.68)		
Mole-Dagbani	0(0.00)	2(100.00)	2(2.15)		
Grusi	0(0.00)	2(100.00)	2(2.15)		
Guan	0(0.00)	3(100.00)	3(3.23)		

Table 4.10: Sociodemographic characteristics and ART Adherence continued

Variables	Adherence		Total	χ^2	P-value
	No, n (%)	Yes n(%)	n (%)		
Ever attended school				0.44	0.509
No	0(0.00)	1(100.00)	1(1.08)		
Yes	28(30.43)	64(69.57)	92(98.92)		
Highest level of education				7.52	0.057
Primary	12(48.00)	13(52.00)	25(27.17)		
Junior High	12(29.27)	29(70.73)	41(44.57)		
Senior high/Vocational	4(21.05)	15(78.95)	19(20.65)		
Tertiary	0(0.00)	7(100.00)	7(7.61)		
Years of education				4.87	0.182
1-5 years	8(47.06)	9(52.94)	17(19.77)		
6-10 years	13(31.71)	28(68.29)	41(47.67)		
11-15 years	5(20.00)	20(80.00)	25(29.07)		
16-20 years	0(0.00)	3(100.00)	3(3.49)		
Work to earn money				7.16	**0.007**
No	25(38.46)	40(61.54)	65(69.89)		
Yes	3(10.71)	25(89.29)	28(30.11)		
Occupation				3.36	0.762
Trading	3(21.43)	11(78.57)	14(50.00)		
Caterer	0(0.00)	1(100.00)	1(3.57)		
Shop Attendant	0(0.00)	1(100.00)	1(3.57)		
Community worker	0(0.00)	3(100.00)	3(10.71)		
Money Transfer agent	0(0.00)	2(100.00)	2(7.14)		
Apprentice	0(0.00)	6(100.00)	6(21.43)		
Laundering	0(0.00)	1(100.00)	1(3.57)		
Religion				3.18	0.204
No religion	0(0.00)	4(100.00)	4(4.40)		
Christian	24(33.80)	47(66.20)	71(78.02)		
Islam	3(18.75)	13(81.25)	16(17.58)		
Drinks alcohol during the last 4 weeks				4.83	0.090
Never	28(33.73)	55(66.27)	83(89.25)		
At least once a week	0(0.00)	7(100.00)	7(7.53)		
Occasionally	0(0.00)	3(100.00)	3(3.23)		
Smoking during the last 4 weeks				0.45	0.503
Never	28(31.11)	62(68.89)	90(98.90)		
At least once a week	0(0.00)	1(100.00)	1(1.10)		
Use of hard drugs during the last 4 weeks				2.35	0.126
Never	27(29.35)	65(70.65)	92(98.92)		
Occasionally	1(100.00)	0(0.00)	1(1.08)		

4.10.2 Sexual characteristics and ART adherence

Respondents' sexual characteristics were examined against their ability to adhere to ART. Ever having sex and having sexual intercourse within the last 12 months were related to adhering to ART ($p<0.05$). Table 11 demonstrates the relationship between respondents' sexual characteristics and ART adherence

Table 4.11: Sexual characteristics and adherence to ART

Variables	Adherence		Total	χ^2	P-value
	No n(%)	Yes n(%)	n(%)		
Number of sexual partners				5.63	0.060
None	24(37.50)	40(62.50)	64(68.82)		
One	4(15.38)	22(84.62)	26(27.96)		
Two	0(0.00)	3(100.00)	3(3.23)		
Ever had sex				4.45	**0.035**
No	20(39.22)	31(60.78)	51(54.84)		
Yes	8(19.05)	34(52.31)	42(45.16)		
Age at first sexual intercourse				3.72	0.156
10-14 years	3(33.33)	6(66.67)	9(22.50)		
15-19 years	4(19.05)	17(80.95)	21(52.50)		
20-24 years	0(0.00)	10(100.00)	10(25.00)		
Had sexual intercourse within the last 12 months				5.30	**0.021**
No	21(39.62)	32(60.38)	53(56.99)		
Yes	7(17.50)	33(82.50)	40(43.01)		
A contraceptive method during last sexual intercourse				2.42	0.660
No contraception	3(15.79)	16(84.21)	19(47.50)		
Emergency contraceptives	1(50.00)	1(50.00)	2(5.00)		
Condom	2(13.33)	13(86.67)	15(37.50)		
I am on pills	1(33.33)	2(66.67)	3(7.50)		
I am on injections	0(0.00)	1(100.00)	1(2.50)		

4.10.3 Clinical related factors and ART adherence

The only clinical related factor that was significantly related to ART adherence was the age at which respondents knew their HIV status ($p<0.05$). All other factors such as respondents'

blood pressure status, how they tested for HIV, knowledge of their HIV status and whether they want their status to remain secret as well as whether ARTs were prescribed to them in the last month and symptoms or reactions towards the ART medications were all not significantly related to ART adherence ($p<0.05$). Table 12 below explains the clinical factors related to ART adherence below.

Table 4.12: Clinically related factors and ART adherence

Variables	Adherence		Total	χ^2	P-value
	No n(%)	Yes n(%)	n(%)		
Classification of Hypertension (Systolic BP)				3.082	0.379
Hypotension (<90mmHg)	2(50.00)	2(50.00)	4(6.78)		
Normal (90-119mmHg)	9(22.50)	31(77.50)	40(67.80)		
Prehypertension (120-139mmHg)	5(38.46)	8(61.54)	13(22.03)		
Stage 2 hypertension (≥160mmHg)	0(0.00)	2(100.00)	2(3.39)		
HIV testing				4.935	0.085
I have not done HIV test before	2(22.22)	7(77.78)	9(9.89)		
I have done HIV test voluntarily	2(11.11)	16(88.89)	18(19.78)		
HIV test was required	24(37.50)	40(62.50)	64(70.33)		
Knows HIV Status				0.04	0.841
No	7(31.82)	15(68.18)	22(23.66)		
Yes	21(29.58)	50(70.42)	71(76.34)		
Age of knowing HIV status				17.56	**0.001**
Below 10 years	0(0.00)	1(100.00)	1(1.41)		
10-14years	16(55.17)	13(44.83)	29(40.85)		
15-19years	5(20.83)	19(79.17)	24(33.80)		
20-24years	0(0.00)	17(100.00)	17(23.94)		
Wants HIV status to remain secret				0.389	0.533
No	4(40.00)	6(60.00)	10(11.63)		
Yes	23(30.26)	53(69.74)	76(88.37)		

Table 4.12: Clinically related factors and ART adherence continued

Variables	Adherence		Total n(%)	χ^2	P-value
	No n(%)	Yes n(%)			
Conditions ever experienced when tested positive for HIV				2.701	0.609
No condition	4(23.53)	13(76.47)	17(20.48)		
Weight loss	7(21.88)	25(78.13)	32(38.55)		
Weight gain	6(35.29)	11(64.71)	17(20.48)		
Tuberculosis	1(33.33)	2(66.67)	3(3.61)		
TB and weight loss	6(42.86)	8(57.14)	14(16.87)		
Symptoms currently experienced				8.125	0.087
Sore throat	7(30.43)	16(69.57)	23(29.87)		
Fever	10(52.63)	9(47.37)	19(24.68)		
Skin rashes	3(25.00)	9(75.00)	12(15.58)		
Cough	3(14.29)	18(85.71)	21(27.27)		
Dizziness	0(0.00)	2(100.00)	2(2.60)		
ART prescribed last month				0.383	0.536
No	3(21.43)	11(78.57)	14(16.47)		
Yes	21(29.58)	50(70.42)	71(83.53)		
Reactions to ART within the past 4 weeks				6.96	0.541
Rashes	3(33.33)	6(66.67)	9(11.69)		
Weight loss	1(10.00)	9(90.00)	10(12.99)		
Weight gain	8(33.33)	16(66.67)	24(31.17)		
Vomiting	1(33.33)	2(66.67)	3(3.90)		
Headache	0(0.00)	5(100.00)	5(6.49)		
Fever persistent	0(0.00)	1(100.00)	1(1.30)		
Cough	0(0.00)	2(100.00)	2(2.60)		
Rashes and Cough	4(33.33)	8(66.67)	12(15.58)		
Rashes, cough, and headache	5(45.45)	6(54.55)	11(14.29)		

4.10.4 Health facility-related factors and ART adherence

Among health facility-related factors examined, receiving counseling from healthcare providers was the only factor significantly related to achieving ART adherence ($p<0.05$). All other factors such as place of seeking care, availability of adolescent-friendly services, counting ART medications by providers, means of follow-ups, and healthcare worker behavior towards adolescents and young people living with HIV were not related with ART

adherence (p>0.05). Table 13 explains the relationship between health facility-related factors and ART adherence below.

Table 4.13: Health facility-related factors and ART adherence

Variables	Adherence		Total n(%)	χ^2	P-value
	No n(%)	Yes n(%)			
Availability of adolescent-friendly services				0.941	0.625
Don't know	0(0.00)	1(100.00)	1(1.08)		
No	9(36.00)	16(64.00)	25(26.88)		
Yes	19(28.36)	48(71.64)	67(72.04)		
Healthcare providers count my pills				2.744	0.254
Don't know	0(0.00)	5(100.00)	5(5.49)		
No	1(20.00)	4(80.00)	5(5.49)		
Yes	27(33.33)	54(66.67)	81(89.01)		
Receives counseling from providers				4.549	**0.033**
No	2(100.00)	0(0.00)	2(2.30)		
Yes	25(29.41)	60(70.59)	85(97.70)		
Means of follow-up				6.389	0.270
Appointment Card	12(23.53)	39(76.47)	51(56.67)		
Phone call	4(25.00)	12(75.00)	16(17.78)		
Home Visit	0(0.00)	1(100.00)	1(1.11)		
Care giver support	0(0.00)	2(100.00)	2(2.22)		
A phone call and home visit	9(50.00)	9(50.00)	18(20.00)		
Appointment, phone call, and home visit	1(50.00)	1(50.00)	2(2.22)		
Healthcare worker behavior towards PLHIV				8.938	0.257
Blaming for immoral behaviour	0(0.00)	4(100.00)	4(4.35)		
Caring and compassionate care	20(30.30)	46(69.70)	66(71.74)		
Gloves and mask use for routine care	1(25.00)	3(75.00)	4(4.35)		
Gossip	1(100.00)	0(0.00)	1(1.09)		
I am not allowed to ask questions	2(66.67)	1(33.33)	3(3.26)		
Long waiting time	0(0.00)	6(100.00)	6(6.52)		
Name calling	1(33.33)	2(66.67)	3(3.26)		
Unfriendly looks	2(40.00)	3(60.00)	5(5.43)		

4.10.5 Community-level factors and ART adherence

Community-level factors including support persons, the type of support the adolescent and young people receive, and whether they seek additional support from elsewhere apart from the clinics were all not related to adhering to ART ($p>0.05$). Table 14 explains the relationship between community factors and ART adherence amongst adolescent and young people below.

Table 4.14: Community-level factors and ART adherence

Variables	Adherence		Total n(%)	χ^2	P-value
	No n(%)	Yes n(%)			
Support Persons				7.912	0.161
No support	1(16.67)	5(83.33)	6(6.59)		
Parents	13(48.15)	14(51.85)	27(29.67)		
Family members	2(16.67)	10(83.33)	12(13.19)		
Friends	0(0.00)	4(100.00)	4(4.40)		
Parents and other family members	1(20.00)	4(80.00)	5(5.49)		
NGO and philanthropist	10(27.03)	27(72.97)	37(40.66)		
Type of support				8.54	0.074
Financial support	7(28.00)	18(72.00)	25(29.41)		
Psychological support	3(15.79)	16(84.21)	19(22.35)		
Material support	0(0.00)	1(100.00)	1(1.18)		
Financial and psychological support	2(16.67)	10(83.33)	12(14.12)		
Financial, psychological, and material	14(50.00)	14(50.00)	28(32.94)		
Seeks additional care				7.9	0.095
No additional care	1(11.11)	8(88.89)	9(11.84)		
Prayer camps	3(75.00)	1(25.00)	4(5.26)		
Herbalist	0(0.00)	5(100.00)	5(6.58)		
Fetish Priest	8(29.63)	19(70.37)	27(35.53)		
Churches	8(25.81)	23(74.19)	31(40.79)		

4.11 Factors Associated With Art Adherence

Factors associated with adherence to ART were determined by performing binomial logistic regression of variables that were statistically significant at the bivariate analyses. P-values of factors that were less than 0.05 in the adjusted logistic regression were considered as factors associated with adherence to ART among adolescents and young people living with HIV/AIDS at a 95% confidence interval (CI).

Factors that were included in the logistic regression model include age, sex, the highest level of education, ever had sex, age of knowing HIV status, viral load testing frequency, means of follow-up, availability of adolescent-friendly services, and testing for HIV. Controlling for the factors above, the means of follow-up was the only factor associated with adherence to ART among adolescent and young people living with HIV/AIDS in Greater Accra. Those who were followed up with both phone calls and home visits were 2 times more likely to adhere to ART compared to those who were only called on the phone as means of follow-up (AOR=2.32, 95% CI: 1.19-4.47, p=0.013). It appears that most of the factors examine did not have any association with adhering to ART (p>0.05). Table 15 demonstrates the association of various factors with adhering to ART below.

Table 4.15: Factors associated with ART Adherence

Variable	Crude OR	P-Value	95%CI	Adjusted OR	P-Value	95%CI
Age (in years)						
10-14	1.00			1.00		
15-19	1.16	0.770	0.43-3.16	0.02	0.126	0.00-3.16
20-24	23.56	0.004	2.82-197.00	1.00		
Sex						
Male	1.00			1.00		
Female	1.59	0.311	0.65-3.92	0.03	0.076	0.00-1.45

Table 4.15: Factors associated with ART Adherence continued

Variable	Crude OR	P-Value	95%CI	Adjusted OR	P-Value	95%CI
Highest level of education						
Primary	1.00			1.00		
Junior High	2.23	0.128	0.79-6.27	58.92	0.082	0.60-580.01
Senior high/Vocational	3.46	0.072	0.89-13.40	129.79	0.186	0.10-176.93
Tertiary	1.00			1.00		
Ever had sex						
No	1.00			1.00		
Yes	2.74	0.038	1.06-7.11	0.54	0.693	0.02-11.62
Age of knowing HIV status						
Below 10 years	1.00			1.00		
10-14	1.00			1.00		
15-19	4.68	0.014	1.37-15.97	10.01	0.297	0.13-760.37
20-24	1.00			1.00		
Viral load testing frequency						
Once a year	1.00			1.00		
Twice a year	1.15	0.847	0.28-4.75	0.44	0.632	0.02-12.48
Means of follow-up						
Phone call	1.00			1.00		
Appointment Card	1.08	0.904	0.29-3.99	1.12	0.957	0.02-73.78
Home Visit	1.00			1.00		
Caregiver support	1.00			1.00		
Phone call and home visit	0.33	0.140	0.08-1.44	2.32	**0.013**	1.19-4.47
Appointment, phone call and home visit	0.33	0.472	0.02-6.65	0.31	0.681	0.00-84.23
Availability of adolescent-friendly services						
Don't know	1.00			1.00		
No	0.70	0.480	0.27-1.86	1.00		
Yes	1.00			0.21	0.426	0.00-10.09
HIV testing						
I have not done an HIV test before	1.00			1.00		
I have done HIV test voluntarily	2.29	0.451	0.27-19.66	0.02	0.241	0.00-12.51
HIV test was required	0.48	0.378	0.09-2.48	0.02	0.208	0.00-10.11

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

The purpose of this study was to determine the proportion of adolescents and young people adhering to antiretroviral medications using their recent viral load counts. The study findings showed that the majority of the variables examined were not associated with adhering to ART, except for the means of follow up. Those who were followed up via phone calls and home visits were twice more likely to adhere to ART than those who were just called by phone as means of follow-up ($p<0.05$). Additionally, the test of independence performed at the bivariate level showed that sociodemographic factors such as age and working to earn money, sexual characteristics such as ever having sex and having sex within the last 12 months and age at which respondents knew their HIV status, as well as facility factor of being counselled by healthcare providers, showed statistically significant relationships with adhering to ART ($p<0.05$).

5.2 Main findings

The rate of adherence to antiretroviral therapy among adolescents and young people in this study was 69.9% (95% CI: 59.5% - 79.0%). This rate does not indicate optimal adherence since more than 95% adherence is required for the ART effectiveness to be achieved (Ghana Health Service & National AIDS/STI Control Programme, 2019). This finding is similar to other studies that reported low adherence to ART among adolescents, young people, and even adults living with HIV. For instance, a study conducted in Northwest Ethiopia among adults revealed 88.2% ART adherence which was lesser than the optimal 95% adherence required for ART effectiveness (Molla et al., 2018). Similarly in a study in Ghana among adolescents aged 7-18 years, the median adherence to ART was high (93.2%) but also sub-optimal,

though 47.5% of the children achieved more than 95% adherence in a study conducted in Ghana (Nichols et al., 2019). In a systematic review and meta-analysis on ART adherence among adolescents and young adults, only 62.3% were adherent, indicating that adherence is a real challenge among this age group (Kim et al., 2014).

In this study, it was found out that participants' age was related to ART adherence however the extent of this relationship could not be established. In a similar study, greater adherence was observed among adolescences older than 12 years but lower adherence was observed among adolescents lesser than 12 years of age (Brittain et al., 2018). Also, those of younger age were identified to have suboptimal adherence to ART in Thailand (Xu et al., 2017). Their level of understanding could explain their low adherence depending on their age.

It was also identified that the age of knowing one's HIV status was significantly related to ART adherence, however, this finding was not consistent with other studies. For instance, a study in South Africa reported that adolescents' knowledge of HIV-positive status was associated with higher ART adherence, however, it did not state their age of knowing their HIV status to be associated with ART adherence (Cluver et al., 2015). One systematic review further reported that many relevant studies highlighted adolescent's knowledge of their HIV status as potentially important themes for ART adherence among adolescents, but failed to indicate their age at which they became knowledgeable about the HIV status (Hudelson & Cluver, 2015). Though knowledge of HIV status influenced ART adherence, studies have not specifically documented the age of knowing one's status.

Among adolescents and young people interviewed in this study, having sexual intercourse within the last 12 months influenced their adherence to ART. A similar study in Asia showed that adolescents' sexual behaviors were the most common issues influencing their ART adherence (Prasitsuebsai et al., 2019). Adolescents living with HIV have risky sexual

behaviors putting their partners and society at risk (Zgambo et al., 2018). This suggests that interventions must be geared toward adolescents' sexuality while they are on ART.

Additionally, counseling was significantly related to ART adherence amongst adolescent and young people living with HIV. Similarly, a study in Uganda reported that counseling and supportive health care facilitated adherence to ART among adolescents living with HIV/AIDS (Nabukeera-Barungi et al., 2015). A study in Thailand also identified the importance of counseling in achieving ART adherence, however, such counseling was peer counseling and not from health professionals to adolescents (Xu et al., 2017).

From this study, the main contributing factor to ART adherence found was the means of follow-up. Adolescents and young people living with HIV and on ART who were followed up by health professionals through appointments, home visits, and phone calls achieved ART adherence. Many studies on factors associated with ART adherence among adolescents did not identify the means of follow-up as a contributing factor to ART adherence, however, among women living with HIV in São Paulo, Brazil, complying to medical follow-up was associated with adhering to ART (Corneli et al., 2016). More studies need to be conducted where follow-up would be studied extensively to see its effect on ART adherence among adolescents and young people living with HIV.

5.3 Limitations

The study was cross-sectional therefore causality could not be established which makes it difficult to draw strong conclusions with the findings of this study even though data was collected from 5 different health facilities. There was the likelihood of recall bias and social desirability due to the age category of people interviewed. They might have given responses that will not judge them. Additionally, the study could not achieve its calculated sample size due to the low number of young persons with HIV within the Grater Accra Region.

Nevertheless, the study was conducted in five different hospitals to realise its sample size, but that was not achieved. The study also, could not measure or assess the role of mental health on adherence. Despite these limitations, findings from the study point to the possible contributory factor associated with ART adherence amongst adolescents and young people receiving HIV care within hospitals in the Greater Accra Region of Ghana.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

The rate of adherence to ART among adolescents and young people receiving HIV care was suboptimal (69.9%) as it did not reach the required rate to achieve ART effectiveness and viral suppression. Participants' age, age at which they knew their HIV status, having sexual intercourse, and receiving counseling from healthcare providers were significantly related to ART adherence. Follow-up through phone calls and home visits was the main contributing factor to ART adherence among adolescents and young people living with HIV in the Greater Accra region of Ghana.

6.2 Recommendations

Based on the findings of this study,it is recommended that:

- Regular counseling should be provided by healthcare workers at each visit to adolescents and young people to encourage them to follow their medication regimen at all health facilities.
- Healthcare providers should follow-up adolescents and young people with HIV through phone calls and home visits as a means of encouragement to ensure adherence to ART.
- Researchers should investigate through further studies, the influence of follow-up visits on ART adherence amongst adolescents.

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APPENDIX 1: PARENTAL PARTICIPANT INFORMATION SHEET

Introduction

My name is Frances Odofuokor Lawson and I am a Master of Public health student at the School of Public, University of Ghana, Legon. I am the Principal Investigator (PI) conducting a research study entitled Factors contributing to adherence to Antiretroviral Therapy (ART) among adolescents living with HIV/AIDS at selected facilities in Greater Accra Region (GAR). I am asking you to take part in this research study because I am trying to learn more about antiretroviral adherence among adolescents living with HIV from age fourteen to nineteen years. This will take about 20-30 minutes of your time.

General Information

If you agree for your child to be in this study, he/she will be asked to complete a set of questions.

Possible Outcome

Your child's participation in this study will result in improving ART adherence to reduce morbidity and mortality in adolescents.

Possible Risks and Discomforts

The study does not possess any clinical risks to participants except that projected psychological and emotional discomfort may occur to participants due to the structure and nature of the questions. However, the Principal Investigator through a role play trained Research Assistants in a manner to administer the questionnaires such that this projected discomfort is averted.

Voluntary Participation and Right to Leave the Research

Your child can stop participating at any time if you feel uncomfortable. No one will be angry with him/her if he/she does not want to participate.

Confidentiality

Your child's information will be kept confidential. No one will be able to know how your child responded to the questions. His/her information will be anonymous.

Contacts for Additional Information

Your child may ask me any questions about this study. Your child can call me at any time on mobile number 0244423884 or email address frannort70@yahoo.com or talk to me the next time he/she sees me.

Your rights as a Participant's Guardian

This research has been reviewed and approved by the Ghana Health Service (GHS) Ethics Review Committee (ERC). If you have any questions please contact GHS-ERC Office between the hours of 8 am-5 pm through the landline *0302681109; 0302679323* or email addresses: ethics.research@ghsmail.com

Voluntary Agreement

By signing or making a mark or thumb printing below, it means that you understand and know the issues concerning this research study. If your child does not want to participate in this study, please do not sign this assent form. You and your child will be given this form after you have signed it.

APPENDIX 2: PARTICIPANT'S CONSENT FORM

Participant's Statement

I acknowledge that I have read or have had the purpose and contents of the Information Sheet read and all questions satisfactorily explained to me in a language I understand (English, Twi, Ga). I fully understand the contents and any potential implications as well as my right to change my mind (i.e., withdraw from the research) even after I have signed this form.

I voluntarily agree to be part of this research.

Name or Initials of Participant.....

ID Code .....

Participant's Signature .....OR, Thumb Print.....

Date: (dd/mm/yyyy) ...../...../20.....

Interpreter's Statement

I interpreted the purpose and contents of the Participants' Information Sheet to afore named participant to the best of my ability in the (Twi, Ga) language to his proper understanding. All questions, appropriate clarifications sort by the participant, and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter.....

Signature of Interpreter.....

Date: (dd/mm/yyyy) ...../...../20.....

Contact Details.....

APPENDIX 3: PARENTAL CONSENT FORM

Parental Statement

I acknowledge that I have read or have had the purpose and contents of the Information Sheet read and all questions satisfactorily explained to me in a language I understand (English, Twi, Ga). I fully understand the contents and any potential implications as well as my right to change my mind (i.e. withdraw my ward from the research) even after I have signed this form.

I voluntarily agree that my ward is part of this research.

Name or Initials of Participant's Parent/Guardian.....

ID Code .....

Participant's Signature .....OR, Thumb Print.....

Date: (dd/mm/yyyy) ...../...../20.....

Interpreter's Statement

I interpreted the purpose and contents of the Participants' Information Sheet to afore named Guardian/Parent to the best of my ability in the (Twi, Ga) language to his proper understanding.

All questions, appropriate clarifications sort and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter.....

Signature of Interpreter.....

Date: (dd/mm/yyyy) ...../...../20.....

Contact Details.....

APPENDIX 4: ASSENT FORM FOR 10 – 17 YEARS

Participant's Statement

I acknowledge that I have read or have had the purpose and contents of the Information Sheet read to me and all questions satisfactorily explained to me in a language I understand (English, Twi, Ga). I fully understand the contents and any potential implications as well as my right to change my mind (i.e. withdraw from the research) even after I have signed this form.

I voluntarily agree to be part of this research.

Name or Initials of Participant.....

Questionnaire Code .....

Participant's Signature ..... OR, Thumb Print.....

Date: (dd/mm/yyyy) ...../...../2020

Interpreter's Statement

I interpreted the purpose and contents of the Participants' Information Sheet to afore named participant to the best of my ability in the (Twi, Ga) language to his proper understanding. All questions, appropriate clarifications sort by the participant, and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter.....

Signature of Interpreter.....

Date: (dd/mm/yyyy) ...../...../20.....

Contact Details.....

APPENDIX 5: PRINCIPAL INVESTIGATOR AND WITNESS STATEMENT

Statement of Witness

I was present when the purpose and contents of the Participants' Information Sheet were read and explained satisfactorily to the respondent in the language, he/she understood (Twi, Ga). I confirm that he/she was allowed to ask questions/seek clarifications and the same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research.

Name.....

Signature..... OR, Thumb Print .....

Date: (dd/mm/yyyy) ...../...../20.....

Investigator's Statement and Signature

I certify that nature and purpose, the potential benefits, voluntary participation, and possible risks associated with participating in this research have been explained to the above individual.

Researcher's name.....

Signature .....

Date: (dd/mm/yyyy) ...../...../20.....

Mobile Number: .....

APPENDIX 6: QUESTIONNAIRE

Questionnaire Code | | | | Facility Code | | | | RA Code | | | |

Date of interview | d | d | m | m | y | y | Participant Identifier | | | | | | | | |

A: Sociodemographic Characteristics

Please select one response to each question or write your response if not in the options provided

Questions	Responses	Codes
1. How old were you on your last birthday?	..... years	*Enter number*
2. Record sex of respondent	a. Male b. Female	1 2
3. Where do you live currently?	.....	*Enter the name of the town*
4. With whom do you live currently?	a. Parents (both) b. Mother only c. Father only d. Siblings e. Alone f. Family member g. Others (*Specify*).....	1 2 3 4 5 6 7
5. What is your marital status?	a. Single b. Married c. Cohabitating d. Others *(specify)*.....	1 2 3 4
6. What ethnic group do you belong to?	a. Ga b. Ewe c. Akan d. Fante e. Hausa f. Others *(specify)*.....	1 2 3 4 5 6
7. Have you ever attended school?	a. Yes b. No	2 1
8. What is the highest level of school you completed?	a. Primary b. Junior high c. Senior high/Secondary/Vocational d. Tertiary	1 2 3 4
9. How many total years of education have you completed up to now?	..... years	Enter number
10. Do you work to	a. Yes	2

earn money for yourself?	b. No	1
11. What do you do to earn money?	a. Trading b. Hairdresser c. Seamstress d. Sex work e. Others *(Specify)*.....	1 2 3 4 5
12. What do you do with this money?	a. Personal needs b. For medications c. Give it to my family d. Others *(Specify)*.....	1 2 3 4
13. What religion are you?	a. No religion (Pagan) b. Christian c. Muslim d. Traditionalist e. Others *(specify)*.....	1 2 3 4 5
14. During the last 4 weeks, how often have you had drinks containing alcohol?	a. Never b. Everyday c. At least once a week d. More than once a week e. Others *(specify)*.....	1 2 3 4 5
15. During the last 4 weeks, how often have you smoked cigarettes or wee?	a. Never b. Everyday c. At least once a week d. More than once a week e. Others *(specify)*.....	1 2 3 4 5
16. During the last 4 weeks, how often have you injected hard drugs (like heroin)?	a. Never b. Everyday c. At least once a week d. More than once a week e. Others *(specify)*.....	1 2 3 4 5

B: Sexual History

17. How many sexual partners do you have in the last 12 months	a. None b. One c. Two d. Three e. Others *(specify)*.....	1 2 3 4 5
18. Have you ever had sexual intercourse? *(Sexual intercourse is defined as vaginal or anal penetrative sexual intercourse)*	a. Yes b. No	2 1
19. At what age did you first have sexual intercourse?	..... years	Enter number
20. Have you had sexual intercourse in the last 12	a. Yes b. No	2 1

months?		
21. What method of contraception did you use in your last sexual intercourse?	a. No contraceptives b. Emergency contraceptives c. Condom d. I am on pills e. I am on injections f. Others *(specify)*.....	1 2 3 4 5 6

C: Knowledge Opinions and Attitudes about HIV/AIDS

22. Have you ever heard of HIV or the disease called AIDS?	a. Yes b. No c. Don't know	3 2 1
23. Do you know anyone who is infected with HIV or who has died of AIDS?	a. Yes b. No c. Don't know	3 2 1
24. Can people protect themselves from HIV, the virus that causes AIDS by using a condom correctly every time they have sex	a. Yes b. No c. Don't know	3 2 1
25. Can a person get the HIV virus from mosquito bites?	a. Yes b. No c. Don't know	3 2 1
26. Can people protect themselves from HIV by having one uninfected faithful sex partner?	a. Yes b. No c. Don't know	3 2 1
27. Can people protect themselves from HIV by abstaining from sexual intercourse?	a. Yes b. No c. Don't know	3 2 1
28. Can a person get HIV by sharing a meal with someone who is infected?	a. Yes b. No c. Don't know	3 2 1
29. Can a person get HIV by getting injections with a needle that was already used by someone else?	a. Yes b. No c. Don't know	3 2 1
30. Do you think that a healthy-looking person can be infected with HIV, the virus that causes AIDS?	a. Yes b. No c. Don't know	3 2 1
31. Can a pregnant woman infected with HIV or AIDS transmit the virus to her unborn child?	a. Yes b. No c. Don't know	3 2 1

32. What can a pregnant woman do to reduce the risk of transmission of HIV to her unborn child?	a. Nothing b. Take her medications c. Take herbal medications d. Others *(specify)*.....	1 2 3 4
33. Can a woman with HIV or AIDS transmit the virus to her newborn child through breastfeeding?	a. Yes b. No c. Don't know	3 2 1
34. Is it possible in your community for someone to get a confidential test to find out if they are infected with HIV? *(By confidential, I mean that no one will know the result if you don't want them to know it.)*	a. Yes b. No c. Don't know	3 2 1
35. Did you voluntarily undergo the Voluntary HIV test, or were you required to have the test?	a. I have not done the test before b. Voluntarily c. Required	1 2 3
36. Do you know your HIV test result?	a. Yes b. No	2 1
37. At what age did you know about your HIV test result?	..... years	Enter number
38. Would you want your HIV status to remain secret?	a. Yes b. No	2 1

D: Adherence Barrier Questionnaire to Antiretroviral Therapy

39. Method of assessing adherence in the facility ***(To be determined by RA)***	a. Pill counting b. care givers report c. State of health d. Rate of default e. Irregular visit f. Viral load	1 2 3 4 5 6

Please select only one option for each question.

40. How sure are you that you will be able to take all or most of your anti-HIV medication as directed?	a. Not at all sure b. Somewhat sure c. Very sure d. Extremely sure	1 2 3 4
41. How sure are you that the anti-HIV medication will have a positive effect on your health?	a. Not at all sure b. Somewhat sure c. Very sure d. Extremely sure	1 2 3 4

42. How sure are you if you do not take your anti-HIV medication exactly as directed, the HIV in your body will become resistant to this medication?	a. Not at all sure b. Somewhat sure c. Very sure d. Extremely sure	1 2 3 4
People may miss taking their anti-HIV medications for various reasons. Here is a list of possible reasons why you may have missed taking your anti-HIV medications. If you have never taken anti-HIV medications, STOP.		
43. During the last month, have you been prescribed any anti-HIV medications?	a. Yes → Continue b. No	2 1
44. What medications are you currently taking?	List medication	1 2 3
45. What reactions have you had in the past 4 weeks of taking your medications	a. Rashes b. Weight loss c. Weight gain d. Vomiting e. Headache f. Fever persistent g. Cough	1 2 3 4 5 6 7
In the past month, how often have you missed taking your medications because:		
46. Did you want to avoid side effects?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 4
47. Of sharing anti-HIV medications with other family members and friends?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 4
48. Of religious beliefs?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 4
49. Of not fully understanding the anti-HIV medications and their requirements?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 4
50. Of traveling away from home (for example to work, family, friends)?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 4
51. Of transportation problems getting to the clinic?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 4
52. Of lost or stolen pills (for example, while in transit in	a. Never b. Rarely	1 2

taxi/bus/car/train)?	c. Sometimes d. Often	3 4
53. You had too many pills?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 4
54. You had a bad event happen that you felt was related to taking the pills?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 4
55. Did you forget?	a. Never b. Rarely c. Sometimes d. Often	1 2 4 5
56. Did you run out of pills?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 5
57. You were busy doing other things (for example, working, trying to survive, getting food)?	a. Never b. Rarely c. Sometimes d. Often	1 2 3 4

E: Clinical Factors

58. Height	..... *cm*	*Enter number*
59. Weight	..... *kg*	*Enter number*
60. Temperature	..... *°C*	*Enter number*
61. Blood Pressure	..... *mmHg*	*Enter number*
62. Pulse	..... *bpm*	*Enter number*
63. Which of the following have you ever experienced when tested positive for HIV?	a. No condition b. Weight loss c. Weight gain d. Tuberculosis e.	1 2 3 4 5
64. Currently what symptoms are you experiencing	a. No Symptom b. Sore throat c. Fever d. Skin rashes e.	1 2 3 4
65. How often do you test for viral load	a. Once a year b. Twice a year c. Thrice a year d. Others *(Specify)*	1 2 3 4
66. Current Viral load count ***(To be determined by RA)***	Date: *dd/mm/yyyy* Count:	66a. Enter date 66b. Enter the

	.....	number

F: Facility Factors

67. What are your experiences from health facilities where you receive care?	a. Blaming for immoral behavior b. Caring and compassionate care c. Gloves and mask use for routine task d. Gossip e. I am not allowed to ask questions f. Long waiting time g. Name-calling h. Status of HIV reveal to others i. Unfriendly looks j. Others *(specify)*.....	1 2 3 4 5 6 7 8 9 10
68. Is there an adolescent-friendly service in the facility where you receive care?	a. Yes b. No c. Don't know	3 2 1
69. Do healthcare providers count your pills or ask about the number of pills you have left?	a. Yes b. No c. Don't know	3 2 1
70. Do you receive counseling from your providers?	a. Yes b. No	2 1
71. Through what means do healthcare providers reach you for follow up?	a. Appointment Card b. Phone call c. Home Visit d. Caregiver support e. Others *(specify)*.....	1 2 3 4 5

G: Community Level Factors

72. Who supports you to take your treatment?	a. No support b. Parents c. Family members d. Friends e. NGO f. Others *(specify)*.....	1 2 3 4 5 6
73. What type of support do you get from 71 above?	a. Financial support b. Psychological support c. Material support d. Others *(specify)*.....	1 2 3 4
74. Where do you seek	a. Prayer camps	1

additional care for your condition?	b. Herbalist c. Fetish Priest d. Churches/Mosque e. Others *(Specify)*	2 3 4 5

Thank you for participating.

APPENDIX 7: ETHICAL APPROVAL LETTER

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
GPS Address: GA-096-3303
Tel: +233-302-681109
Fax + 233-302-685424
Email: ethics.research@ghamail.org

My Ref: GHS/RDD/ERC/Admin/App/[illegible]
Your Ref. No.

19th June, 2020

Frances Odofinarkor Lawson
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 065/02/20**
Project Title	Factors Contributing to Antiretroviral Therapy Adherence among Adolescents and Young Persons Living with HIV in five Healthcare settings in Greater Accra Region
Approval Date	19th June, 2020
Expiry Date	18th June, 2021
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.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

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. James Ayamdi
(Head, Ethics & Research Management Department)

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