AN ASSESSMENT OF DRUG ADHERENCE ON HIV POSITIVE SECONDARY SCHOOL STUDENTS AT COMPREHENSIVE CARE CENTRE, KENYATTA NATIONAL HOSPITAL.

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JULY, 2017
DECLARATION

This research project is my original work and has never been presented in any other university for any other award.

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Declaration by the supervisor

This research thesis was prepared and submitted by the candidate for examination with my approval as University Supervisor.

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DEDICATION

I would like to dedicate this work to my parents and siblings whose dream was to enable me realize my desire for highest level of education.
ACKNOWLEDGEMENT

First, with humility and gratitude, I thank and praise God for healthy body, mind and soul throughout life especially this study period. I am greatly indebted to my supervisor Dr. Diana A. Opollo, for her unconditional assistance during my study period, preparation and presentation of this document. In addition, I cannot forget my family, for their inspiration, moral support and patience during my class workseason. Lastly, I accord appreciation to friends, colleagues, classmates and the entire Management University of Africa staff fraternity during class season culminating into this meaningful project document.
ABSTRACT
Global drug adherence was advocated because non-adherence was documented as the commonest reason for treatment failure, potential risk for drug resistance, increased health costs or death from opportunistic infections such as Tuberculosis, pneumonia and meningitis. Unlike, well documented global plagues and holocausts description, HIV/AIDS has two differentials: it does not cause rapid death after infection and has affected the young productive citizens whom the economy and family survival depends on. Thus, thorough understanding of determinants of adherence to ART was inevitable. The UN 2030 advocacy policy on ending HIV/AIDS, Kenya has expanded national ART coverage tremendously with adults receiving ART increasing from 55.3% in 2008 to 70.4% in 2009. This necessitated the intensity for more ART programs in Kenya for successful control, prevention and treatment of HIV/AIDS related morbidity and mortality among citizens aged 15 to 64 years. Thus, Kenya’s socio-economic growth and development towards vision 2030 blue print is directly affected by national demographic structure, education and health status. This retrospective, cross-sectional study aimed at assessing ART drug adherence among active Adolescents living with HIV/AIDS at Comprehensive Care Centre, Kenyatta National Hospital from 2nd May 2016 to 31st July 2017. Participant medical, clinic attendance and pharmacy records were reviewed. A secondary data abstraction questionnaire was used to collect demographic data and optimal ART drug adherence indicators categorized as gender, prescribed ART regimen, viral load and consistent clinic attendance records from the clinic’s electronic Health Management System. The findings were analyzed, presented in graphs and charts. It was observed that there was more male participant (52.7%) than female (47.3%) participants. Male participants 35.2% and female 30.8% had undetectable viral loads (> 50 copies/mL of blood). A recommendation shared with clinic manager was to fast track implementation of adolescent/youth friendly ART services in differentiated care approach.
ACRONYMS AND ABBREVIATIONS

HAART : Highly Active Antiretroviral Therapy.

HIV : Human Immunodeficiency Virus.

AIDS : Acquired Immunodeficiency Syndrome.

ART : Anti-Retroviral Therapy.

ARV : Anti Retro Viral.

CDC : Centre for Disease prevention & Control.

CCC : Comprehensive Care Centre

KNH : Kenyatta National Referral and Teaching Hospital

FDC : Fixed Dose Combination Drugs.

WTO : World Trade Organization

SDG : Sustainable Development Goals.

MDG : Millennium Development Goals.

MOH : Ministry of Health

NASCOP : National HIV/AIDS and Sexually Transmitted Diseases Control Program.

DOTS : Directly Observed Treatment Short course
OPERATIONAL DEFINITION OF TERMS.

Children: These are individuals aged below 15 years from birth(Patateam, 2015).

Adolescence: it is a consistent period of physical, emotional, mental and physiological development for persons aged 10 to 20 years(UN, July, 2016).

Comprehensive care: the ability of a healthcare worker to offer holistic focused services to a patient within an approximate environment i.e. a one stop shop for patients(KAIS, 2013).

Adherence: this is the ability of a patient to follow and stick on agreed instructions by a healthcare professional for a predetermined outcome such as improved patient immunity(UNAIDS, 2014).

Immunity: the ability or power of the body to fight against specific disease causing microorganisms circulating in a person’s blood stream or in the tissues(Helen, 2002).

Viral load: the number of HIV viruses present in a person’s blood stream measured in number of copies per millilitre (UNAIDS, 2016). Undetectable viral load is a situation when the HIV RNA copies cannot be detectable clinically by standard viral load tests; usually below 50 copies/millilitre of blood.

Fixed dose combination: it is a drug preparation method aimed at delivering more than one drug into a single formulation, for easier prescription and consumption by a diseased patient(Davies, 2013).

Regimen: it is a cocktail of drugs targeting microorganism especially virus at varied points of contact with the host(WHO, 2015).
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CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter entails the background of the study, statement of the problem, objectives of the study, research questions, and significance and scope of the study. This was to offer guidance to the researcher in conducting the study in accordance with the laid down procedures.

1.1 Background of the Study

Global economic growth and development has been defined as the advancement of people's socio-economic framework. Unlike growth (short term), development is a process of consistent, long-time and sustainable improvement of the social, economic and environmental pillars of a society. From an economic perspective, quality education has several direct and indirect outcomes such as increased human capital in labour force thus fostering entrepreneurial and innovation capacity resulting into higher output equilibrium levels of products and service industries as well as transmission of knowledge and skills into people’s livelihoods (Eric & Wobmann, 2007). Consequently, the indicators of growth and development include improved literacy levels, quality, accessible and affordable health services, improved physical infrastructure and adoption of democratic political principles. Moreover, food and socio-economic security as well as peaceful co-existence of citizenry, aimed at fostering social integrity and upholding of universal human rights for sustainable human dignity. Therefore, public, private and civil society groups and agencies spend massively on prevention, care and treatment of diseases in efforts to combat poverty, illiteracy, and poor physical infrastructure.
In global and national agenda, such as United Nations (UN), World Trade Organisation (WTO) and regional summits, primary healthcare service delivery is a constitutional right visiblysignalling stable and secure state. In addition, global Sustainable Development Goals (SDGs) global partnerships in research and development have emphasised on basic healthcare, especially prevention, care and treatment of HIV/AIDS. A healthy nation is a wealthy nation thus inevitably; healthcare and education are fundamental stimuliforsustainablehousehold and national cumulative growth and development.

Advancements in antiretroviral drugs (ARVS) - medications used in combating HIV/AIDS - have resulted in precipitous declines in HIV/AIDS associated morbidity and mortality. In USA, (Sari, Brandon, Carey, Steven, & Margie, 2009) studies conducted on HIV-infected youth (aged 13 to 24 years) on adherence to antiretroviral regimens and interventions, was insightful on this subject. It proved that within broad contextual youth tailored ART drug adherenceinterventions,clear understanding of HIV stigma, disclosure status, caregiver stress, peerpressureandrelationships, reproductive health, mental health and substance use as well as theindividualattitudeonlong termmedications factors is vital. It also noted that secondary HIV prevention measures amongyoung people represent possible modality for delivering individual-tailored ART medication adherence skills. Thus, offering improvedroutine counseling on antiretroviral medication adherence.

According to the Centers for Disease Control and Prevention (CDC), an estimated 5,259 young people aged 13 years to 24 years received HIV /AIDS diagnosisin the United States in 2006, (25% increase from estimate diagnosed cases among youth in 2003). The researchers demonstrated thatfreedom ofadolescents and young adults living with HIV/AIDS to manage their HIV positive lifestylethrough consistentroutine ARVS has caused revolutionofHIV/AIDS into a

Currently, an estimated 36.7 Million people worldwide are living with HIV/AIDS, with approximately 52% residing in Sub-Saharan Africa (SSA). HIV has increasingly become chronic managed disease triggering global ARVS roll-out efforts to infected persons. HIV/AIDS infected persons receiving antiretroviral therapy services (ART), have increased by a third since 2013. Observably, in 2015 approximately 17 Million (46%) persons received ART drugs globally. Meanwhile, HIV/AIDS comprehensive care and treatment success required sustainable supply of ART commodities to health facilities and consistently lifelong counseling sessions on importance of ART drug adherence to prescribed treatment regimen (Tessa, Joyce, Sigrid, Susan, & Krestin, 2016). Unlike the bubonic plagues of the middle ages in Europe, HIV/AIDS was described different in two aspects: first, after initial infection, the body’s immune system can fight the virus for longtime hence no rapid illness or death. Secondly, the plagues killed people of all ages yet HIV/AIDS primarily infect and affect young and middle aged of whom, the economic growth and family survival depend on (Helen, 2002).

Poor adherence to medication regimens accounts for substantial worsening of disease, death, resistance and increased health care costs in the United States. According to Blaschke (2005), of all medication-related hospital admissions in the United States, 33 to 69 % are due to poor medication adherence, with a resultant cost of approximately $100 billion annually. In treatment of people living with HIV/AIDS, it is essential to achieve more than 95 % adherence to highly active antiretroviral therapy (HAART) for optimal suppression of viral replication and prevention of resistance strains emergence. Achieving such high rates of adherence is very
challenging to such patients. In addition, ART drug regimen include multiple, (often expensive) medications that have complex dosing schedules, several pills, drugs or food interactions and widespread side effects, resulting to poor regimen tolerability and non-adherence to ART medication (Stare, 2001).

Drug adherence experienced by HIV positive adolescents was important on improved treatment outcomes options resulting in vast number of publications focusing on this subject. World Health Organization (WHO) has intensified advocacy on the provision of antiretroviral therapy (ART) to reduce Acquired Immune Deficiency Syndrome (AIDS) related deaths and alleviate fears about HIV/AIDS. Therefore, global drug adherence has been advocated because non-adherence was the commonest reason for ART treatment failure, potential risk for development of drug resistance and unnecessary death from resultant opportunistic infections such as pneumonia and meningitis. Globally, by 2015 approximately, 10 Million (54%) people living with HIV/AIDS were on ARVs resulting into HIV related deaths reduction to below 0.5 Million in all age groups (UNAIDS, 2016). Meanwhile, India and China have many people living with HIV/AIDS due to high population with contrasting lower national disease prevalence (Helen, 2002, p. 8).

Subsequently, transmission of first-line ART drug resistant strains has increased demand for second and third line treatment drug regimen, often associated with poorer patient health outcomes and increased healthcare costs. Muchangi, Star Kenya newspaper (2016), reported that in sustainability of the gains made in HIV, malaria, tuberculosis and immunization programs, Kenya national government health care budget had increased from 47.4 Billion (4% of National Budget) in 2014 to a 60.26 Billion in 2017 budget estimates. This has demonstrated efforts to retain Millennium Development Goals gains combating HIV/AIDS and re-emergent opportunistic diseases including Tuberculosis (TB).
In embracing global UN advocacy policy, Kenya expanded its ART coverage tremendously with percentage of adults receiving ART increasing from 55.3% (2008) to 70.4% (2009). Consequently, there is need for increasingly intensified ART programs in Kenya for successful treatment, control and prevention of HIV-related morbidity and mortality among 15 to 64 years aged citizens largely affecting country’s economic growth. In accordanceto Kenya Aids Indicator Survey (2012), out of the national population of 38 Million, estimated 1.2 Million constitutes People Living with HIV/AIDS yielding 5.6 % national HIV infection rate, not uniformly distributed within all counties. In response, Kenyan government rolled out freeARVs, through its National Aids & STI Control Program (NASCOP), aimed at lowering HIV-related morbidity and mortalities.

However, studies have shown that drug adherence has remained a clear challenge despite the provision of free and accessible quality HIV/AIDS medication and related services. In 2014, strategic Kenya HIV prevention revolution road map to vision 2030 by the Ministry of Health (MOH), recommended the integration and implementation of the UN global policy on 90-90-90 (test 90% of all contacts, 90% of those found HIV positive, enrolled on ARVS and 90% of these should attain optimal viral suppression) to curb the scourge. Meanwhile, Art drug non adherence risk factors differ broadly, necessitating context-specific development of individual profiles. This was to enable healthcare providers focus on patient - tailored care to avert costly risk of non-adherence (Wanja, 2016).

NASCOP (2013) revealed that gender and age constituted factors for sharp non uniform rise in HIV prevalence in Kenya counties. It was observed that prevalence among young girls and women rose from 2.1 among 15-24 years aged to 10.5% among 25-35 year aged, despite more treatment coverage (52% among women to 41% in men). Therefore, adolescents and youth
cannot be ignored in the efforts to reverse and end the scourge by 2030. Thus, for optimal socio-economic growth and development in Sub Saharan Africa (regionbearing global HIV/AIDS disease burden of up to 80%), the youthARTdrug uptake and subsequent adherence to medication, was vital for retention on care (UNAIDS, 2014).

In conclusion, according to Kenya National Bureau of Statistics of 2015, Nairobi County had population of 4,232,087 comprising of approximately, 2.0M males (49%) and 2.1M female (51%) with children population composition of 34% and 18% of 15-24 years aged. In addition, the county had prevalence of 6.1% of which estimated 7.6% women and 4.7% men, 14% aged 15-24 years and 5% children less than 15 years of age, demonstrating HIV/AIDS infection vulnerability in females aged more than 25 years in the city. Thus, Nairobi County had ART drug coverage of 87% and viral suppression rate of 28% necessitating intensified HIV testing, counseling and linkages to care for maximal viral suppression (NACC, 2016).

1.1.1 Profile of Comprehensive Care Centre, Kenyatta National Hospital (CCC-KNH).

Kenyatta National Hospital was established in 1901 as native civil hospital with two ward capacity. In 1922 it grew into a 423 bed service facility for Africans and 41 beds for Asian communities. In 1952 it was renamed King George VI Hospital through British Protectorate Governor’s order. After Kenya’s independence, it was renamed in honor of first President, Mzee Jomo Kenyatta and changed its status from a department in the Ministry of Health into a state corporation through legal notice no.109. Kenyatta National Hospital maintains its global, regional and national status as Centre of excellence in provision of specialized health care services with bed capacity of 1800 (50 wards), 209 beds for private wing, 22 outpatient clinic services and 6000 staff. Its HIV/AIDS Centre of excellent, Comprehensive Care Centre (CCC- KNH) is a specialized outpatient clinic managed by a director of special programs in the hospital
organogram with collaborative internal and external partners. It has units headed by team leaders and 60 staff membership, delivering HIV/AIDS and related healthcare service points of care to approximately 10,000 clients (children, adolescents, youths and adults). Currently, CCC-KNH mandate includes Teaching and Referral Hospital services in the provision of specialized health care, research and development to actively participate in National health planning and policy formulation. It visualizes an intention to be a world class, patient-centered specialized care hospital.

1.2 Statement of the Problem

In Kenya, HIV/AIDS was declared nation disaster in 1999 with a preference on children and adults in both national policies and service delivery. Thus, for too long, the adolescents have been invisible in national plans, policies and budgetary allocations and actual point of care targeting that age group. This resulted in high HIV/AIDS related cross transmissions, more hospitalizations and missed school time due to opportunistic diseases and resultant unnecessary death. Recent executive government efforts and presidential declarations on youth agenda, has escalated embankment on UN commitment to eliminate this scourge by 2030. Meanwhile, ART enrolments for all HIV positively tested persons with no consideration for age, gender and socio-economic status is ongoing. ARVs have been denoted globally as miracle cocktail of medications that have elevated infected people’s survival rates hence longevity of life. Thus, ART drug adherence was critical in attaining and maintaining quality lifestyles for infected and affected population. Measuring adherence has been highlighted as a complex, expensive and unexploited undertaking in sub Saharan Africa region. Thus an ideal ART drug adherence measurement instruments was classified as either direct or indirect for reliability, affordability and practicability with low participant and staff burden. Whereas developed countries used direct
sophisticated biological technologies such as blood-drug concentration profiling for drug adherence monitoring of patients, developing countries relied on indirect adolescents self-reporting, Directly Observed Therapy Short course (DOTS) and used clinical evaluation as well as pharmacy record methodologies. The authenticity of actual medication consumptions has been ‘wait and sees’ phenomenon in our Kenyan resource limited settings. Moreover, adolescent age group has been demanding, dynamic and dilemma-filled group irrespective of HIV/AIDS status. Therefore, adherence to ARV medications for optimal and long term outcomes; undetectable viral loads, optimal immunity, quality of life and low scourge transmission, in adolescents and youths living with HIV/AIDS remains thorn in the flesh globally. Quality education and healthcare services is among the cardinal components of socio-economic growth and development. Valid government and civil society reports have demonstrated that high HIV/AIDS infection, more opportunistic infections prevalence, high number of disease resistance strains and high mortality are a critical aspect in this cohort, for sustainable combat against HIV/AIDS. Seemingly, ART drug adherence in adolescents is directly or indirectly affected by consistency in clinic attendance for routine checkup and number of prescribed medication. Objectively, the study aimed at assessing determinants and outcomes of optimal adherence to ART medication among the adolescents. Furthermore, it aimed at establishing the role of gender and viral load on ART drug adherence among HIV-positive secondary school students attended, at Comprehensive Care Centre, Kenyatta National hospital within the previous 15 months.

1.3 Objectives

1.3.1 General Objectives

This study aimed at assessing ART drug adherence among HIV positive Secondary School students at Comprehensive Care Centre, Kenyatta National Hospital.
1.3.2 Specific Objectives

a. To assess the effect of gender on ART adherence among adolescents aged 15 to 20 years receiving ART care at CCC-KNH.

b. To determine the relationship between pill burden among adolescents and ART drug adherence.

c. To assess the role of adolescent viral loads in optimizing ART drug adherence.

d. To determine the effect of consistent adolescent clinic attendance on ART drug adherence.

1.4 Research Questions

i. How does gender influence ART drug adherence in adolescents receiving care at CCC-KNH?

ii. To what extent does pill burden affect ART drug adherence in adolescents living with HIV/AIDS at the CCC-KNH?

iii. To what extent does viral load play a role in adolescents ART drug adherence?

iv. How does consistent scheduled clinic attendance influence ART drug adherence?

1.5 Significance of the Study

Adherence to ART medication regimens has been monitored since the time of Hippocrates, when the effects of various options were recorded with notations of whether patients had taken them or not.
1.5.1 Adolescent and Youth

The study has enabled school going HIV positive adolescents understand the role of status disclosure, acceptance and adherence to life-long ART medication. Unlike children and adults, adolescents and young adults are mostly excluded from many global and national strategies to curb the scourge. Thus, adolescents’ received inadequate support during transition from childhood to adulthood and creating gaps in health care service delivery. As they transition into education systems, they are expected to take charge of their individual health as well as be oriented to their mental predisposition as adults. Thus, they are under self-care, with unforeseen issues on status disclosure, fear of stigma from routine environment as well as emphasised daily, timely, lifelong taking of drugs. This resulted in complex hindrance factors to effective, efficient and quality oriented HIV/ AIDS prevention, care & treatment. The was need for continued emphasis on routine adolescent ART adherence counselling to influence factors such as number of prescribed drugs, clinic attendance, timely consumption of the medication and viral load measurements for optimal ART drug adherence realisation.

1.5.2 Researchers

HIV/AIDS is a chronic disease with a milliard of complexities hence this study has provided insights on need for consistent communication and understanding of ARV medication adherence and incorporation of school support system among adolescents and youth. It also aimed at establishing gaps in health care service providers and related stakeholders such as secondary school institutions, caregivers and executive policy framework. Measurable adherence indicators such as school holiday scheduled clinic attendance, bi-annual viral load, and
disclosure status as well as gender factors impacted on adolescent friendly healthcare service provision nationally.

1.5.3 CCC- KNH Management

With the global efforts to end HIV/AIDS by 2030, locally the programs to combat the scourge required consistent partnership inputs with statistical basis in routine service provisions. Thus the organisation’s management team has benefited from the information collated in demonstrating practical ART medication adherence indicators in active adolescents, within the previous 15 months. An adolescent friendly service as well as emphasis on individualised differentiated care in long-term disease such as HIV/AIDS was targeted as basis for learning and improving treatment, care and prevention of other chronic disease in the cohort group.

1.6 Scope of the Study

This study aimed at assessing, identifying and summarizing determinants and outcomes of ART drug adherence among HIV-positive secondary school students at Comprehensive Care Clinic, Kenyatta National Hospital (CCC-KNH), in Nairobi County. This retrospective cross sectional study considered only active HIV positive adolescents / youth aged 15 to 20 within 15 months commencing 2nd May 2016 to 31st July 2017. In reference to CDC policies, which form basis for NASCOP guidelines, optimal ART drug adherence was considered to be acceptable at greater than 95%. This implied that in 30 days the participant is expected to miss not more than three drug doses. The capability to accurately monitor ART drug adherence and its consequential outcome was crucial for retention of participants into beneficial ART care and sustainability.
1.7 Chapter Summary

Despite global achievements in health past the 1950s, more people die of preventable, non-communicable diseases such as diabetes, cardiovascular, measles, malaria and malnutrition. With 1980s emergence of HIV/AIDS; immunity compromising disease, healthcare sector has observed rapid emergence of curable yet deadly opportunistic infections such tuberculosis, pneumonia, malaria and meningitis requiring long-term and costly treatments as well as resultant unnecessary death. Therefore, ART drug adherence has remained a global challenge and cannot be further ignored despite intensified collaborative efforts to scale up provision and access to free and quality ARVS medications towards an HIV/AIDS free generation by 2030. Clearly, Everett Koop’s (Blaschke & Lars, 2005), statement that drugs do not work in patients who do not take them, captured the importance of ART medication adherence.
CHAPTER TWO

LITERATURE REVIEW

2.0 Introductions

This section involves review of the literature and findings from other studies carried out in the past on this related area of study. It further, involves use of presently availed knowledge, skills and experiences as well as industrial reports to assist in reviewing the work from earlier researchers on the subject. Theoretical review aims to establish the existing investigative literature on ground breaking hypothesis for testing in HIV/AIDS infections. Moreover, empirical review show cases knowledge obtained from observed or measured actual experience rather than belief. Therefore, this section highlights on past and ongoing studies on adolescent / young adult issues that influence adherence to HIV/AIDS medication and their outcomes.

2.1 Theoretical literature review

Since the early 1980s discovery of HIV infection in the US, there has been a profound engagement in the knowledge and skills to first understand the infection and establish methodologies to curb its spread. However, being an immune compromising infection, spread mainly through blood and other body fluids from infected persons, HIV/AIDS has grown into a public health problem. Globally, the main mode of infection spread has been noted as consented or non-consented sexual exposures thus made scholars categorize HIV/AIDS as a sexually transmitted disease like gonorrhea and syphilis. However, intensive studies have refuted this angle by introducing the subject of vertical mother to child transmission, which has resulted into strategies to curb generational spread of HIV/AIDS through prevention of mother to child transmission (PMTCT). With intensified research and development efforts, antiretroviral therapy (ART) was introduced to objectivity rejuvenate an infected individual’s body immune system.
despite limited knowledge on drugs side effects, sustainable supply and adversity on long-term use. Thus, the global partnerships efforts were incorporated in the 2000-2015 UN Millennium Development Goals (MDG) strategy for equitable availability and accessibility of ART services to all. Thus, the United State Presidential Emergency Plan for Aids Relief in developing and under developed countries (US-PEPFAR), was coined under 43rd US president George W. Bush administration and propagated by his successor.

According to UNAIDS children HIV factsheet (2016), it was observed that 77% of pregnant women living with HIV meaning that 3 in every 5, had access to ART in 2015, through prevention of mother to child transmission programs (PMTCT). Thus, about 150,000 children became HIV positive compared to a high of 490,000 in 2000. However, it stated that only 54% of the children exposed to the scourge in 21 highest disease burden countries were tested within recommended two months. This was due to inaccessibility to the centralized complex diagnostic laboratory technology and long queues waiting for results by post-delivery mothers. Therefore, it was clear that the only method to establish HIV/AIDS status of individuals at any age was through specific HIV testing and counseling services (HTC), whether voluntarily (VCT) or by healthcare provider initiatives (PITC). Consequently, an estimated 1.8 Million children (under 15 years) were captured as living with HIV/AIDS while only 49% had access to life saving ART drugs compared to 21% in 2010.

Meanwhile, HIV/AIDS was noted as cardinal cause of death among 15 - 19 year olds globally and second in Sub-Saharan Africa (SSA). Furthermore, it was approximated that half of adolescents living with HIV/AIDS are in just six countries namely South Africa, Mozambique, Kenya, Tanzania, Nigeria and India. In addition, 7 in 10 new infections among adolescents in SSA are girls due to factors such as non-comprehensive HIV knowledge, early traditional
marriage practices, multiple sexual partnerships, and low income earnings in households (Patateam, 2015).

In Kenya, the HIV/AIDS prevalence among adults aged 15 to 64 years has been 5.6% with non-uniformed distribution pattern in all counties, resulting into a 1.2 Million, representing 6.8% of persons living with HIV/AIDS in Sub Sahara Africa. Notably in 2011, the annual new HIV infection was as high as 13,510 persons in Nairobi and as low as 10 in Wajir counties. In addition, gender and age factors were demonstrated as vital factors in the sharp rise of HIV prevalence in Kenya. Thus, prevalence among girls and young women rose from 2.1% among 15-24 year olds to 10.5% amongst 15-35 year age group. Nationally, two cross sectional based surveys were carried out in 2007 and 2012 to monitor HIV epidemic changes, evaluate preventive, care and treatment measures for surveillance on national demographic, behavioral attitudes and blood specimen’s collections and analysis from 18 months aged babies to 64 years aged adults. Conclusions demonstrated that national adult (15-64 years) HIV prevalence decreased from 7.2% in KAIS 2007 to 5.6% in 2012 with a 0.9% in children (KAIS, 2013).

2.1.1 Fixed-dose drug combination theory

With intensified global scientific and technological advancements into research and development division in healthcare provision, morbidity levels have increased significantly. Lifestyle disorders such as hypertension and diabetes as well has high mortality in fatal infections such as malaria, tuberculosis and immunity compromising disorders mainly HIV/AIDS have required multiple classes of medications for optimal short or long term individualized health output. An open label randomized control clinical trial to establish the effect of fixed dose combination treatment of cardiovascular patient drug adherence in Australia concluded that fixed dose combination drug delivery modality was highly acceptable to patients and healthcare
practitioners. It was observed that there was significant improvement of 81% in long term cardiovascular medication adherence compared to 46% on single medications care (Vanessa, et al., 2014). In addition, there was continued reformatory agenda in development of efficacious, less complex, synergistic drug combinations for easier regulation in manufacturing, optimal cost by healthcare service providers and easy administration to the end user for optimal adherence benefits (Jeremy & Scotts, 2011).

In 21st century healthcare evolution, it was observable that successful efforts in combating tropical diseases such as Malaria and Tuberculosis, with multiple synergistic medications in fixed dose efficacious drug combinations was adopted in management of HIV/AIDS as well as its co-morbidities in Sub-Saharan Africa. According to Davies (2013), transitioning from 3-separate Antiretroviral medications into a once a day single (FDC) tablet was beneficial to the supply chain management team, prescribers and patients reducing pill burden to guarantee long-term ART drug adherence.

With longevity of life among infected individuals, HIV/AIDS programs have been cornered into addressing ART drug adherence in prevention, care and treatment routine protocols. Uguru and Eneh (2013) conducted a survey to objectively determine factors affecting adherence to pediatric ART in Part Harcourt, Nigeria and observed that barriers to adherence were largely attributable to caregivers. It was reported that patient factors such as age, literacy levels, gender of the child, type and duration of ART did not significantly affect ART drug adherence. However, it was documented that predictors of good adherence outcomes included disclosure of HIV status, regular clinic attendance and self-owed strategy for medication taking reminders in achieving minimal forgetfulness.
2.1.2 Behavior change theory

In treatment sustainability of chronic diseases, patient focused status disclosure and mental predisposition on healthcare benefits from long-term medication is paramount for successful health service provision. Thus, consistent patient focused counseling should be incorporated in the establishment of rational human behavior in development and implementation of strategies to promote sustained medication adherence. Behavior change theory has been found useful in long term Tuberculosis and HIV/AIDS medications use at all age levels (Salla, Simon, Tanya, & Jimmy, 2007).

Behavior is an attribute of routine patient habits focused on intrinsic and extrinsic driving forces towards consistent self-awareness, timely clinic appointment that result into better ART drug adherence outcome. It was notable that health beliefs, relationship coherence and habit strengths played vital roles in adolescent, youth and adult HIV/AIDS treatment goals namely significantly sustainable viral suppression, stabilized immunity recovery and elimination of opportunistic infections amalgamating into improved individual quality of life (Leigh, 2011).

The 2014 Kenya National adolescents and youth package of care guidelines initiatives significantly emphasized on strict ART drug adherence for immediate and long term benefits to adolescents living with HIV/AIDS. Reproductive health knowledge and skills are some of behavior change focused pillars in achieving reduced risk of HIV transmissions and unintended pregnancies (NASCOP, 2015). Further to this, multidisciplinary team decisions and multi sector approach was advocated in the efforts to end HIV/AIDS among adolescents and young adults; especially in differentiated patient care service such as PMTCT, infant and children as well as adolescent / youth friendly services at all primary healthcare service provision points.
According to Ulrike G.Nandra, UNICEF Kenya AIDS program chief, for too long HIV/AIDS infected adolescents and youth have been ignored both in planning and policy at national and county budgetary allocations, resulting into unexpectedly high HIV related unnecessary deaths. The ability to accurately and appropriately monitor and timely address medication adherence was highlighted as a national challenge. However, advocacy groups such as Sauti-Skika with approximate membership of 1000 youths put hope on the executive government commitments such as President Kenyatta’s initiatives on linkage of schools with health facilities with readily available and accessible free ART services provisions nationally (Njanja, 2015).

2.2 Empirical literature review

In evidence based literature, medication non-adherence is a glowing concern to clinicians, healthcare systems and other stakeholders specifically in chronic disease management such as diabetes, tuberculosis, hypertension and HIV/AIDS. There is mounting evidence that ART drug non-adherence is prevalent and associated with adverse outcomes as well as high healthcare costs among household, business and national stakeholders. The objective of this study was to assess ART adherence among HIV positive adolescents at Comprehensive Care Centre, Kenyatta National Hospital. Objectively, optimal ART medication adherence indicators namely patient pill burden, consistent clinic attendance, patient gender and viral load records was scrutinized and analyzed.

2.2.1 Gender and ART drug adherence

In the children and adolescents 2015 statistical updates, Michel Sidibe (UN executive director) emphasized that ending HIV/AIDS epidemic by 2030, was dependent on social justice which constituted equity in education, employment and health for both girls and boys empowerment on own health choices(Patateam, 2015). For decades HIV/AIDS has continued to be a thorn in flesh
of public health sector globally. By 2001 estimates, more than 28.5 Million people were living with HIV/AIDS in Africa comprising approximates of 70% of World’s people living with HIV/AIDS. According to Helen (2002, pp. 12), from Ethiopia to Botswana countries, one (1) person in every ten (10) persons aged 15-49 years, had HIV confirmed infection. Thus, SSA population average life expectancy was estimated to have been lowered from 62 years to 47 years by HIV/AIDS scourge.

Meanwhile, adolescence is a transitory age marked with rapid developmental, emotional and social changes in both girls and boys. Several AIDS fora, have observed that they are underserved by HIV/AIDS services globally, resulting into high risk of loss to follow up and low ART medication adherence. Notably, several barriers are faced in this age group towards early adulthood healthcare service provisions including ethical-legal and policy issues on consent for HIV testing and counseling services, enrolment and retention into HIV/AIDS care systems. Thus, adolescents living with HIV/AIDS needed equitable, acceptable, accessible, age appropriate, effective and durable services to foster social support, retention into care for harmonized combat against ART medication non-adherence. Subsequent trade-off between infection transmission risks and benefits of early ART initiation, provided by the right person, in the right way and to the right person, empowered the emergence of Adolescent Friendly HIV healthcare service global centers (WHO, 2015). These are strategies aimed at ensuring that adolescents are diagnosed early, timely enrolled into ART medication, and appropriately supported for maximal retention into care.

According to Kedney (2014), United Nations Population Fund estimated that there was global young people (10-24 years) demographic surge of approximately 1.8 Billion. The researcher demonstrated that this population dividend is culminating into destabilized countries in the
region unless political leaders and other global stakeholders work harder and in partnerships to secure access to sexual and reproductive health services, education and employment opportunities for young people. Further, he statistically demonstrated that 6 out of 32 low literacy leveled countries are in Sub Sahara Africa with a further projection of 60% young people population growth by 2030. Thus, with global challenges of universal high quality education, unemployment, emerging and re-emerging disease trends in regard to substantial population changes in Asia and African continents, HIV/AIDS is critical in 2030 Sustainable Development Goals attainment. UN population (2015, May, p.4) compared trends in population, age structures, youth employments, gross domestic products (GDP) and per Capita in Tunisia and Republic of Korea. It concluded that there was necessity for informed investment in youth age group for optimal realization of next generation of innovators, entrepreneurs; change agents and global leaders for utilization of any nation’s demographic dividend mainly in economic growth and development agenda.

A repeated cross sectional survey with unlinked anonymous blood sampling at the antenatal clinic in Zambia, aimed at examining social demographic HIV prevalence patterns and trends, and demonstrated that HIV/AIDS was highly prevalent in children bearing women. The study covered 27 areas in Zambia sampling 11,517 children bearing women within a 2-4 year period. Thus, with exception of 15 to 19 years age group, findings demonstrated an exponential trend in HIV infection despite increased educational attainment. It was highlighted that urban residing women scooped 25 to 35% infection prevalence in comparison to rural residency at 8 to 16% respectively. It was observed that tendencies of changing social status were a sign of ongoing process of significant behavior change in HIV/AIDS combat(Fylkeynes, et al., 1997).
Due to biological and anatomical differences between girls and boys, HIV/AIDS has been shown to affect more girls than boys. Thus gender in terms of cultural and socio-economic factors has blamed for more girls being HIV infected than boys as well as higher number of non-adherence trends in adolescent group. Thus Robert Shaffer’s general statement that healthcare teams ought to view adolescents not as bottles to be filled but candles to be lit for global achievement of an HIV infection free generation by 2030 proclaims necessity for holistic approach into ART drug adherence. Cheruitich et al (2012) through a study on HIV, sexual partnership and behavior among adolescent girls (15-19 years) in Nairobi demonstrated that many girls experienced sexual debut compared to same age boys. Thus, they are likely to report transactional or non-consensual sexual contact from multiple adult partners annually, risking early pregnancies, sexually transmitted diseases (STD) and ultimately HIV infections.

According to Heesterman, et al (2017), scaling up of ART drug use resulted in higher life expectancy hence patients’ medication adherence follow up was paramount subject. The Main determinants of non-adherence established in the study included; use of alcohol, male gender dominance, use of traditional and herbal medicine, dissatisfaction with healthcare facility and healthcare workers, depression, discrimination and stigmatization, and poor social support. In addition, the reviewed findings established promoters of ART drug adherence as consistently age appropriate counseling and education interventions, memory aids, and active disclosure among people living with HIV for support system.

### 2.2.2 Pill burden and ART drug adherence

Reaching for excellence in Adolescent care and health project (REACH study) enrolled 161 human adolescent subjects from 13 cities in US to find out ARV medication adherence among HIV adolescents infected through sexual contacts and drug injecting abuse modalities. It
revealed that 7% could not identify their drugs, 11% missed at least one drug and 83% used ARV medications erratically. However, 41% of the sampled adolescents reported full adherence to medication. Findings indicated that optimal adherence of above 95% to all medications resulted to reduced viral loads and high levels of immune cells above 500 copies per mL of blood. In addition a trend was postulated between number of prescribed drugs and optimal ART drug adherence. REACH study concluded that strict adherence to HAART was critical for sustained viral suppression to ensure immune reconstitution and decreased ART drug resistance selection trends for future treatment options (Murphy, Wilson, Dunako, Belzer, & Muenz, 2010).

In addition, (McConnell, Robert, Mary, Sharon, & Tamara, 2005) established with clarity that the US HIV infected children are aging while using ARVs for extended periods of time. Thus HAART has achieved low mortality and higher life expectancies of the seropositive children and adolescents into adulthood. It was observed that continued changes in ARV regimen, effective modification of ARV formulations in affordably, accessible, quality and fixed dose combinations (FDC) resulted into sustainability of the gains achieved. However, in resource limited settings such as SSA, timely supply of high quality and functional ARVs as well as skills, knowledge and equipment for timely, intensified and comprehensive testing of ARVs effectiveness on users body, was still challenging. Thus, ART drug adverse reactions and opportunistic infections case findings were dependent on high index of suspicion of the healthcare workers.

In linking ART drug adherence to immunological and virological parameters in regard to gender and age, a descriptive study by Jobanputra et al (2015) in Swaziland, established that advanced disease patients had high viral loads hence less likely to achieve desirable viral undetectable levels (< 50 viral copies/mL of blood). They further observed that treatment support tended to improve adolescent adherence to both scheduled clinic attendance and medication taking.
Therefore, consumption of ARVs was aimed at viral suppression and immune reconstitution whose outcome was better quality of life and minimal re-infection rates. Subsequently, number of prescribed drugs regimen directly influenced adherence level to medication and resulted into vulnerability to selective drug resistance as well as virological failures (Harrigan, Dong, & Woodward, 2005, pp. 339-47).

The National target of 80% HIV testing and counseling was necessary to formulate appropriate HIV preventive, care and treatment service. In 2007 it was stated that only 36% of Kenyans population had tested for HIV despite 83% willingness for household testing. Moreover, barriers such as limited access to the service due to sites distance and limited education were cited. It was demonstrated that household HIV testing rates increased with education level; 56.3% for those reporting no primary education and 74.3% for those with secondary education or higher (Anne, Wanjiru, & Andrea, 1999). Kenya expanded ART coverage tremendously with percentage of adults receiving ART increasing from 55.3% in year 2008 to 70.4% in 2009. This consequently intensified the need for more ART programs in Kenya for successful control and prevention of HIV/AIDS related morbidity and mortality among 15 to 64 years aged citizens. Notably, no absolute instrument to measure ART adherence has been developed to holistically be considered valid, reliable and logistically practical with low healthcare staff and patient burden. Thus complexity of HIV medication has dictated use of more than 3 drugs from at least 2 of readily available ART drugs into one prescription. Embracing malaria and tuberculosis program initiatives to reduce pill burden, fixed dose drug combinations were developed and sensitized in adolescent HIV/AIDS package of care. This was aimed at addressing number of pills taken in specified timings of the day by an individual with regard to adolescents schooling schedules.
2.2.3 Consistent scheduled clinic attendance and ART drug adherence

Sub-Saharan African region bears burden of social, economic and political factors that directly makes its constituents countries vulnerable to emergent life threatening diseases such as malaria, tuberculosis and HIV/AIDS. A study conducted in Kayunga district hospital, Uganda demonstrated that out of 392 adults prospectively monitored in over 28 weeks on clinic attendance, 361 (92%) kept all appointments as an effective measure for optimal medication adherence. The findings informed on the conclusion that good medication adherence for durable viral suppression entailed appropriately scheduled clinic appointments keeping despite reasons such as forgetfulness, economic difficulties on transport fares and diverse caregivers and patients travels (Sector, John, & Eric, 2010).

With rapid initiatives to intensively counsel and test global citizen through the UN 90:90:90 policies to end HIV/AIDS by 2030, many infected children, adolescents and adults were initiated on ART medication with resultant improvement on virological and immunological markers. According to NIH (2014), viral loads assessment, aided by consistently, scheduled clinic attendance every 3-6 months was mandatory. This was amalgamated into improved survival rates and management of HIV/AIDS as other chronic diseases with long-term use of medication where pill fatigue was inevitable.

2.2.4 Viral load and ART drug adherence

Objectively, the cardinal ART drug adherence goal was to achieve significantly persistent and durable viral suppression hence efficient viral load control and immune cell monitoring was vital. Research indicated that undetectable Viral load indicator constituted HIV-RNA measures of 20-75 copies in milliliter (mL) of blood, (standardized undetectable viral load of < 50 viral copies) achievable within 8-24 weeks of initiation into ART care and treatment. These
participants’ viral loads reflected acceptable adherence behavior on appropriately informed, selected and prescribed ART medications to the right patient during well-timed clinic attendance (NIH, 2014). A study by Nachega et al (2009) to establish the influence of age (11-19 years and adult subjects between 1999-2006), virological and immunological indicators on ART drug adherence concluded that adolescents in Southern Africa are less adherent (20.7% at 6 months and 6.6% at 12 months) to these medication resulting into low rates of immunological recovery and erratic viral suppression than adults (40.5 % and 20.6% respectively). In addition, it was observed that adolescents achieving 100% adherence within 12 months on ART drugs had significantly shorter time of viral rebound than adults.

Studies continually demonstrated relationship between immune cells and viral loads in people living with HIV/AIDS. Recently, it was established that there was significantly consistent relationship between gender, immunity cells and viral loads in ART initiated individuals. Findings from greater than 30,000 blood samples of people living with HIV in US and Netherlands indicated that women had higher viral loads than men when with 50 immune cells per mL of blood and lower Viral loads with greater than 350 cells per ML of sample blood (Donnelly, et al., 2005). ART drug dose timing was influenced by school schedules, education support systems and number of prescribed drugs (ART regimen) resulting into high (unsuppressed) viral loads (> 1000 copies/mL) and subsequent changes into second or third line ART treatment regimen.

2.3 Summary and Research gaps

For decades, HIV/AIDS has continued to be the growing global public health problem necessitating multi-sector and multi-disciplinary combative efforts to achieve the desired UN 2030 HIV/AIDS free generation target. UNAIDS (2016) indicated that ignorance,
misunderstandings, discriminatory attitudes and behaviors, facilitated by punitive laws, policies and non-committal political executives, continued to undermine effectiveness and efficiency in fast track HIV/AIDS free societies. In low income countries especially Kenya bearing population of approximately 44M and 6.8% of Gross Domestic Product (GDP) expenditure on healthcare, adolescent ART drug adherence assessment was inevitable. Unlike many chronic diseases such as diabetes and hypertension, whose drug regimens remain effective after eminent treatment interruptions and resumptions, non-adherence to ART medications was noted as unforgiving hence focused prevention of HIV infection and sustainability into ART care was paramount.

2.4 Conceptual framework

Figure 2.1: Diagram showing relationship between theories, dependent and independent variables

<table>
<thead>
<tr>
<th>Theories</th>
<th>Independent variables</th>
<th>Dependent variable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behaviour change</td>
<td>Gender of patient</td>
<td>ART drug ADHERENCE</td>
</tr>
<tr>
<td></td>
<td>Pill burden</td>
<td>among adolescent</td>
</tr>
<tr>
<td>Fixed dose drug combination</td>
<td>Clinic attendance</td>
<td>with HIV/AIDS.</td>
</tr>
<tr>
<td></td>
<td>Viral load</td>
<td></td>
</tr>
</tbody>
</table>
2.5 **Operationalization of variables.**

HIV diagnosis, enrolment into long-life ARVs medications, adolescent disclosure status and secondary school education support system directly influenced optimal ART drug adherence. Scheduled clinic attendance and number of prescribed ART drugs were reviewed in regard to laboratory viral load reports of adolescent participant aged 15-20 year within stipulated 15 months of study. All independent variables were demonstrated to be impactful on optimally acceptable ART medication adherence of greater than 95%. Therefore, ART drug adherence was multidimensional phenomenon whose indicators included consistent clinic attendance, number of pills consumed by participant, viral load measures as well as gender influence on the desirable outcome.

**Table 2.5: Table showing the operationalization of study variables.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indicator</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male or Female</td>
<td>Patient records</td>
</tr>
<tr>
<td>Pill burden</td>
<td>ART treatment regimen</td>
<td>Patient records</td>
</tr>
<tr>
<td>Clinic attendance</td>
<td>Scheduled attendance dates</td>
<td>Patient records</td>
</tr>
<tr>
<td>Viral loads (copies/mL)</td>
<td>Viral loads lab results</td>
<td>Patient records</td>
</tr>
</tbody>
</table>
2.6 Chapter summary.

Adolescence is the bridge age group between children and adults who enjoy self-independence on healthcare subject. It is an age where post basic education was aimed at transforming an individual into an informed, rational thinker problem solver and decision maker. It is characterized by rapid developmental, emotional and social changes where HIV/AIDS adds to the complexity. On initiating free ART programs, drug adherence counseling was cardinal for every patient / caregiver and reinforced on the subsequent clinic attendance. Longevity of life in patients optimally adherent to ART drugs necessitated strategic multi-sector and multi-disciplinary approach involving all relevant stakeholders to achieve increased advocacy trend on differentiated ART care and treatment. Intentional adoption and implementation of adolescents’ friendly healthcare services concept characterized by equity, accessibility, affordability, acceptability and age focused programs was beneficial. Thus post primary school adolescent involvement improved optimal ART drug adherence trends, decreased / delayed sexual debut and pregnancy rates. In conclusion, lifelong process of appropriate information and attitude acquiring fostered self-awareness and life skills attitudes such as self-care, decision making, problem solving and relationships yielding holistic approach in adolescent HIV/AIDS care.
CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter entails the description of methods applied in carrying out the research study. It was organized under the following subsections: research design, target population, sample design and instruments use, incorporating ethical consideration on participant privacy protection. It also incorporated how data was collected, analyzed and presented embracing participant information confidentiality for authenticity and reliability of output.

3.1 Research design

The researcher undertook the retrospective cross sectional study on adolescents living with HIV/AIDS, aged 15 to 20 years, at CCC-KNH for the previous 15 months commencing on 2nd May 2016 to 31st July 2017. This period enabled participants’ assessment within three consecutive school holiday scheduled clinic attendance with at least one viral load laboratory report. Thus, participants’ health records were reviewed from the clinic’s electronic management system in use.

3.2 Target population

According to NACC (2016 pp.148) Nairobi county had 14% adolescents living with HIV/AIDS. Unpublished 2016 report demonstrated that CCC-KNH had 800 adolescents taking ART drugs. For reliability threshold, 91 active adolescents recorded into the clinic electronic health management system and initiated on ART treatment within the study period dated 2nd May 2016 to 31st July 2017 and aged 15 to 20 years of age was considered as part of the study population.
3.3 **Sample and sampling technique**

Using purposeful non probability sampling design, all 91 active adolescents recorded into the clinic electronic system aged 15 to 20 years, within the study period of 2nd May 2016 to 31st July 2017 were considered as study participants.

3.3.1 **Inclusion criteria**

All active adolescents aged 15 to 20 years who received adolescent living with HIV/AIDS care and recorded into the clinic’s electronic management system within the study period.

3.3.2 **Exclusion criteria**

All adolescents living with HIV/AIDS aged below 15 years or above 20 years or within specified age group but have not been initiated on ART treatment within the stated 15 months of study. In addition all inactive, transfer out and deceased participants were excluded for consistency, reliability and objectivity threshold.

3.4 **Instruments**

The researcher with assistance from designated data clerk used tailored data abstraction questionnaire that emphasized on five study components. For objectivity of the study, the components considered included age, gender, ART treatment regimen, laboratory viral load reports and scheduled appointment. The sample abstraction questionnaire used was attached in the appendix for authenticity.
<table>
<thead>
<tr>
<th>No.</th>
<th>Components of data abstraction</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age</td>
<td>15-20 years old</td>
</tr>
<tr>
<td>2.</td>
<td>Gender</td>
<td>No. of male and female</td>
</tr>
<tr>
<td>3</td>
<td>ART treatment regimen</td>
<td>ART drugs prescribed</td>
</tr>
<tr>
<td>4.</td>
<td>Scheduled clinic appointments</td>
<td>Attendance dates</td>
</tr>
<tr>
<td>5.</td>
<td>Viral loads report</td>
<td>Lab Viral copies/mL</td>
</tr>
</tbody>
</table>

3.5 Validity

Upon submission of the official introduction letter (appendix), researcher accorded authority from the clinic manager and an assistance by a designated professional health records staff. He explained data abstraction procedure from the clinic’s electronic health management system in use into an excel sheet for easier management. The data abstraction questionnaire was observed to be objective, accurate and specific on study subject.

3.5.1 Reliability

Researcher’s use of accurately obtained secondary data on 91 active adolescent participants living with HIV from the clinic health management electronic system has ensured data reliability within Nairobi County and beyond.

3.6 Data collection procedure

With the assistant accorded by designated data clerk, a five-main component data abstraction questionnaire design was adjusted, piloted on digital standard queries from electronic health management system in use. It was approved and data was collected, cleaned and saved in Microsoft excel sheets for easier analysis. The researcher ensured all necessary components were captured on by reconfirming the study objectives and research questions. In precision, participant
anonymity, privacy and confidentiality was an absolute ethical consideration thus no participant bio data was obtained for identity by researcher.

3.7 Data analysis and presentation
With assistance from designated data clerk, obtained data was organized and presented in tables, charts and graphs to demonstrate relationship between conceptualized valuables in the study area of adolescent ART drug adherence.

3.8 Ethical considerations
For privacy and confidentiality of institution participant health record and reports, written permission was sought and data clerk assigned by clinic manager in confidence to access and obtain only necessary data. This was upon presentation of the official school introductory letter for project data collection. On completion of the study, clinic manager was informed of researcher’s official termination of data collection period for only academic purpose.

3.8.1 Informed consent
In precision, a data abstraction questionnaire was prepared for use during data collection. Participants’ names and clinic’s evident serialized unique patient numbers was excluded.

3.8.2 Voluntary participation
Participant secondary data was obtained from the clinic electronic health management system in-use via a simplified highly specific data abstraction questionnaire approved by the clinic manager with no direct participant engagement.

3.8.3 Confidentiality
Data was obtained from the clinic electronic system, cleaned, analyzed and presented without direct encounter with the participant with supervision and assistance by the designated data clerk.
3.8.4 Privacy

The participant data was provided by the authorized healthcare professional with minimal participant physical encounter or bio data to fulfill desired academic purpose only. The findings were not to be published without written and approved authority from the clinic manager.

3.8.5 Anonymity

Participant direct engagement, names and clinic unique serialized identity was purposefully omitted by researcher to ensure anonymity.

3.9 Chapter summary

In precision, it was notable that there was emphasized objectivity on collecting authentic data and analyzing it through standardized technique to obtain accurate, relevant, valid and reliable output. It further demonstrated use of specific research instruments for data collection such as specific designed secondary data abstraction procedures. Participants’ dignity and anonymity were purposefully protected for intended beneficial outputs to all relevant stakeholders. Thus, Ethical consideration was inevitable in this study due to sensitivity of the data obtained.
CHAPTER FOUR

INTRODUCTION

4.0 Introduction

This chapter gave the data analysis of the study findings which were collected and analyzed by the researcher using quantitative and qualitative methods to obtain better understanding of study findings and the objectives. The findings were organized and presented into tables, graphs and charts for study objectivity.

4.1 Findings.

4.1.1 How does gender influence ART drug adherence in adolescents receiving care at CCC-KNH?

Table 4.1: Table showing gender differentiation of participants

<table>
<thead>
<tr>
<th>Gender</th>
<th>Participant</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>48</td>
<td>52.7</td>
</tr>
<tr>
<td>Female</td>
<td>43</td>
<td>47.3</td>
</tr>
<tr>
<td>total</td>
<td>91</td>
<td>100</td>
</tr>
</tbody>
</table>
Figure 4.1 demonstrated that study participant differentiation on gender basis was 48 male accounting for 52.7% and 43 female representing 47.3% of the study population of 91 (100%) participants. According to PataTeam (2015) report, ending HIV/AIDS in sub-Saharan Africa by 2030 was dependent on gender equity for social justice constituting education, employment and health. This pie chart demonstrated 5.4% difference in gender ART drug access and use in adolescents living with HIV/AIDS at CCC-KNH from May 2016 to July 2017. The gender ratio of 52.7% (boys) against 47.3% (girls) demonstrated need to intensify ART drug access and use by the Kenyan adolescent population living with HIV/AIDS to cover the > 5% difference in ART drug adherence for a sustainable active population.
4.1.2 To what extent does viral load play a role in adolescent ART adherence?

Table 4.2: Table showing the participants Viral loads.

<table>
<thead>
<tr>
<th>VIRAL LOADS</th>
<th>Gender</th>
<th>Number of participants</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Un detectable (&lt; 50)</td>
<td>Male</td>
<td>32</td>
<td>35.2</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>28</td>
<td>30.8</td>
</tr>
<tr>
<td>Suppressed (51-999)</td>
<td>Male</td>
<td>7</td>
<td>7.7</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>7</td>
<td>7.7</td>
</tr>
<tr>
<td>Un suppressed (&gt; 1000)</td>
<td>Male</td>
<td>8</td>
<td>8.8</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>8</td>
<td>8.8</td>
</tr>
<tr>
<td>Without viral loads</td>
<td>Male</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>91</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 4.2: Diagram showing the participants Viral loads values.
Figure 4.1 demonstrated four participant viral load categorization in both male and female as either undetectable (< 50 copies/mL of blood) bearing 32 male (35.2%) and 28 female (30.8%). This category of participant represented 66.1% of participants’ diligent beneficiaries of optimal adherence to ART drugs. Second category showed that an equal of 7 male and 7 female participants had attained viral suppression (<1000 viral copies/mL of blood). This implied that ART drugs were achieving their goal of durable viral suppression and subsequently improved immunity system. The third category portrayed that an equal ratio of male (8) and female (8) participants had unsuppressed high viral loads. It was indicative of poor ART care and treatment output and possibility of severe opportunistic infections such as tuberculosis and meningitis. This supported the needed intensive individualized adolescent ART drug adherence counseling to address underlying factors such as pill burden and poor clinic attendance. In regard to Nachega et al (2009) study whose conclusion that adolescents (11-19 years) in southern Africa were non-adherence to ART drugs resulting into low immunity and unsuppressed viral loads than adults, seemed the true in CCC KNH from the findings. The last category showed only a single person had no viral load laboratory results. On further inquiry the researcher was informed of two possibilities: the participant had either transferred himself out of the clinic without official notification to another center. He might also be experienced ART drugs fatigue and solely decided to take unsupervised drug/pill holiday. The designated study data clerk was obligated to urgently notify clinic social work team for further individualized follow up and inquiry on this participant. He was found fairing physically well and seemingly not under parent or guardian care and acknowledged avoiding access to laboratory services but taking ART drugs diligently.
4.1.3 To what extent does pill burden affect ART drug adherence in adolescent living with HIV/AIDS at the CCC-KNH?

Table 4.3: Table showing the type of ART drug regimen prescribed

<table>
<thead>
<tr>
<th>Drug regimen</th>
<th>Gender</th>
<th>Participants</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed dose combination (2-drugs)</td>
<td>Male</td>
<td>23</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>21</td>
<td>23%</td>
</tr>
<tr>
<td>Fixed dose combination (3-drugs)</td>
<td>Male</td>
<td>16</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>18</td>
<td>20%</td>
</tr>
<tr>
<td>3 or more Single drugs</td>
<td>Male</td>
<td>9</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4</td>
<td>4%</td>
</tr>
</tbody>
</table>

Pill burden was the measure of number of drugs pill prescribed and taken as a course of treatment by an individual participant. *Table 2* indicated that 2-drugs fixed dose combinations were taken by 23 male and 21 female participants accounting for a total of 44%. In addition, 16 male and 18 female were observed to be taking 3-drug fixed dose combinations representing 34%. Further, it showed that 9 male (10%) and 4 female (4%) participants respectively, were consuming more than three drugs in non-combined formulations. Thus, more participants were on fixed dose drug combinations resulting in better ART drug adherence outcomes such as high number of participants (35.2 % male & 30.8% female) with undetectable viral loads. However, an equal number of 39 participants both gender were observed to have been on fixed dose combinations. Vanessa et al (2014) indicated that “*there is significant improvement in long-term cardiovascular medication (81 %) compared to 46 % participants on single formulation medications.*” It was noted that a significant 10% male and 4% female participant respectively were on single agent drugs.
4.1.4 To what extent does duration on ART drugs influence adolescents’ drug adherence?

Table 4.4: Table showing the duration the participants has been on ART drugs

<table>
<thead>
<tr>
<th>Duration (Months) on ART drugs</th>
<th>Gender</th>
<th>Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 30 days (1month)</td>
<td>Male</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0</td>
</tr>
<tr>
<td>31 to 90 days (1-3 months)</td>
<td>Male</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1</td>
</tr>
<tr>
<td>91 to 180 days (3-6 months)</td>
<td>Male</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1</td>
</tr>
<tr>
<td>181 to 360 days (6-11 months)</td>
<td>Male</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>3</td>
</tr>
<tr>
<td>Greater than 361 days (&gt; 12months)</td>
<td>Male</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>39</td>
</tr>
</tbody>
</table>

Figure 4.3. Diagram showing the duration (Months) of participants on ART drugs.
Figure 4.3 illustrated that there was not even one participant enrolled on ART care in under 1 month duration and only one female had taken ART drugs for 3 months only. In a progressivetrend participants on ART drugs are demonstrated to be increasing with over 3 months duration observing 2 male and 1 female and then 3 female and 1 male in less than 12 months respectively. Subsequently, majority participants were on treatment above 12 months (39 female and 46 male participants) during the study period. Further, it portrayed that more male (46) participants were on ART drugs compared to 39 female in the same study population. Thus, the majority of the study participants (85) were experiencing more than 12 months on ART drugs hence assessing optimal ART drug adherence outcomes was sufficiently valid.

4.1.5 How does consistent scheduled attendance influence ART adherence?

Tables 4.5: Table showing participantsscheduled clinic attendance period in Months

<table>
<thead>
<tr>
<th>Duration of Appointments (Months)</th>
<th>Gender</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>1</td>
</tr>
<tr>
<td></td>
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<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>Male</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>21</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Male</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>6</td>
</tr>
</tbody>
</table>
Figure 4.4: Diagram showing relationship between consistent clinic attendance and ART drug adherence.

Figure 4.4 observably indicated that of 91 participants 6 female and 1 male were attended during clinic appointments in a month and 1 male and 3 female participant in two months duration. In addition, 3 male and 6 female attended in 6 months while 4 male and 2 female were attended in five months period. The scheduled clinic attendance visibly peaked during 3 & 4 months periods bearing attendance of 14 male and 23 female compared to 18 male and 21 female in respective months. Thus, participants living with HIV/AIDS attended at CCC-KNH seemed to be beneficiaries of clinic’s holiday scheduled adolescents attendance hence optimal ART drug adherence assessment was varied.
4.2 Limitations of the study.

The study was limited to 15 months commencing 2\textsuperscript{nd} May 2016 to 31\textsuperscript{st} July 2017 among 15-20 year old adolescents living with HIV/AIDS actively served at CCC-KNH in Nairobi County. Inactive participants as well as active but non-ART initiated participants were excluded. Absence of participants during school session was overcome the researcher’s request to collect secondary data from the clinic’s electronic system assisted by an authorized data clerk. Other challenges included access to my supervisor due to unforeseen illness with a systemic predetermined graduation timetable. The challenge was overcome unconditional delegation to her colleague for supervision and researcher’s consistency in faith and prayers for quickest recovery.

4.3 Chapter summary.

The findings analyzed in this chapter indicated that gender was influential on ART drug adherence in adolescent participants in this study compared to national adult report demonstrating more female on ART than their male counterparts. In addition pill burden, viral load measures and clinic attendance were confirmatory indicators of optimal ART drug adherence outcomes in combating adolescent HIV/AIDS to achieve the UN 2030 AIDS free vision. Thus numbers, figures and tables were adequate visual aid in making objectively rational decisions and policy formulation.
CHAPTER FIVE

SUMMARY, RECOMMENDATION AND CONCLUSIONS

5.0 Introductions.

This chapter encompassed the finalization of the study where the researcher made summary from the findings in relation to the study objectives and research questions. Further the researcher drew conclusions that directly informed the recommendation to the beneficiaries in the study area. A conclusion that amalgamated entire document to the topic and objectives was carried out. Notably, public health goal in ART provision was maximal viral suppression for maximizing adolescent population survival rate through use of limited available resources.

5.1 Summary of findings.

Objectively, the researcher aimed at assessing ART drug adherence among adolescents aged 15-20 year within a 15 months period at CCC KNH. With the aid of clear, definite secondary data abstraction questionnaire, data was organized and presented into tables and figures to answer research questions appropriately.

5.1.1 Effect of gender on ART drug adherence

It was observed that more male (52.7%) were on ART treatment than female (42.7%). NACC (2016) had however demonstrated that Nairobi County had 6.1% HIV/AIDS prevalence that estimated 7.6 % in women and 4.7 % in menand was inference that female gender than men were more vulnerable to HIV/AIDS in the city. Thus more boys were on ART drug Adherence due to enrolment into ART care by their HIV positive mothers’ prior to teenage year’s contribution significantly into more male on ART drug adherence than female in that age group.
5.1.2 Relationship between pill burden and ART drug adherence
According to patateam (2015) report, adolescent living with HIV/AIDS was rampant globally and Kenya and India were listed high. Thus co-morbidities of HIV/AIDS remained key factor in adolescent prescription writing. Jeremy and Scotts (2011) advocated for fixed dose drug concept to ease pill burden, lower production costs and enhance end-user ease of administration. The researcher found out that there were more participants on 2-drugs and 3-drugs fixed dose combination than single drugs resulting into many participants with low viral loads and optimal 3 or 4 months holiday scheduled clinic attendance at CCC KNH.

5.1.3 Viral load as an indicator of ART drug adherence
According to UNAIDS (2016) virological parameters were modern and most efficient indicator of poor ART drug adherence. Further, it highlighted that HIV/AIDS infected person’s immune recovery rebound effect was closely witnessed in high viral loads individuals. Thus in adolescent participants reports assessed, 60 were confirmed with undetectable VL and 14 maximally suppressed. Consequently, only 16 participants demonstrated ART drug poor adherence having observed that 13 participants were on single drugs treatment regimen with a possibility of pill burden effect.

5.1.4 Effect of consistent clinic attendance by adolescents
Sector et al (2010) conducted a study in Kayunga hospital Uganda and confirmed that adherence to scheduled clinic was essential in ART drug adherence determination. Unlike children who were under the guardianship of parents and appointed caregivers, adolescents assumed individualised care which hindered consistency in clinic attendance and prescribed regimen actual consumption. It was observed that 3 and 4 months clinic schedules were directly influenced by school holiday. Thus, it was concluded from the findings that the participants’
Clinic attendance was directly and significantly impacted by adolescent living with HIV/AIDS ART drug adherence and individual case clinic tailored follow-up.

5.2 Recommendations

The assessment conducted by the researcher recommended that UN 2030 vision to end HIV was achievable with intensive, effective and efficient systems on HIV testing and early detection of ART treatment failure indicators and adoption of appropriate and timely steps for sustainable healthcare youthful population dividends.

5.2.1 Adolescents / youth and trainings.

KAIS (2012) indicated that approximately 1.2 Million were persons living with HIV/AIDS. It further indicated that only 70% of adults’ had access to ART drugs. Unlike, children and adults, adolescents cannot be treated as small adults or big children in combat against HIV/AIDS scourge. The researcher has recommended intensified implementation of adolescents’ friendly clinic to foster early HIV testing, status disclosure and enrolment into ART care. It will influence both retention and sustainability of the transitioning infected adolescents into adulthood. ART rooted on multi-sector and multi-disciplinary approach for ultimate success. The researcher recommends annual systematic review of adolescent information materials for updates in this technology focused era to maintain healthy nation, wealthy nation mantra. Reproductive health, life skills and routine post primary education curriculums should be regularly inspected for quality age-appropriate information updating on adolescence as well as adolescence living with HIV/AIDS. Therefore, appropriate, consistent, age-focused information retain high stature in the fight against and elimination of adolescence ART drug adherence.
5.2.2 Research, development and policy

Through science based evidence decision making process is made easier and informative. Research and development units’ responsibility in public, private, academic and business sectors is to keep abreast with emergence issues to support policy formulation. HIV/AIDS in adolescents is still poorly understood due to its complexity and diversity of considerations in relation to well-studied adults and children. Thus more collaborative and partnerships are cherished for innovative technology and information on dynamic HIV status. This study has provided an insight to the fact that there were more adolescent boys than girls living with HIV in Nairobi County. Use of accurate secondary data from on-going authentic systems made the findings more reliable in follow up specific studies such as adolescent self and community stigma factors or trends. These would directly inform on adolescents group policy changes and adoptive training in diverse sectors of Nairobi county and national economy. The management of CCC KNH has partnered with public, private and independent minded individuals in combating adolescent HIV/AIDS scourge.

5.3 Conclusion.

Despite three decades on HIV/AIDS studies, no vaccine or cure exist. Thus appropriate use of available ART drugs for sustained viral suppression remains paramount. Adolescent HIV/AIDS is a ground breaking opportunity to facilitate the UN policy on 2030 AIDS frees generation. This assessment study has demonstrated that gender, viral loads, consistent clinic attendance and pill burden directly influenced ART drug adherence in adolescent age group within the study period. Thus defined role of care givers and guardians and education system in the fight of adolescent HIV/AIDS and ART drug adherence cannot be further ignored.
REFERENCES


Wanja, C. (2016, June 7). First lady Margaret Kenyatta appreciates Kenyans support to Beyond Zero campaigns. *PSCU*.

APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

Date: 25th September 2017

TO WHOM IT MAY CONCERN

GERALD MUTEMBEI KIAMBI - BDS/9/00059/1/2015

This letter serves to introduce the above named who is a Bachelors of Arts in Development Studies (BDS) student and is interested in carrying out research on An assessment of drug adherence on HIV positive secondary school students at the comprehensive Care Centre. A case study of Kenyatta National Hospital.

Any assistance accorded to him in pursuit of this study will be greatly appreciated.

Yours Sincerely,

Dr. John Chelugei
Dean, School of Management and Leadership
APPENDIX II: DATA ABSTRACTION FORM

1. Participant Date of Birth

2. Participant Age (years)

3. Participant Gender: Male ☐ Female ☐

4. Participant enrolment date on ART drugs

5. Participant ART regimen category:
   - 3- Drug FDC ☐
   - 2 - Drug FDC ☐
   - Single Drugs ☐
   - Any other regimen (specify) ………………………..

6. Participant duration on ART since enrolment (days).
   - < 30 days ☐
   - 90 days ☐
   - 180 days ☐
   - 360 days ☐
   - >365 days ☐
7. Participant latest viral load (VL) measures:

- Undetectable VL (< 50 copies/mL)
- Suppressed VL (51-999 copies/mL)
- Not suppressed VL (>1000 copies/mL)

8. Participant clinic attendance schedules dates (Days)

- <30 days
- 60 days
- 90 days
- 120 days
- >120 days
# APPENDIX III: WORK PLAN

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<th>AUG</th>
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## APPENDIX IV: RESEARCH STUDY BUDGET

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