ACCEPTANCE AND COMMITMENT THERAPY IN THE PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV PROGRAM AMONG PREGNANT WOMEN LIVING WITH HIV IN SOUTH WESTERN STATES OF NIGERIA

ACCEPTANCE AND COMMITMENT THERAPY IN THE PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV PROGRAM AMONG PREGNANT WOMEN LIVING WITH HIV IN SOUTH WESTERN STATES OF NIGERIA

ADEYINKA GANIYAT ISHOLA

RN, RM, RNE, ROHN, B.Sc (Nursing Education), MSc (Mental Health Nursing), MSc (Bioethics)

Student No 3279761

Degree of Doctor of Philosophy

A thesis submitted to the School of Nursing, Faculty of Community and Health Sciences, the University of the Western Cape, Bellville, South Africa, in fulfilment of the requirements for the degree of Doctor of Philosophy.

Supervisor: Prof. Jennifer Chipps

November, 2017

ABSTRACT

The objective of this study was to determine if introducing acceptance and commitment therapy in the prevention of mother to child HIV transmission (PMTCT) program using weekly mobile phone messages would result in improved mental health status of HIV-positive, pregnant women in Nigeria.

The study used a quantitative approach using a Solomon four-group (two intervention and two control groups) randomised design to evaluate the impact of an acceptance and commitment therapy program. The study population was 132 randomly selected (33 per site), HIV-positive pregnant women attending four randomly selected PMTCT centres in Nigeria. Two were Intervention and two were Control sites which functioned as Intervention and Control groups. The intervention groups were exposed to one session of acceptance and commitment therapy with weekly value-based health messages sent by mobile phone for three months during pregnancy. The control groups received only post-HIV test counselling.

The intervention and control groups did not differ significantly with regard to demographics at baseline testing. Evaluation of the pre- and post-tests of the intervention group indicated significantly higher psychological flexibility (AAQ-II) scores (<.001), reduced levels of depressive (p=<.001) and anxiety symptoms (p=<.001)) and lower reports of stress (p=<.001)) following ACT between all the groups. In terms of stigma, the study showed reduced levels of stigma (p=<.001), increased disclosure (p=.028), improved self-image (p=<.001) and improved perceptions of public attitude (p=<.001) following ACT in all the four groups.

The introduction of a mobile phone acceptance and commitment therapy program may result in greater psychological flexibility and relieve mental health problems among women diagnosed with HIV.

Keywords: Acceptance and commitment therapy, mobile phone, mother–child HIV transmission, pregnancy

DECLARATION

I, Adeyinka Ganiyat Ishola declare that the dissertation entitled: *"Acceptance And Commitment Therapy in the Prevention of Mother to Child Transmission Of HIV Program among pregnant women living with HIV in South Western States of Nigeria."* is my own work and has not been submitted for any other degree or examination in any other University other than the University of the Western Cape. I have given full acknowledgement to the resources referred to in my study.

Adeyinka Ganiyat Ishola Date: 10th April, 2017

Signed: 

DEDICATION

I dedicate this work to God Almighty, my creator and sustainer. And in loving and evergreen memory of my late brothers-in-law, Dr Abdul-Wasiu Ademola Ishola, Barrister Lukman Olakunle Ishola and my mentor, Dr Modupe Oyetunde who all shared and initiated the process of this journey of my dream. Sadly, they departed unexpectedly from this life during the period of this research project.

ACKNOWLEDGMENTS

I want to start this by acknowledging Almighty God, whose sustenance has seen me through HIS countless Rahman during this arduous journey.

I am indebted to many people who have supported me during this academic journey. Therefore, I would like to thank the following people for their contribution to my study:

- My proactive supervisor, Prof. Jennifer Chipps whose scholarly advice and insightful support steered the completion of this thesis;
- Prof. Oluyinka Adejumo for his invaluable support as a mentor and critical friend during this journey and Prof. Susan Terblanche for her contributions during the conceptualization of this research;
- I would like to thank all the participants in the study, the institutions and the PEPFAR team that provided the ethical clearance and permission to conduct the study. Thanks for making the study possible;
- The Tertiary Education Trust Fund and Medical Education Partnership in Nigeria for their financial support;
- Dr. Adenike Onibokun and Prof. Olabisi Adejumo for their support and mentoring;
- The School of Nursing, University of Western Cape for providing me with many enriching experiences;
- My home department of Nursing, University of Ibadan for their support, encouragement and providing an enabling environment for the completion of this thesis. Special thanks to my lovely friends, Dr. Titilayo Odetola, Mrs. Adenike Faremi, Dr. Olabisi Ibitoye, Doyin Olanlesi-Aliu and Dr. Ogunyewo who supported, encouraged and made me believe in myself when I had doubts.

- Simon Cushman for editing my thesis;
- My heartfelt gratitude to my sweetheart, Hon. Justice Mojeed Oladimeji Ishola for whom my love is infinite for standing in the gap for me and carrying me when I felt like quitting;
- To my lovely boys, Abdul Muiz, Abdul- Malik and Mubarak Ishola, words are not enough to appreciate your sacrifice of love and to my caring niece Tiwalade Omidiran, I appreciate your support;
- Lastly to my biological family, I thank my parents Alhaji and Mrs. Gbadegesin Jimoh Omidiran, may Allah grant you long life enough to reap the fruits of your hard labour. My indebtedness is immeasurable to my siblings – Adedamola and Teslim Omidiran, Dr. Mutiat Feruke-Bello, Bolade Hammed, Adepeju Mustapha, Aderiyike Akande and the last born, Waliyat Olurode, I appreciate your prayers and support through my academic journey.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ACT	Acceptance and Commitment Therapy
AIDS	Acquired immunodeficiency syndrome
ART	Antiretroviral therapy
ARV	Antiretroviral
CD4	Cluster of Differentiation 4
EHealth	Electronic health
FBOs	Faith-based organizations
FHI	Family Health International
FMOH	Federal Ministry of Health
GHAIN	Global HIV/AIDS Initiative
GSM	Global system for mobile communications
HAART	Highly active antiretroviral therapy
HCT	HIV counselling and testing
HIV	Human immunodeficiency virus
HPV	Human Papillomavirus
ICT	Information and communication technologies
IEC	Information, Education and Communication
INH	Isoniazid
ITU	International Telecommunications Union
IVR	Interactive voice response
KAP	Knowledge Attitude and Practice
M and E	Monitoring and evaluation
MAMA	Mobile Alliance for Maternal Action partnership
MCH	Maternal and Child health

MDG	Millennium Development Goals
MEDLINE	Medical Literature Analysis and Retrieval System Online
Mhealth	Mobile health
mHELP	mHealth Expert Learning Program
MMS	Multimedia Messaging Service
MNO	Mobile network operator
MTCT	Mother-to-child transmission
NACA	National Action Committee on AIDS
NDHS	National Demographic and Health Survey
NGOs	Non-governmental organizations
NOTARI	Narrative, Opinion and Text Assessment Review Instrument
NPC	National Population Commission
NPOs	Non-profit organizations
NVP	Nevirapine
PATH	Program for Appropriate Technology in Health
PATHS	Partnership for transforming health system
PCR	Polymerase Chain Reaction
PDA	Personal digital assistant
PEP	Post Exposure Prophylaxis
PEPFAR	President's Emergency Plan for AIDS Relief
PHC	Primary Health Care
PICT	Provider initiated counselling and testing
PMTCT	Prevention of mother-to-child transmission
Pre-EP	Pre-exposure prophylaxis
RFT	Relational Frame Theory

SIM	Subscriber identification module
SMS	Short message service
STIs	Sexually transmitted infections
UNAIDS	United Nations Program on HIV and AIDS
UNGASS	United Nations General Assembly Special Session on AIDS
UNICEF	United Nations Children's Emergency Fund
USSD	Unstructured Supplementary Service Data
VCT	Voluntary counselling and testing
VL	Viral load
WAP	Wireless application protocol
WHO	World Health Organization

CHAPTER 1: OVERVIEW OF THE STUDY

1.1 INTRODUCTION

The HIV/AIDS is a pandemic threatening public health worldwide, more so in sub-Saharan Africa where about 70% of people living with HIV/AIDS reside (UNAIDS, 2010).The first case of HIV and AIDS was identified in Nigeria in 1985 and reported at an international AIDS conference in 1986 (Adeyi and Ademo, 2006). More than thirty years after the start of the epidemic, despite moderate successes in decreasing individual-level risk (Stone burner and Low-Beer 2004), and international efforts to address structural factors (Cohen and Scribner, 2000) the epidemic continues unabated.

In 2015, sub-Saharan Africa battled with HIV epidemic, with an estimated 25.5 million people infected ad 1.4 million new infections. In that year, 60% of the recorded HIV infections occurred in Nigeria (GARPR 2016; UNAIDS 2016 estimates). About 26.5% (58,495) of the HIV-infected pregnancies led to child infections in the same year. Approximately nearly 180,000 people died from AIDS-related illnesses in Nigeria (NACA, 2015). With the growing political will of the World Health Assembly to eliminate HIV infections among children and keep their mothers alive, there is the need to develop innovative interventions for increasing ARV uptake which is the gold standard for reducing vertical transmission of HIV infections.

1.2 BACKGROUND

In recent times, there has been a shift in the focus of health care from treatment to prevention and health promotion. The concept of prevention and promotion of health

had evolved into a scientific field with the rapid development of ideas and research evidence. Health promotion as a concept was deliberated on and redefined at a World Health Organisation conference in 1986 in Ottawa, Ontario. The meeting concluded that ‘Health Promotion' is a health strategy that aims to incorporate skills and community development and to create supportive environments for health, endeavours to build healthy public policy and looks at re-orienting health services (Tountas, 2009). Prevention in psychiatry has a history of over a century. Since the mental hygiene movement days of the beginning of the 20th century, many ideas have been generated towards strategies to prevent behavioural problems and psychiatric disorders in children and adults. However, the systematic development of science-based prevention programs and controlled studies to test their effectiveness did not emerge until around 1980 (World Health Organization, 2008).

Mental health promotion involves the use of strategies that enhance the capacity of individuals, families and communities to strengthen or support positive mental health. Among these include the support of individual resources and skills and improvements in the socio-economic environment (World Federation of Mental Health, 2003 in Tountas, 2009; WHO 2001). The WHO European Ministerial Conference on Mental Health (2005) emphasises the fact that mental health well-being is fundamental to quality of life, enabling people to experience life as meaningful and to be creative and active citizens. Mental health promotion focuses on increasing the quality of life and psychological well-being of the whole population. It is critical for social cohesion, productivity, peace and stability in any environment, and for contributing to social capital and budgetary development in societies. The design and implementation of activities to promote mental health will enhance

psychological well-being for all (WHO European Ministerial Conference on Mental Health, 2005).

Mental health promotion activities evolved from the public health model of care that emphasises the reduction of the risk of mental illness for an entire population by providing services for those with increased risk for mental health problems. The public health classification of prevention applies three levels of prevention: primary, secondary and tertiary prevention (Stuart and Laraia, 2005). Promoting the mental health status of pregnant women living with HIV falls into the primary level of prevention of the public health model using the selective preventive approach to intervention. Studies have demonstrated that depression, anxiety and other disabling distress states occur in pregnancy and the postnatal period. These have been found to be associated with a range of psychosocial and health-related stressors. Leading to poor maternal mental health, poor birth outcomes and impaired infant health (Iheanacho, Obiefune, Ezeanolue, Ogedegbe, Nwanyanwu, Ehiri, Ohaeri, Echezona and Ezeanolue, 2015; Stewart, Umar, Gleadow-Ware, Creed, and Bristow. 2015; Ndokera and MacArthur 2011). Empirical studies have proven that people living with HIV experience mental health problems more than people who do not live with the virus. Assertions from these studies could be linked to the complex nature of HIV infection. And, the stress around diagnosis, and side effects of some anti-HIV medications (Kinyanda, Weiss, Levin, Nakasujja, Birabwa, Nakku, Mpango, Grosskurth, Seedat, Araya and Patel, 2017; Kagee and Martin, 2010; Pence, 2009). Coping with HIV infection is a complex phenomenon involving multiple interacting stressors ranging from disclosure of HIV infection to social ostracism, fear of death, obtaining adequate health care services, medication, repeated hospitalization, and

family conflict following disclosure (Morrison, Petitto, Ten Have, Gettes, Chiappini, Weber, and Evans, 2002; Collins, Holmand, Freemane and Patelf, 2006). Documented evidence hypothesised HIV stigma to nondisclosure of HIV status. Nondisclosure to significant others hinders infected persons from seeking antiretroviral treatment. ART has proven to reduce the risk of HIV significantly from mother to child (Abaynew, Deribew, and Deribe, 2011; Anglewicz and Chintsanya, 2011; Vu, Andrinopoulos, Mathews, Chopra, Kendall, and Eisele, 2011). The evidence from these studies serves as a call to mental health professionals to institute psychological health interventions that can promote mental health among this population.

Hayes and Hayes in 1989 described the concept of Acceptance and Commitment Therapy (ACT) as a behavioural therapy based on the achievement of value guided action through personal involvement. The general goal of the ACT is to increase mental flexibility which is the ability to be present, open up, and to do what matters to the individual (Hayes, Luoma, Bond, Masuda and Lillis, 2006). This goal is achieved through abstracted six core ACT processes of acceptance, defusion, self as context, contact with the present moment, values, and committed action (Hayes, 2009). All the six "processes" are interrelated functionally defined on-going psychological acts. They focus on altering the function of the client's open private events off the table as variables of importance and help shift the focus back to apparent and meaningful behaviour change in the service of chosen values (Hayes and Strosahl, 2004; Hayes,2009). ACT is useful in improving anxiety states, depression, and other mood disturbances (Dalrymple and Herbert, 2007; Kocovski, Fleming and Rector, 2009;

Feros, Lane, Ciarrochi, and Blackledge, 2013) but it has not been used among pregnant women living with HIV.

Mobile technologies (mHealth) for health interventions have been applied in diverse health settings (Reynolds, Satyanarayana, Duggal, Varghese, Liberti, Singh, Ranganathan, Jeon and Chandra, 2016; Pop-Eleches, Thirumurthy, Habyarimana, Zivin, Goldstein, De Walque, Bangsberg, 2011). Different studies found that mhealth can efficiently be used to implement a variety of health behavioural and psychological interventions (Ehrenreich, Righter, Rocke, Dixon and Himelhoch, 2011; Heron and Smyth, 2010). It was also noted that text messages can be beneficial for medical adherence, reduction of stress, anxiety and depression and to successfully change patients' behavior (Cole-Lewis and Kershaw, 2010; Ehrenreich et al. 2011; Free, Phillips, Galli, Watson, Felix, Edwards, Patel and Haines 2013; Reynolds et al. 2016). The aim of this study is to strengthen the mental health status of pregnant women living with HIV and improve PMTCT outcomes in Nigeria through the introduction of mobile phone delivered Acceptance and Commitment therapy into the PMTCT program.

1.3 PROBLEM STATEMENT

The evolution of HIV epidemics globally started in 1982, and by the end of the year 2014, 37 million people were living with HIV (UNAIDS, 2016). Nigeria has the second largest HIV epidemic in the world. With an estimated 3,391,546 PLWH, 60% of new HIV infections (only 38% of PLWH are virally suppressed) and a third (32%) of all cases of mother to child transmission (MTCT) of HIV in western and central Africa in 2015. Pre-exposure prophylaxis (PrEP) coverage is less than 5% of the 2020 target in Nigeria, and as a result, vertical transmission through MTCT is high at 26.5%

(AVERT,2016). The introduction of preventive interventions and invention of ARVs presented a breakthrough in the prevention of HIV and mother-to-child transmission through pre-exposure prophylaxis. With the commencement of ARVs in 2012, global AIDS-related deaths decreased from 2.3 million in 2005 to 1.6 million by 2012 (Maartens, Celum and Lewin, 2014).

The WHO guidelines for 2010 recommended that all infants who are born to HIV-positive mothers should receive antiretroviral prophylaxis. Despite various preventive interventions and government commitment towards availability of ARVs, the gap between infants' and mothers' uptake of antiretroviral medicine is still substantial. Suggesting problems with the provision of postpartum prophylaxis to the infant or early loss to follow-up of mother-infant pairs (UNICEF, 2010; WHO and UNAIDS, 2010, NACA, 2015). Research challenges have therefore been with finding ways to increase the Prevention of Mother-To-Child Transmission (PMTCT) uptake to improve the PMTCT outcome among pregnant women living with HIV (PLWH).

Women living with HIV are vulnerable to a variety of psychosocial barriers that limit access and adherence to treatment (Reynolds, Satyanarayana, Duggal, Varghese, Liberti, Singh, Ranganathan, Jeon and Chandra, 2016).Studies have linked PMTCT outcomes of PLWH with maternal psychological health status. But, few have explored interventions to improve access and treatment adherence among vulnerable groups of women in low- and middle-income countries. And also to address maternal psychological health (Levine, Aaron, and Criniti, 2008; Adewuya, Afolabi, Ola, Ogundele, Ajibare, Oladipo and Fakande, 2008; Ross, Sawatphanit and Zeller, 2009; Onyebuchi-Iwudibia and Brown, 2014; Reynolds et al., 2016). The global community at the Sustainable Developmental Goals (SDG) meeting in

September 2015 recommitted their fight to end the AIDS epidemic by 2030. Based on this agreement, the United Nations General Assembly targeted a Fast–Track response to achieve this goal through three milestones of reducing new HIV infections and AIDS-related deaths to fewer than 500 000 globally by 2020 and less than 200000 by 2030. And, eliminate HIV-related stigma and discrimination by 2020 (Ghys, Bouey, Yekeye, Erkkola, Padayachy and Low-Beer, 2017). In seeking to achieve the objective of reducing new HIV infections and AIDS-related deaths by 2020 as proposed by the global community, this study aims to introduce Acceptance and Commitment therapy into the PMTCT of HIV based on the assumption that acceptance of HIV status will promote commitment and thus improve PMTCT outcomes.

1.4 THE STUDY

1.4.1 Aim of the Study

The aim of the study is to strengthen the mental health status of pregnant women living with HIV and improve PMTCT outcomes in Nigeria through the introduction of mobile phone delivered Acceptance and Commitment therapy into the PMTCT program. The findings of the study are intended to facilitate planning for and implementation of improved PMTCT.

1.4.2 Research Objectives and Questions

There are two research objectives in this study. The pertinent research questions are presented after each objective.

1.4.2.1 **Research objective and Question One**

To ascertain the effect of Acceptance and Commitment therapy (delivered by mobile phone) on the mental health status of pregnant women attending PMTCT centres in the South Western states of Nigeria.

Research Question:

What is the effect of Acceptance and Commitment therapy (delivered by mobile phone) on the psychological acceptance of HIV in pregnant women attending PMTCT centres in the South Western states of Nigeria?

What is the effect of Acceptance and Commitment therapy (delivered by mobile phone) on depression, anxiety and stress in pregnant women attending PMTCT centres in the South Western states of Nigeria?

What is the effect of Acceptance and Commitment therapy (delivered by mobile phone) on the perception of stigma in HIV in pregnant women attending PMTCT centres in the South Western states of Nigeria?

1.4.2.2 **Research objective and Question two**

To evaluate the effect of Acceptance and Commitment Therapy (delivered by mobile phone) on PMTCT service outcomes among pregnant women attending PMTCT centres in South Western states of Nigeria.

Research Question:

What is the effect of Acceptance and Commitment therapy (delivered by mobile phone) on antenatal attendance among pregnant women attending PMTCT centres in South Western states of Nigeria?

What is the effect of Acceptance and Commitment therapy (delivered by mobile phone) on ART visits among pregnant women attending PMTCT centres in South Western states of Nigeria?

What is the effect of Acceptance and Commitment therapy (delivered by mobile phone) on infant feeding choice among pregnant women attending PMTCT centres in South Western states of Nigeria?

What is the effect of Acceptance and Commitment therapy (delivered by mobile phone) on choice of delivery among pregnant women attending PMTCT centres in South Western states of Nigeria?

What is the effect of Acceptance and Commitment therapy (delivered by mobile phone) on paediatric HIV status among pregnant women attending PMTCT centres in South Western states of Nigeria?

1.4.3 Hypothesis

Ho: There is no significant relationship between exposure to mobile phone delivered Acceptance and Commitment Therapy and the mental health status (psychological acceptance, depression, anxiety and stress and perceptions of stigma) of pregnant women attending PMTCT centres in South Western states of Nigeria.

Ho: There is no significant relationship between exposure to mobile phone delivered Acceptance and Commitment Therapy and adherence with antiretroviral therapy among pregnant women attending PMTCT centres in South-Western states of Nigeria.

Ho: There is no significant relationship between exposure to mobile phone delivered Acceptance and Commitment Therapy and antenatal attendance among pregnant women attending PMTCT centres in the South-Western states of Nigeria.

Ho: There is no significant relationship between exposure to mobile phone delivered Acceptance and Commitment Therapy and mode of delivery choice among pregnant women attending PMTCT centres in the South-Western states of Nigeria.

Ho: There is no significant relationship between exposure to mobile phone delivered Acceptance and Commitment Therapy and the choice of infant feeding patterns among pregnant women attending PMTCT centres in the South-Western states of Nigeria.

Ho: There is no significant relationship between exposure to mobile phone delivered Acceptance and Commitment Therapy and paediatric HIV status among pregnant women attending PMTCT centres in the South-Western states of Nigeria.

1.4.4 Definition of Terms

The terms in Table 1 were operationalized in this study.

Table 1: Definition of Terms

Term	**Definition**	Operational Definition
Acceptance	Agreeing either expressly or by conduct to an act or offer (www.merriamwebster.com/ dictionary/acceptance)	The movement of the mothers from the grieving phase following diagnosis, to learning to live with HIV.
Acceptance and	It is an empirically-based set of psychological interventions that uses	The use of a third wave Cognitive Behavioural therapy

Term	**Definition**	Operational Definition
Commitment Therapy	mindfulness skills to develop Psychological flexibility and helps clarify and direct values-guided behaviour (Hayes, 2005).	(delivered by mobile phone) to improve the mental health status of pregnant women attending PMTCT centres in some South Western States of Nigeria.
Antiretroviral therapy	Antiretroviral therapy is a method of treatment for individuals who have immunodeficiency disorders like HIV. (www.who.int/topics/antiretroviral_therapy)	The use of drugs to reduce the CD4 count of mothers and prevent vertical transmission of HIV.
Commitment	Willingness to give your time and energy to something that you believe in, or firm decision to do something: (dictionary.cambridge.org/dictionary/english/commitment)	Prompt initiation of a baby into ARV therapy.
HIV	HIV stands for human immunodeficiency virus which attacks the body's immune system. (www.hiv.gov/hiv-basics/overview/about-hiv-and-aids/)	The presence of HIV in the blood of a pregnant woman evident by a reactive test result with a CD4 count that is eligible for ARV.
Mental Health	A state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community.(WHO, 2014)	High psychological flexibility score and low depression and stigma scores as measured by the study instruments.
Mother to Child transmission	The transmission of HIV from a HIV-positive mother to her child during pregnancy, labour, delivery or breastfeeding (http://www.who.int/hiv/ topics/mtct/en/)	Vertical transmission of HIV from diagnosed pregnant women with reactive HIV test results to the infant in any of the selected PMTCT centres.
Outcome	An end result; a consequence, something that follows from an action or situation (https://en.oxforddictionaries.com/definition/outcome)	Mental health status outcomes (psychological acceptance, reduction in depression and perceptions of stigma. Health Service outcomes Retention of mothers and paediatric initiation to ARV as

Term	**Definition**	Operational Definition
		measured by mother's antenatal attendance, choice of delivery, infant feeding method, and postnatal attendance.
Pregnant Women living with HIV	The period from conception to birth experienced by a female HIV positive person. Usually lasts 40 weeks, beginning from the first day of the woman's last menstrual period, and is divided into three trimesters, each lasting three months. (www.cdc.gov/hiv/group/gender/ pregnantwomen/index.html)	Diagnosed HIV-positive women with CD4 count that is eligible for ARV, and the pregnancy is not more than six months and attend any of the four PMTCT centres chosen for the study.
Exposure	The fact of experiencing something or being affected by it because of being in a particular situation or place (dictionary.cambridge.org/ dictionary/english/exposure)	A state of coming in contact with a person living with HIV either through birth or by breastfeeding

1.5 FRAMEWORK FOR THE STUDY

This section sets out to provide a background on behaviour theories and then a specific discussion of the ACT model and its application in this study. Henning, Van Rensburg, and Smit (2004) asserts that theoretical frameworks in research serve to "frame" the inquiry. The framework for the study is the Relational Frame Theory (RFT) which is a Functional contextual theory. Functional contextualism as one of the two contextualistic philosophy of science analyses the context (nature and function) of the whole event to identify the pragmatic truth criterion (Hayes, 1993). According to Hayes, Barnes-Holmes, & Roche (2001), RFT is an explicitly psychological account of human language and cognition that approaches verbal events as activities, not products. It embraces the idea that deriving stimulus

relations are learned behaviour (Figure 1). RFT has shown that it is helpful to think of language when regarding a core behaviour called arbitrarily applicable relational responding that consists of abstracting types of relations between two events and bringing them under the control of arbitrary contextual cues (Hayes, 2009). Coherence and sense-making serve as a continuous reinforcement for derived relational responding. Verbal repertoire grows as experience imbues non-verbal stimuli with relational and verbal functions. This process can lead to unhealthy behaviours.

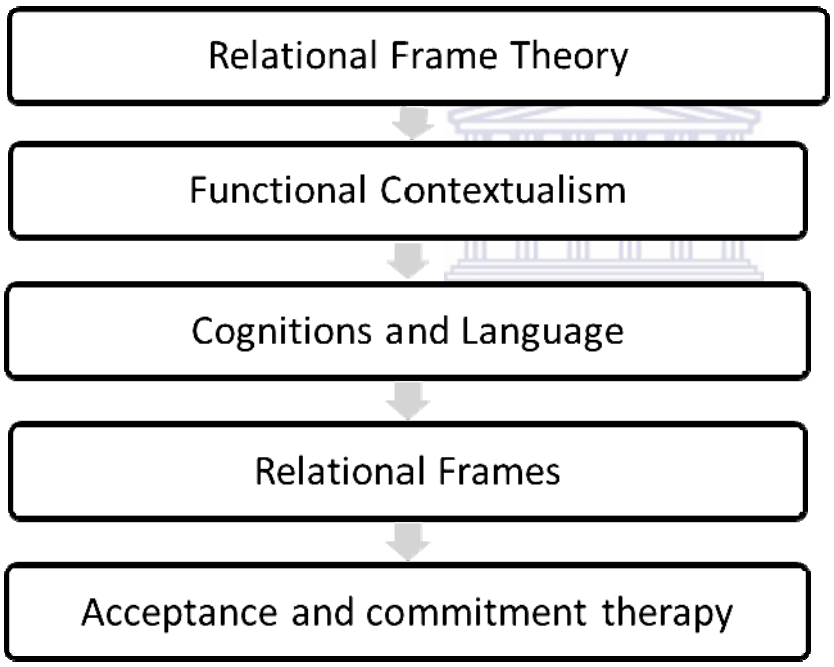


Figure 1: The Relational Frame Theory (Hayes et al, 2001)

1.5.1 Behavioural Frameworks of ACT

Behaviour therapy evolved from three generational trees: traditional behaviour therapy, cognitive behaviour therapy, and the relatively contextualistic approaches (Hayes, Luoma, Bond, Masuda and Lillis(2006)). Fundamentally, CBT and other mindfulness-based interventions were based on a behavioural analytical model like

Skinner's radical behaviourism. Acceptance-based therapies like ACT uses RFT as its theoretical root with the integration of cognition and language into a behavioural analytic framework (Hofmann, 2008). According to Guadiano (2008), examples of cognitive therapies are Mindfulness-based cognitive therapy, problem-solving therapy, Dialectic Behavioural Therapy, meta-cognitive treatment, rational-emotive behaviour therapy, cognitive processing therapy, cognitive behavioural therapy, cognitive-behavioural analysis and schema-focused therapy. Mindfulness-based therapies include Acceptance and Commitment Therapy, Functional Analytic Therapy, and Compassionate Mind Training (Hayes, 2004 in Ngo, 2013). Both treatments have slightly different therapeutic techniques regarding emotion regulation strategies. CBT focuses on the use of cognitive reappraisal for emotional regulation while ACT uses acceptance to regulate emotion (Hofmann & Asmundson, 2008). Despite their differences, all the major types of therapeutic approaches have significant points of convergence in their empirical validity, focus on present moment) and use of behavioural techniques to identify and solve precise problems. Some empirical studies have documented that ACT promotes psychological flexibility, which is an essential focal point for improving clients mental health (Forman, Herbert, Moitra, Yeomans and Geller, 2007; Gaudiano; 2008; Feros, Lane, Ciarrochi and Blackledge, 2013). Based on the aim of this study, the focus of literature will be Acceptance and Commitment Therapy. Based on the aim of this study, the focus of literature will be Acceptance and Commitment Therapy.

1.5.2 Acceptance and Commitment (ACT)

ACT is a mindfulness-based behavioural therapy that utilises mindfulness, experiential and acceptance strategies to achieve values-based committed

behavioural interventions (Hayes, 2009). The goal is to create a productive and meaningful life while accepting the pain that inevitably goes with it. ACT uses six interrelated functional processes to help clients develop psychological flexibility. The six principles are: acceptance, defusion, self as context, contact with the present moment, values, and committed action (Figure 2). All the six areas are explored, familiarised and advanced experientially over the course of treatment.

Acceptance: The concept of acceptance in this context originated from Latin word "accipere" meaning to receive or take what is offered (Torsi,2012). Psychologically, it connotes an actual taking in of an event or situation. Acceptance involves actively embracing private events (thoughts, feelings, bodily sensations), while they are presently occurring, as ongoing individual experiences. Acceptance is the focused adoption of a purposefully open, accessible, flexible, and non-judgmental posture on moment-to-moment experience (Hayes, Strosahl, and Wilson,2012). Acceptance is supported by a "willingness" to make contact with distressing reserved experiences or situations, endeavours, or dealings that will likely trigger them. Acceptance is an action; it is not a feeling or way of thinking about private events. People can behave acceptingly, or they can work to reduce or change a private occurrence. Acceptance means to stand with self psychologically and embrace what is present at the level of experience which is different from tolerance or resignation (Harris, 2008).

Defusion: Thoughts do not present themselves as thoughts. Because of the relational and bi-directional nature of human language, ideas appear to be what they are related to, not what they are (Hayes, Barnes-Holmes, and Roche, 2001). People are far more aware of the world structured by thoughts than they are of the events

themselves. According to Twohig and Hayes (2008), our culture adds to the inherent problem of language by teaching us that our negative thoughts are themselves dangerous or harmful. There is nothing hazardous about any private event. Indeed, thoughts are both useful tools and indications of the relevance of history to the present moment. (Hayes, Strosahl, and Wilson, 2012). Cognitive defusion involves altering the context in which thoughts are experienced, to undermine their automatic impact and importance, by seeing them as an ongoing relational process (Hayes, 2009).

Fusion is the pouring together of verbal/cognitive processes and direct experience such that the individual cannot discriminate between the two. By its nature, fusion narrows our response repertoire in individual domains. When fused, we formulate a situation symbolically and then organise our behaviour to fit the demands of the rules that we are programmed to follow (Hayes, Barnes-Holmes, and Roche, 2001). When the situation involves painful, unwanted private experiences, fusion almost automatically leads to experiential avoidance. To bring fusion under contextual control, ACT teaches clients how to separate an ongoing cognitive process from its cognitive products. The act of pulling the "human" (the listener) apart from the "mind" (the speaker) which is the process called "defusion". This ACT neologism means making closer contact with verbal events as they are, not merely as what they say they are (Ciarrochi, Bilich Godsel, 2010). Defusion does not eliminate verbal meaning; it just reduces its natural effect on behaviour such that other sources of behavioural regulation can better participate at the moment (Hayes, Strosahl and Wilson, 2012).

The Self: Three types of self are defined within ACT, the conceptualised self, the self as a process of ongoing self-awareness, and the observing self or self as context. In the conceptualised self we live in the world as responsive stimuli to the internal and external environment. In technical terms, derived stimulus relations dominate over other behavioural processes (Harris,2008). All Individuals define their life histories and attributes through a process of self-reflective categorisation and evaluation. People often develop a protective attachment to a conceptualised self (Hayes,2009). In ACT, fusion with the conceptualised self is problematic because it can lead to distortion or reinterpretation of events thus narrowing our repertoire of actions needlessly (Harris,2009).

An assumption in ACT is that a healthy human life requires continuous and flexible verbal self-knowledge thus it's inherently constraining to tie one's identity to the conceptualised content of any kind. Based on this premise, ACT encourages clients to see what they consider to have seen, without symbolising the content. This encouragement is to justify what was felt or seen in contrast to social contingencies that encourages a client to lie or to self-deception (Hayes, Strosahl and Wilson in Dempsey, 2014; Sousa, Ribeiro and Rodrigues, 2006). ACT trains clients to accept psychological content and just describe it, without adding or subtracting anything. ACT helps clients distinguish themselves from their conceptualised content, however right or wrong that content may be (Hayes, Strosahl and Wilson, 2012).

The observing self is a core phenomenon that is taken to be at the heart of human spirituality, it forms the foundation for the first move in ACT (Hayes, 1984; Barnes and Roche, 1997). In understanding self, the being, awareness and consciousness

are of importance. Consciousness means "with knowing by the mind". Pure consciousness comes from being with verbal knowing as a locus, not merely as the content of what is known. ACT teaches the clients how to notice when thoughts and feelings are present from a perspective of self-as-context, without objectifying these events. This sense of self is the result of seeing that observations are being made from a consistent locus: I/here/now. In lay terms, it is the "you" that is "behind your eyes," the "you" aware of the experiences, not the experiences themselves. ACT fosters a sense of the observing self. This sense creates a psychological stance in which thoughts and experiences can occur without threatening one's self. This cognitively established sense of self is the context in which private event occurs. Because the limits of this regard cannot themselves be observed by the person, the observing self-carries with it a sense of transcendence and boundlessness (Hayes et al. 2001).

Contact with the present moment: Ongoing self-awareness involves a continuous awareness of present experiences where those experiences are noticed in a descriptive, non-judgmental way. It is defined as consciously experiencing internal and external events as they are occurring, without attachment to evaluation or judgment (Hayes, 2009). Therapeutically, contact with the present moment helps clients experience the external and internal world as it is, instead of the world as portrayed by one's symbolic behaviour. It encompasses at least two skills: to openly and fully experience what is occurring in the present moment and to label and describe these events without judgment(Harris,2008). ACT assumes that healthy living requires continuous and flexible verbal self-knowledge of the present moment (Hayes, Strosahl, and Wilson,2012).

Values are useful because they help humans select from alternatives. In humans, choosing from among other options almost always occurs in the presence of the problem-solving mode of mind, which is useful for generating reasons for and against a particular course of action. Values are the areas of life that we choose to pursue on a moment-by-moment basis. Values are areas of importance that we recognise and embrace as guides of our patterns of action(Sousa, Ribeiro and Rodrigues, 2006). Everybody values different areas in life, and ACT works to support the client's values without judgment. Values also provide direction for therapy. ACT is a core behavioural treatment to assist the client in developing and perpetuating a valued behavioural direction in life. The other important feature of values, as compared with different verbal goals, is that values cannot be fully satisfied, permanently achieved, or held like an object. Values tend to be relevant over very long time frames, in many situations and are less subject to satiation and change(Hayes, Strosahl, and Wilson,2012). ACT seeks to penetrate the language-based barriers to making direct contact with personal values, with the conviction that value-driven behaviour change is more likely to be sustained over time. The process of making close experiential contact with one's values is one of the most intense, intimate clinical experiences in ACT. In ACT, the values assessment helps clients to find significant discrepancies between valued life directions versus current behaviours. The values evaluation process is generated by using the ratings of the Valued Living Questionnaire–2 (VLQ-2). The client creates response covering many separate life domains like career, marriage, relationship to mention a few (Wilson et al., 2010). All ACT techniques are coordinated towards helping clients live in accord with his or her chosen values.

Committed action: Committed action is at the heart of traditional behaviour therapy, and it is at the heart of ACT. Committed Action involves defining goals along with a specific path and then acting on these goals while practising the other ACT strategies to build more substantial patterns of action (Harris, 2008). According to Hayes, et al. (2012) commitment in ACT involves a process of deliberately constructing patterns of behaviour. It is a value-based action that occurs at a particular moment in time and is deliberately linked to creating a pattern of action that serves the value. Keeping a commitment means, in a moment-by-moment way, behaving consistently with values as part of an extended and ever-expanding pattern of action.

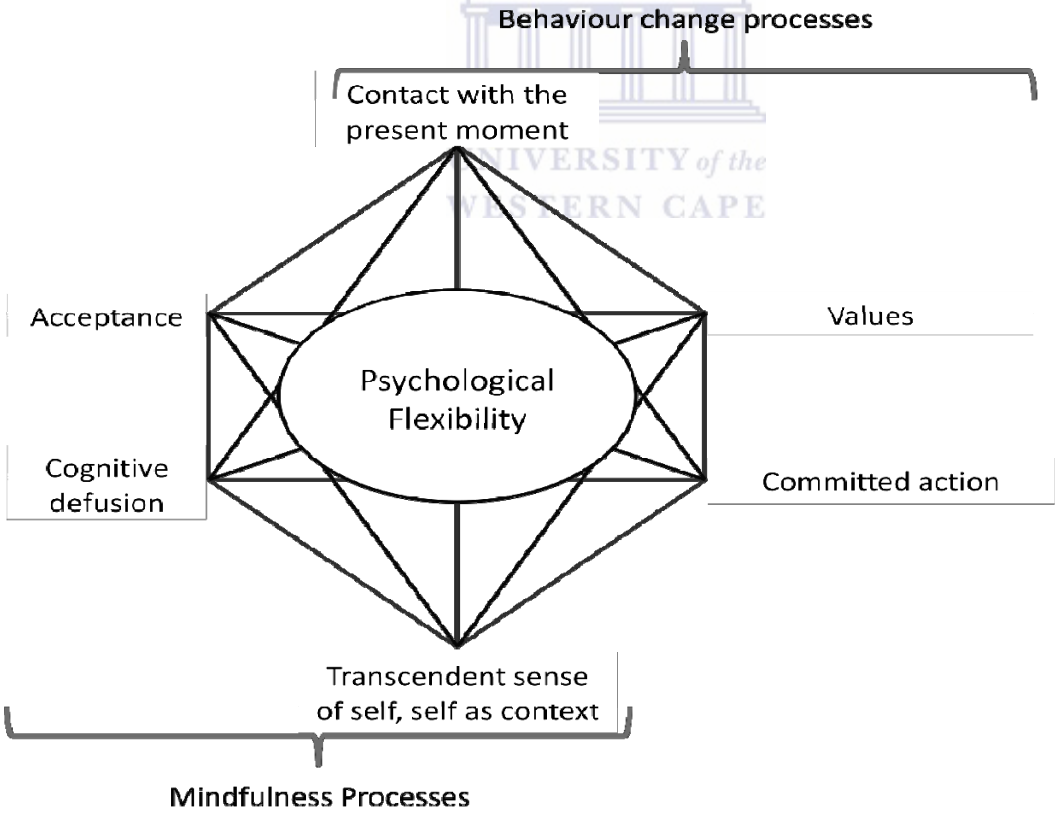


Figure 2: ACT Model of Psychological Flexibility (Hayes et al, 2006)

1.5.3 Psychopathology in the context of ACT

In the context of ACT, psychopathology can result from (or be exacerbated by) either an absence of relational abilities or by psychological inflexibility (Hayes et al., 2006). Psychological inflexibility can be defined as the inability to modulate behaviour when it is helpful to do so and to persist when persistence is needed to achieve desired ends (Hayes et al., 2004). The ACT model of psychopathology (Figure 3) posits that there are six guiding principles that contribute to psychological inflexibility. They are cognitive fusion, experiential avoidance, attachment to a conceptualised self, the dominance of the conceptualised past or future, lack of values clarity, and inaction towards valued directions (Bach and Moran, 2008; Hayes et al., 2006; Luoma, Hayes, and Walser, 2007). The ACT model of psychopathology sees these processes co-occurring and interacting with each other, therefore contributing to a narrowing of the patient's behavioural repertoire (Bach and Moran, 2008). The model describes general processes rather than specific psychopathological processes associated with a particular disorder. This public process makes the model amenable to be used as an account of any disease in which psychological inflexibility is thought to contribute to its inception or maintenance (mental and physical forms of suffering) (Luoma, Hayes, and Walser, 2007).

Cognitive fusion can be defined as the domination of behaviour by verbally related antecedents and consequences (e.g. thoughts, feelings, judgements), rather than directly contacted non-arbitrary contingencies (Bach and Moran, 2008). People's behaviour is guided by the real content of their thoughts, and they lose the ability to make the distinction between what they are thinking and the ongoing process of

thinking. As a result, their behaviour becomes inconsistent with their values and goals even in the presence of environmental opportunities to follow valued directions (Fletcher and Hayes, 2005; Hayes et al., 2006; Luoma et al., 2007).

Experiential avoidance is the pursuit of altering the form, mode, and environmental sensitivity of private events even when doing so causes behavioural harm (Hayes et al., 1996). It emerges from human's innate linguistic and cognitive abilities to evaluate and sort private events into positive and negative categories rather than on their functional contextual properties (Luoma et al., 2007). The expression of experiential avoidance is presented in two primary forms: suppression and situational avoidance (Hayes et al., 2004). However, it can also be present in any kind of behaviour, overt or private, aimed at altering the shape or frequency of a private experience, like the use of substances, gambling, and excessive eating to mention a few (Hayes and Smith, 2005; Chawla and Ostafin, 2007). Suppression is the deliberate attempt actively to control or eliminate the experience of an unwanted thought, feeling, memory or physical sensation (Hayes et al., 1996). Situational avoidance is related to attempts to alter or control the antecedent contextual features that might trigger the appearance of unwanted private experiences (Hayes et al., 1996).

Attachment to conceptualised self can be described as a collection of verbal content or group of self-referential statements that seek to define and explain self (Luoma et al. 2007).Self-referential statements are an integral part of the building of a social being, a useful feature derived from our language and cognition abilities; the problem occurs when individuals attempt to hold on to a particular self-description and

engage in ineffective behaviour (Bach and Moran, 2008). It is related to a lack of awareness of the present moment and often takes the form of rumination, in which the person fuses with the verbally constructed past failures or possible adverse future consequences (Zettle, 2007). The dominance of a conceptualized past or future not only diminishes the contact with the present moment, but it also prevents effective action towards a valued direction (Luoma et al. 2007). Lack of values clarity allows the rule-governed behaviour to take over forms of behaviour that are valued consistent (Bach and Moran, 2008). People avoid valued thoughts to prevent unwanted adverse private events. The dominance of pliance or an excessive reliance on social acceptance makes individuals prevent value behaviours to conform with socially accepted values (Bach and Moran, 2008; Luoma et al., 2007). Valued directed behaviour takes a backseat to more immediate goals of living pain-free, according to society rules or according to how one sees oneself. Patterns of behaviour become narrowly focused on these quick goals, and people become less sensitive to the opportunities available for effective valued action (Hayes et al., 2006).

Inaction, impulsivity or avoidant persistence are the behavioural manifestations of experiential avoidance supported by a mix of fusion, the dominance of conceptualised self, past or future and lack of values clarity (Luoma et al. 2007). This behaviour serves and reinforces an inflexible approach to living, leaving less room for efficient conduct that will lead to valued life. (Bach and Moran, 2008).

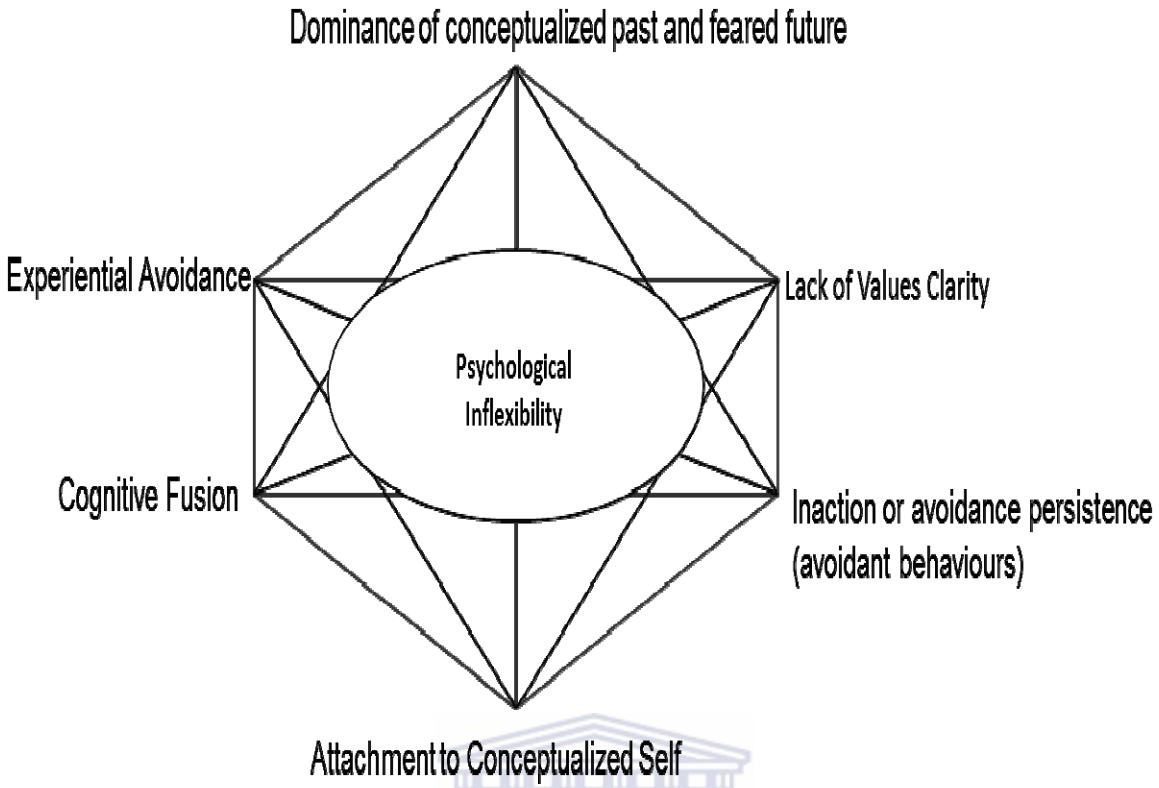


Figure 3: Psychopathology of ACT (Hayes et al 2008)

1.5.4 ACT as applied in this study

The RFT model underpinned the Intervention and determined the Intervention components. An explanation of the underlying theory as applied to HIV and ACT are seen in Figure 4. Following confirmation of pregnancy, a woman is expected to register at an antenatal care (ANC) facility for monitoring and care. At the ANC, HIV test is part of the routine registration screening. An HIV positive test result stimulates both physical and emotional reactions from the pregnant woman, the family and the community. These responses lay the foundation for explicitly taught and unspoken relationships that are inferred from our day to day interaction ("AIDS is a deadly communicable disease, so am likely to die"). And usually, the initial reaction to a positive HIV test result is shock, disbelief and denial. The acceptance of HIV testing

and counselling (HCT) and HIV test results according to a UNAID (2002) report, form the gateway to HIV/AIDS prevention, care, treatment and support interventions. The behavioural intention of PMTCT services is based on the call by the global community to keep mothers alive and prevent mother to child transmission of HIV.

Following the diagnosis of HIV infection, there is an antecedent interaction between human language and cognition which is determined by the attitude, subjective norms and perceived behavioural control of the pregnant woman. Attitude is determined by the pregnant woman's personal belief about HIV and her evaluation of intended health outcomes. Perceived belief about the cause of HIV, the susceptibility of the baby to HIV infection and known available treatment option (PMTCT). The pregnant woman's personal belief will guide her evaluation of the intended outcome of ARVs (the effectiveness and efficiency) toward the prevention of new HIV infections.

Subjective norms are determined by both normative beliefs and motivating factors to comply with behavioural intention. Normative beliefs are the societal belief about HIV, cultural barriers to treatment and support and the interaction of language and symbols used for HIV infection. The relationships among the norms are unequivocally taught ("A virus infection is a deadly communicable disease), and unspoken relationships that are assumed. These implicitly assumed relationships are based on relationships taught through relational framing (HIV is a viral infection, so HIV is deadly). The interaction of the language and cognition between two events serve as a continuous reinforcement for derived relational responding. Motivation to comply is guided by support or approval from a significant other like the husband,

family or communities. Motivation can strengthen the pregnant woman's willingness to disclose her HIV status and seek help.

Perceived behavioural control is a significant factor when analysing the antecedent interaction between language and cognition. Two major determining factors laid the foundation of perceived behavioural control. One, is the pregnant woman's definitions of mental health and her sociodemographics regarding status, level of education, socioeconomic status, disclosure status and understanding of PMTCT services. Also, health factors like access to PMTCT services, availability and affordability, health worker's attitude, shortage of resources in the health sector might also affect PMTCT behavioural control.

The interplay between behavioural intention and antecedent interaction between human language and cognition forms the relational frame. The interaction between the attitude of the pregnant women, a societal belief expressed through language use and constant reinforcement of either motivation or disapproval will determine the pregnant woman's behavioural decision to access PMTCT services. This behavioural decision can either be positive or negative.

The role of ACT is to assist the pregnant woman living with HIV to make guided decisions towards a positive behavioural decision to access PMTCT. A psychologically flexible pregnant woman is a confident and mature person who can walk through the phases of ACT to arrive at acceptance of HIV status and make a commitment to valued living with a positive mental health state.

Telehealth technologies had been adopted as a means of communicating with clients and families to support the achievement of health objectives across the globe. With over 5 billion wireless subscribers globally and 70% residing in low- and middle-income countries, the relevance of mHealth as a complementary strategy for the achievement the health-related Millennium Development Goals (MDGs) cannot be overemphasized (Commission on information and accountability for Women's and Children's Health,2011). Shreds of evidence from different countries had shown the effectiveness of mhealth in HIV prevention and treatment. Hendriksen, Hlubinka, Chariyalertsak, Chingono, Gray, Mbwambo, and Coates (2009) evaluated the use of mhealth technologies for HIV-related interventions in Tanzania, Zimbabwe, South Africa and Thailand. They concluded that the use of mhealth in HIV increased the likelihood of being tested for HIV by 1.8-3 times. Vidnapathirana, Abramson, Forbes and Fairley (2005) reviewed fourteen mass media health promoting campaigns to improve HIV test. All the interventions had a significant impact on HIV testing. This research will assess the effect of a mhealth delivered ACT intervention on the mother to child transmission of HIV among pregnant women in selected states in south western, Nigeria.

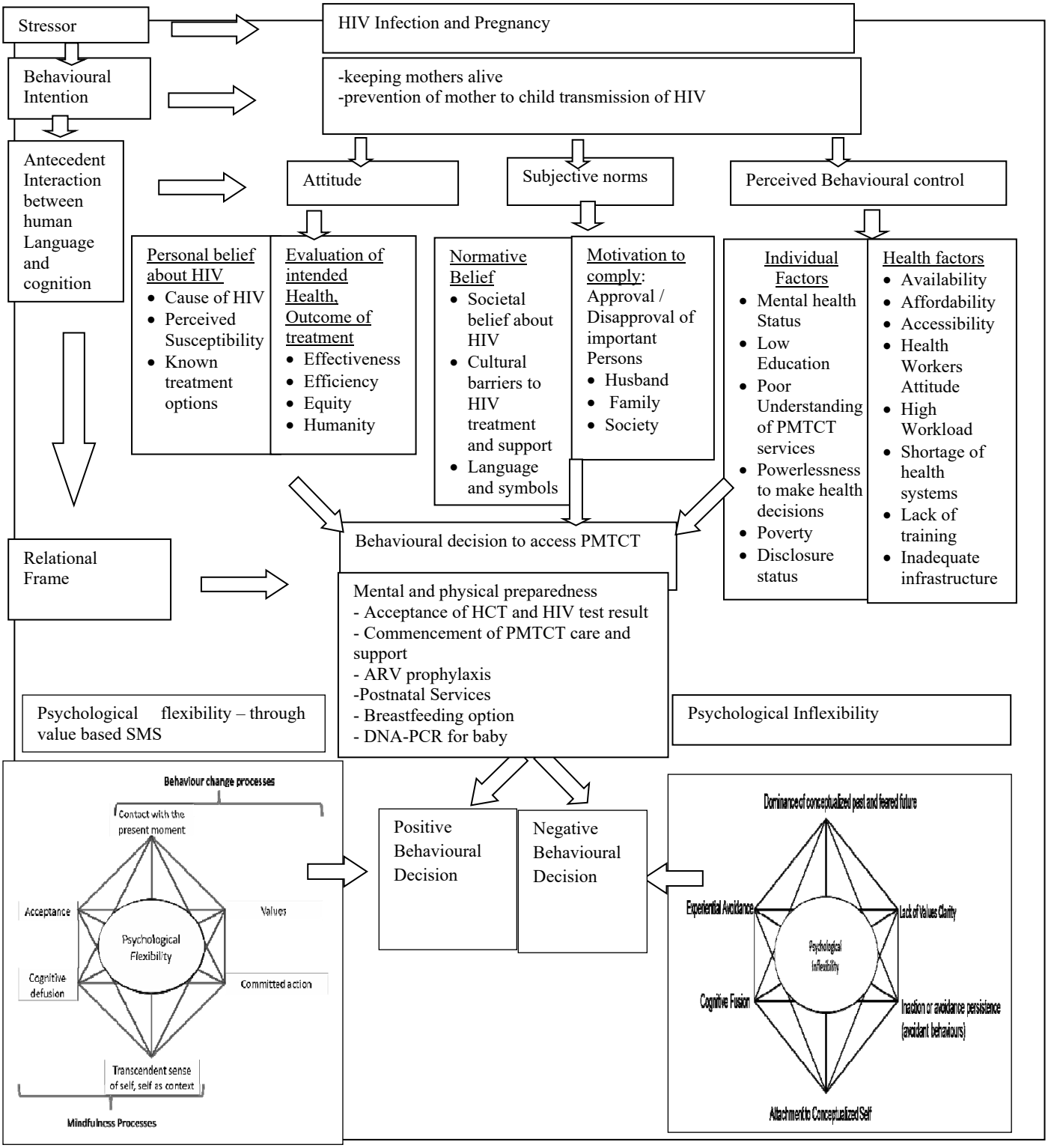


Figure 4: Acceptance and Commitment Therapy in the prevention of mother to child HIV transmission Model

1.6 SIGNIFICANCE OF THE STUDY

This study is novel in its application of Acceptance and Commitment Therapy in helping prevent mother to child transmission of HIV. The findings from this study may generate new knowledge that might bridge the gaps in the existing empirical literature on mHealth delivered psychological therapies specific to pregnant women living with HIV in Nigeria.

ACT has the potential of enhancing practice through improved PMTCT outcomes by ensuring continuous retention of not only the mother but also the newborn child in the program through increased psychological flexibility and resultant enhanced mental health. This synergistic intervention is hoped to benefit the mother by improving her quality of life despite her HIV status. Maternal quality of life would ensure the protection of the infant from HIV infection, and with a healthy mother and baby, stability will be secured. ARV adherence will reduce the rate of HIV disease progression in mothers and prevent new infections in infants thus improving maternal morbidity and mortality rate, and reduce the prevalence of HIV.

The integration of ACT into the PMTCT program may bring about a more customer-friendly service thus improving clients' satisfaction and ensuring better antenatal attendance, delivery outcome, postnatal service and sustainable paediatric prophylaxis or integration into an ARV program. This alliance has implications for the education of health providers, some of ACT-based skills can be taught in nursing schools and at primary and mental health care levels centres.

1.7 SUMMARY OF THE CHAPTER

This chapter provided an introduction and background to the principal issues at play, as well as highlighted the identified problem, the aims and objectives, the conceptual framework and subsequent significance of the survey.

CHAPTER 2: LITERATURE REVIEW

2.1 LITERATURE SOURCES

The major themes of interest were from the research title ‘‘Pregnant women living with HIV’’ who are the target population, ‘‘ACT’’ the intervention, ‘‘mhealth’’ the medium of the intervention and ‘‘mental health’’ the expected outcome. Various strategies were adopted to review the literature. Firstly, the major bibliographic databases were explored: PubMed, Web of Science, CINHAL, Google Scholar, EBSCO Host, and Science Direct. The keywords/phrases used were ‘‘HIV/AIDS’’; ‘‘pregnancy and HIV’’; ‘‘mental health in pregnancy’’, ‘‘psychological flexibility’’, ‘‘depression’’,’’ anxiety’’, ‘‘stress, ‘‘disclosure’’, ‘‘mhealth’’ and ‘‘ACT’’. All titles and abstracts of journal articles were read for their relevance to the topic after which relevant articles were retrieved. A search was also made of hard-copy materials that provided relevant information for further sources, such as books, journals, and legislation and policy statements. Consulted experts recommended additional journal articles which, in turn, led to others.The global and national HIV epidemiology was reviewed. The chapter also discussed the changing profile of HIV in Nigeria and the impact on mother to child transmission of HIV. Issues around mental health and HIV were critically examined and the mental health needs of women living with HIV through telecommunication as a strategy.

2.2 THE HIV EPIDEMIC

The World Health Organisation (WHO) documented that approximately 36.9 (34.3–41.4) million people are living with HIV globally (Awofala and Ogundele, 2016). Out of which an estimated 25.6 million [24.0–28.7 million] people are living in sub-

Saharan Africa, nearly 70% of the world total (WHO, 2016). According to UNAIDS (2015) 34.5 million adults were living with HIV, and there are more women (17.8 million) living with HIV than HIV-positive men (16.7million).

Sub-Saharan Africa remains by far the region where most of the HIV-positive pregnancies occur. Nineteen of the top twenty countries that host about 90 percent of all HIV-positive pregnant women reported from low and middle-income countries was found in this region (WHO, 2008). Nigeria is one of the countries where HIV infection remains an issue of all people living with HIV globally. 9% of them live in Nigeria (Awofala and Ogundele, 2016). In 2015, of all new HIV infections in western and central Africa, 60% occurred in Nigeria (UNAIDS, 2015). HIV is the leading cause of death among women of reproductive age. Without antiretroviral treatment, more maternal mortality and morbidity will be recorded. There is the need to place more people living with the virus on antiretroviral therapy (ART) to increase the survival (Nigeria National Agency for the Control of AIDS, 2012).

2.3 COMMITMENTS TO GLOBAL AND NATIONAL HIV RESPONSE

Prevention of MTCT of HIV had been a forefront global HIV prevention activity since 1998. . In 2001, different countries came together at the United Nations General Assembly Special Session (UNGASS) on AIDS to sign the declaration of commitment to ensure a coordinated effort and sustained response towards HIV and AIDS. Together, the presidents committed to halting the spread of HIV through an improved health care access (UNAIDS, 2002).

Following the earlier mentioned declaration meeting, the Nigerian government developed her National HIV/AIDS Strategic Plan (HEAP- HIV/AIDS Emergency Action Plan 2001-3) to addressed public awareness of HIV epidemic. The national ART program commenced in 2001 in 25 tertiary hospitals and targeted 10,000 adults and 5,000 children. The PMTCT program in Nigeria began in July 2002 in six tertiary facilities in the six geopolitical zones of the country. In Nigeria, response to HIV and AIDS is mostly donor-funded, with a national contribution of 25% of HIV funds (NACA, 2014). At the expiration of HEAP 2001-3, a new National Strategic Framework for action tagged NSF 2005-9 was developed to coordinate HIV preventive services. In 2006, a meeting was held by a committee to acknowledge the need to achieve a worldwide access to HIV treatment, prevention, care and support for HIV. With the backing of the significant development donors and partners such as UNICEF and the Centre for Diseases Control (CDC).This committee evolved to an autonomous agency in 2007 called the National Agency for the Control of AIDS (NACA). It was established to provide overall coordination of the national response to issues of HIV/AIDS prevention, care, and support, and formulate policies and guidelines for HIV/AIDs treatment and support. In December 2007, the implementation of the NSF 2005-9 was reviewed to accommodate more recent strategies of ensuring the attainment of national development goals and objectives of vision 20/20. According to the World Health Organization in 2008, Nigeria was one of ten countries with a large number of pregnant women with HIV (75%) in need of PMTCT services necessitating aggressive PMTCT interventions. The National Agency for the Control of AIDS endorsed a Nigerian National Policy on HIV/AIDS. The policy provided the regulations and guiding principles on the prevention of new infections, behavioural change, management and support for infected and affected

persons. The NSF 2005-9 metamorphosed to National HIV/AIDS Strategic Plan 2010-15 that added behavioural change components and prevention of new infections to the HIV/AIDS treatment, care and support strategies (Awofala and Ogundele, 2016)

The WHO (2010) identified that the integration of PMTCT interventions in high-burden countries would help advance the global PMTCT effort towards the elimination of paediatric HIV, and would make significant progress towards the Millennium Developmental Goals. The United Nations Political Declaration on HIV and AIDS indicators (2011) was set to monitor progress, with 2015 as the target for the reversal of the HIV epidemic trajectory. In line with this goal, the Health Sector Plan and the 2010 National PMTCT guidelines were utilised to articulate clear strategies for acceleration, expansion and strengthening of PMTCT services through decentralisation and integrated service delivery at the Primary Healthcare Centres (PHCs). The global plan 2011 was launched to reduce the prevalence of HIV infections among children, and to keep their mothers alive in 21 priority countries, of which Nigeria was one. In Nigeria, the PMTCT scale-up plan was developed to support the acceleration of PMTCT programming at the state level in 2012.The program started with 12+1 priority states. The states were Abia, Akwa Ibom, Anambra, Bayelsa, Benue, Cross-Rivers, Kaduna, Kano, Federal Capital Territory (FCT), Lagos, Nassarawa, Plateau, and Rivers, which together bear 70% of the burden of the epidemic and which have consistently shown a high prevalence of HIV. With massive support from PEPFAR and the GFATM, the number of sites increased to 5622 by December 2013. In 2014, about 6546 facilities comprising tertiary, secondary and primary health care centres were providing PMTCT services. Four

teams administered the PMTCT sites: Harvard University; the Global HIV/AIDS Initiative, Nigeria (GHAIN); Maryland's Institute of Human Virology (IHV) and Catholic Relief Services/AIDS Relief. ART programs in Nigeria are on two tracks. Track one sites administered by Harvard/AIDS Prevention Initiative, Nigeria (APIN) and CRS/AIDS Relief. The centres on track one utilise USG funds before the launch of PEPFAR ART services and incorporation of the PEPFARprogram in 2005. The Track Two sites were established in 2005 and funded by USAID. Under this program, clinic-level facilities, referred to as primary sites, and state-level hospitals, termed secondary sites, were administered by GHAIN, whereas the tertiary hospitals, were managed by IHV. Furthermore, there has been a significant engagement of the private sector in PMTCT service delivery to increase access. Nigeria is devoted to the goal of eliminating MTCT by 2020 and has steadily sought this purpose.

2.3.1 The epidemiology of HIV in Nigeria

The epidemiology of HIV in Nigeria is mainly informed by two national surveys, the antenatal clinic (ANC) survey conducted among pregnant women and the National HIV/AIDS and Reproductive Health Survey (NARHS) which is a general population-based study (NACA, 2014). The HIV prevalence in the general population was estimated at 3.4% (FMoH, 2013). In Nigeria, the primary route of transmission of HIV is through sexual transmission (accounting for about 80% of HIV infections). The Nigerian HIV seroprevalence level, obtained from sentinel surveys of antenatal care attendees(figure 5) increased from 1.8% in 1991 to 5.8% in 2001 and then declined to 5.0% in 2003 and further to 4.4% in 2005. This decrease was followed by a rise to

4.6% in 2008, fell to 4.1% in 2010 and a drop to 3.4% in 2012 (NACA, 2016). NARHS 2013 reported a national HIV prevalence rate of 3.4%, lower than 3.6% published in 2007 and as at 2015, the HIV national prevalence was 3.1% estimated to be about 3.2 million PLWH in Nigeria (UNAIDS,2015; NACA, 2016). With an approximation of 3,229,757 people living with HIV in Nigeria, 220,393 new HIV infections and 210,031 death from AIDS-related causes in 2013, these reduced to 180,000 in 2015 (UNAIDS,2015; NACA, 2015). HIV prevalence was highest among the 35-39 years age group (NARHS, 2013; NACA, 2015).

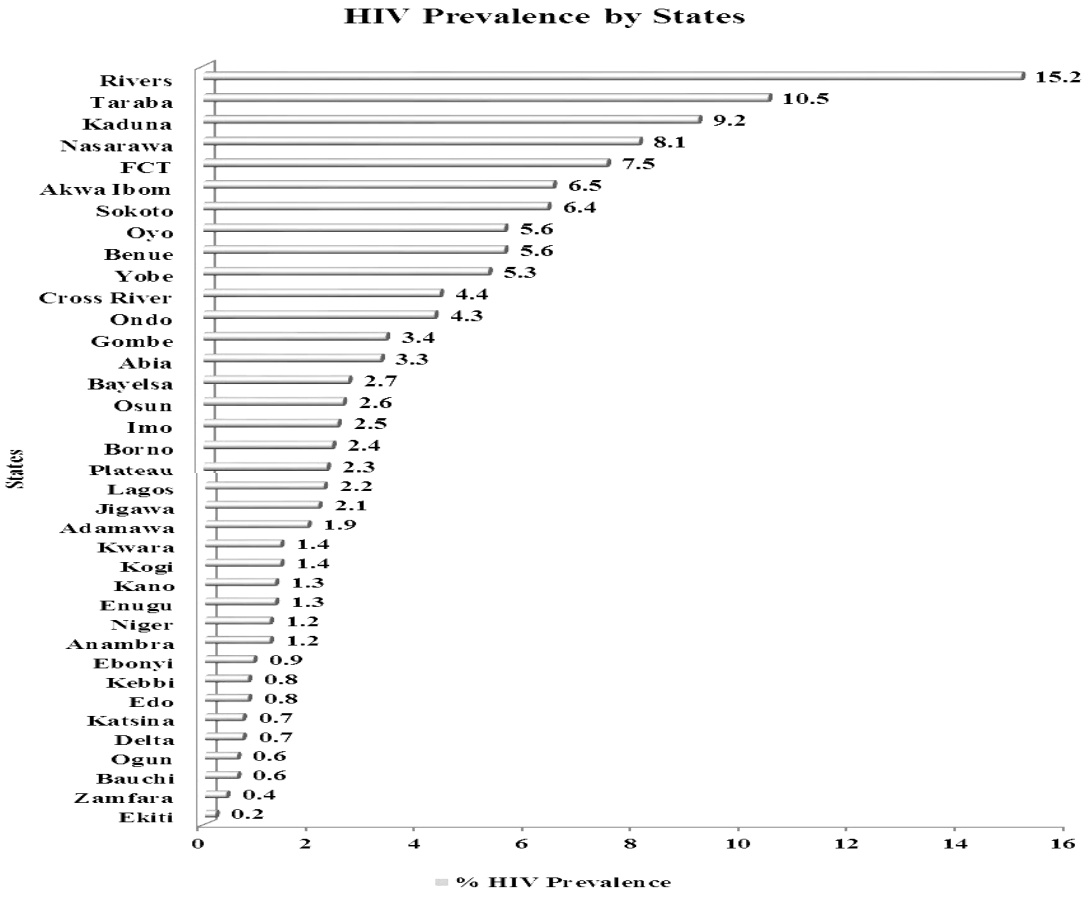


Figure 5: National HIV Prevalence by states in Nigeria (National AIDS Reproductive Health Survey (NARHS), 2012 in NACA, 2016)

2.3.2 The changing profile of HIV in Nigeria and the impact on mother to child transmission

The epidemiology of HIV is changing, In Sub-saharan Africa, more than half of new HIV infections occur among women as presented in figure 6 (UNAIDS, 2014). HIV/AIDS poses a severe threat to women's health and their social well-being (Okonofua, 2012). Documented demographic evidence has shown that black women are disproportionally infected with HIV (Ivanova, Hart, Wagner, Aljassem, and Loutfy, 2012; NACA, 2012; World Bank Policy Research Working Papers, 2014). Women are more vulnerable to HIV infection than men due to some factors such as their biological makeup, the phenomenon of younger women having sex with older men, women's low social standing, and an unequal power balance in their heterosexual relationships (Okonofua, 2012; UNAIDS, 2011).

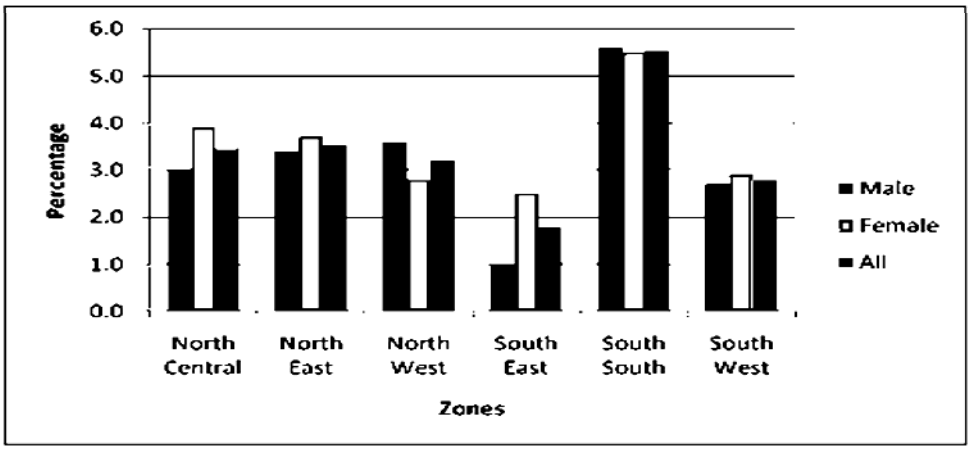


Figure 6: HIV Prevalence by Sex and Zones (National AIDS Reproductive Health Survey (NARHS), 2013)

The number of women living with HIV within the childbearing age continued to increase, so is the risk of HIV infected new-born infants through MTCT. In Nigeria,

Mother to Child Transmission of HIV contributes an enormous public health burden. Many women and their babies do not have access to PMTCT services. From the 2012 statistics, only 17% of women tested for HIV received their results, and just a percentage (22%) of HIV pregnant women received ARV (Global AIDS Response Country Progress Report (GARPR), 2013). While in 2013, only 30.1 % of HIV positive pregnant women received ARV prophylaxis to reduce MTCT. Figure 7 showed the number of pregnant women who were counselled, tested and accepted results.

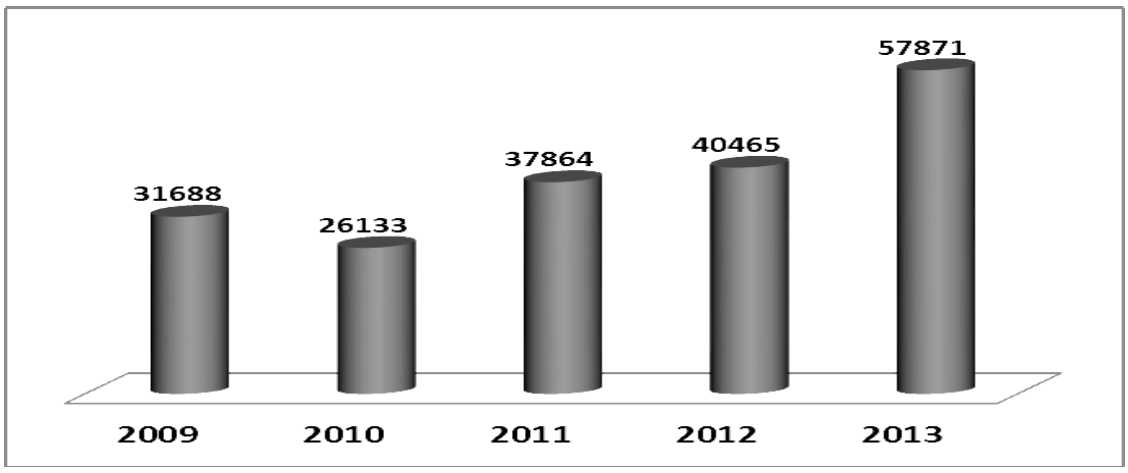


Figure 7: Number of HIV pregnant women received ARV prophylaxis in the country, 2009 - 2013 (GAPR,2014)

Poor PMTCT coverage and uptake in Nigeria can be linked to factors affecting the supply and demand of PMTCT services. There were only 690 sites in 2009, These increased to 1,410 sites in 2012 and progressed to 5,622 in 2013 (figure 8). These represent a small percentage of the PMTCT sites required for elimination of mother to child transmission of HIV (PCRP, 2013).

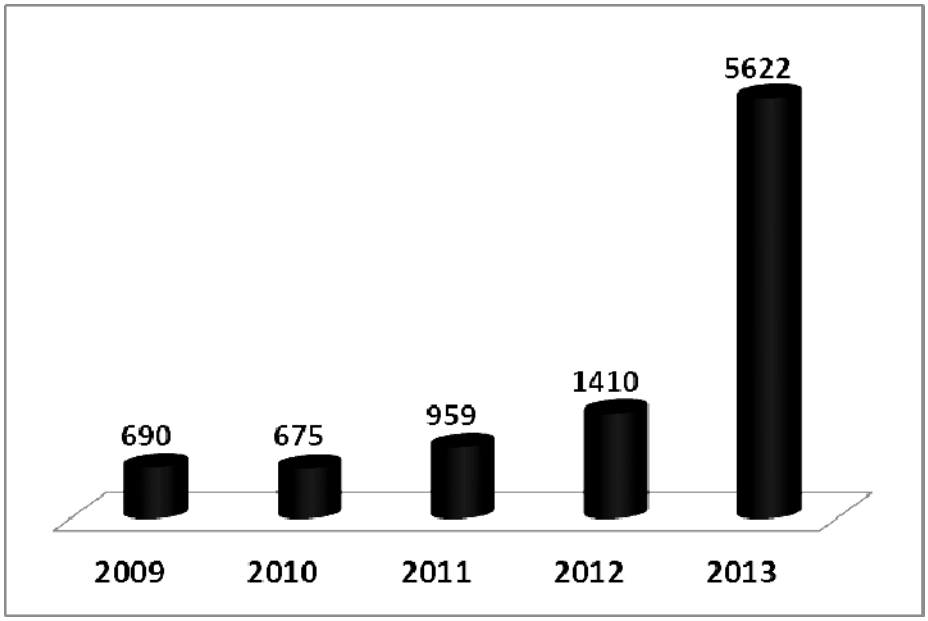


Figure 8: Number of PMTCT sites in the country 2009-2013 (GAPR, 2014)

2.4 PREVENTION OF MOTHER TO CHILD TRANSMISSION (PMTCT) OF HIV

Vertical transmission from mother to child of HIV (MTCT) can occur during pregnancy (in utero), labour (intrapartum) when the new-born infant comes in contact with infected maternal birth fluids or during the early months of life while the infant is being breastfed (postpartum). MTCT is the second commonest route of transmission of HIV/AIDS after heterosexual transmission (NACA, 2012).

Pregnancy serves as a crucial period in which to identify and treat HIV-positive women and to deliver comprehensive care to their families (Abrams, Myer, Rosenfield and El-Sadr, 2007). An effective strategy aimed at reducing the risk of MTCT must focus on preventing women from becoming infected in the first place (WHO, UNICEF; UNAIDS, 2008).

UNAIDS and WHO in 2009 developed a 4-pronged approach to comprehensive PMTCT prevention that consists of primary prevention of HIV infection among

women of childbearing age, prevention of unwanted pregnancies among HIV-infected women, prevention of HIV transmission from infected women to their infants, and treatment support for infected women and their babies and families (USAIDS & WHO,2009). Despite the rapid expansion of antiretroviral therapy (ART) programs, PMTCT coverage and uptake of ART in pregnancy remains suboptimal below desired targets leading to an increase in HIV exposed infants with a subsequent inability to get Early Infant Diagnosis (EID) services in sub-Saharan Africa. There is the need for scale-up and strengthening strategies for ART uptake and PMTCT services (Ghys, Bouey, Yekeye, Erkkola, Padayachy and Low-Beer, 2017).

2.5 MENTAL HEALTH AND HIV STATUS

The HIV epidemic has a global implication for the individual who is infected, the family, the community, and also the country experiencing the outbreak. These effects affect all sectors of life, such as the social and economic sectors (Campbell, Scott, Madanhire, Nyamukapa, and Gregson, 2011).

2.5.1 Depression and HIV status

Psychological co-morbidities, particularly depression, often accompany HIV infection and add to the complexity of clinical management. Many studies had identified the effect of stress and social health issues on maternal mental health and morbidity, such as depression.Some of these studies examined depression among pregnant women with HIV infection. Ciesla and Roberts (2001) documented that there is a high prevalence of depression among HIV-positive persons. Kwalombota (2002) a Zambian study conducted among 45 pregnant women examined and reported major depressive episodes and suicidal thoughts among 85% of the pregnant women.

Bernatsky, Souza and DeJong (2007) assessed the mental health status of pregnant women who are HIV-positive, compared with other groups of pregnant women in Angola. The control group consisted of HIV-negative pregnant women coming for antenatal clinic consultations. They found out that 67% of the HIV + pregnant women had significant emotional distress and concluded that HIV-positive women suffer greater levels of psychological distress than non-infected women during pregnancy indicating poorer mental health in the HIV-positive group. Marital status was a strong independent predictor of mental health status, with married women experiencing less emotional distress (Bernatsky, Souza and Dejong, 2007). Fawzi, Kaaya, Mbwambo, Msamanga, Antelman, and Wei (2007) in a randomised clinical study on the effects of multivitamins on depression and quality of life in HIV-positive Tanzanian pregnant women. Finding from the survey revealed that 85% of the women reported signs of major depressive episodes. The study also concluded that supplementations of vitamins B-complex, C, and E minimised depressive symptoms and increased the quality of life of pregnant women living with HIV in Tanzania.

A study by Adewuya, Afolabi, Ola, Ogundele, Ajibare, Oladipo, and Fakande (2008), was presumed to be the first study among HIV+ women in Nigeria. It examined depressive symptoms and quality of life of these women and found a significant association between the diagnosis of depression and poorer quality of life. Depression independently predicted poorer physical health, psychological health, and environmental situations of the subjects. The study also found that other sociodemographic and clinical variables like low levels of education, low socioeconomic status, poor social support, older age groups, female sex, and previous HIV-related hospital admission were associated with reduced quality of life.

The Ross, Sawatphanit and Zeller (2009) assessed the predictors of depressive symptoms among Asian pregnant women with HIV infection in Thailand during antenatal and postpartum periods. The depression rate was based on Center for Epidemiological Studies-Depression (CES-D) cut off point of 16 for clinical depression.The study from its findings documented that 44.7% had mild depression and 29.4% had severe depression making a total of 74%. The study concluded that self-esteem, emotional support, and physical symptoms were predictors of depressive symptoms.

Futterman, Shea, Besser, Stafford, Desmond, Comulada & Greco (2010) assessed depressive symptoms among 160 HIV+ pregnant women in South Africa using CES-D tool. The study recorded that 38% had CES-D scores above the diagnostic cutoff. Manikkam and Burns in 2012 documented evidence that HIV seropositivity is a correlate of depression; from a cross-sectional study among pregnant women in South Africa. From this study, 38.5% of the cohort suffered depression. Onyebuchi-Iwudibia and Brown (2014) explored the prevalence of depression and its association with HIV-related stigma among HIV-positive patients in Eastern Nigeria. The study found that negative self-image and number of treatment side effects were significant predictors of depression.

2.5.2 Anxiety and HIV status

Different publications provided documented evidence on adverse mental health outcomes in PLWH, but limited studies had been done on anxiety symptoms among HIV+ pregnant women (Ivanova, Hart, Wagner, Aljassem and Loutfy 2012;

Kapetanovic, Dass-Brailsford, Nora and Talisman, 2014; Aaron, Bonacquisti, Geller and Polansky,2015). A study by Yelland, Sutherlan and Brown (2010) provided the first Australian population-based data on disquiet life events and psychosocial issues experienced by women postnatally and identified a significant association with psychological morbidity. Anxiety symptoms among PLWH who were of childbearing age had been linked with faster HIV disease progression, reduced antiretroviral treatment adherence, low quality of life (Ivanova et al. 2012; Davis,2004). Also, antenatal anxiety had shown some association with increased infant risk for neurodevelopmental, behavioural issues and preterm birth (Ross and Mclean, 2006; Dole, Savz, Hertz-Picciotto, Siega-Riz, McMahon, and Buekens, 2003).

Kapetanovic et al.(2014) examined synthesised literature and established that adverse mental health outcomes are common among pregnant women living with HIV. Ivanova and colleagues investigated the correlates of anxiety among 361 PLWH in Canada. Thirty-seven percent of the HIV+ women had high stress related to HIV-related stigma from family and friends for trying to become pregnant and for the use of antiretroviral drugs. Mfusi and Mahabeer (2000) compared sixty PLWH (30 HIV+ and 30 HIV- pregnant women) in South Africa, findings from the study confirmed a high level of anxiety among the HIV+ group during the antepartum phase of pregnancy. Villar-Loubet, Illa, Echenique, Cook, Messick, Duthely, and Potter (2014) validated high rate of anxiety among pregnant women living with HIV.While Aaron et al. (2015) substantiated high anxiety among 358 pregnant women in Philadelphia. Berkley- Patton, Moore, Hawes, Thompson and Bohn (2012) documented that correlates of anxiety among postpartum HIV+ women are the

thought of having HIV+ babies and stigma related to peoples awareness of their HIV status.

2.5.3 Stigma and HIV status

Stigma can be described as an ancient Greek socially constructed concept denoting a mark of dishonour related to an unacceptable circumstance, quality or person (Dos Santos, Kruger, Mellors, Wolvaardt, and Ryst,2014; Sherman, 2007). It has a negative impact on the life, health and quality of life of individuals and groups so labelled (Liamputtong and Kitisriworapan, 2012). From the onset of the epidemic, people living with HIV/AIDS were perceived as discredited individuals who have “immoral characters.” As a consequence, they are socially conditioned as not “one of us” (Mason et al. 2001; Letteney and LaPorte, 2004). HIV-related stigma is multidimensional, and are of three broad types- self, perceived and enacted stigma. Self-stigma occurs through “self-blame and self- depreciation” of individuals living with HIV/AIDS and is characterised by the endorsement of negative beliefs and feelings. Perceived stigma is related to fear of disclosure of their HIV-positive status. Enacted stigma is characterised by actual experiences of prejudice, stereotyping, and discrimination from others and occurs when these individuals are discriminated against because of their HIV status - real or perceived (Thomas, 2006; Steward et al. 2008).

Despite substantial progress over the last five years, PMTCT programs have been hindered by challenges. The breakthrough in the diagnosis, prevention, and treatment have not been matched by progress in social acceptance of the disease (Mokoae, Greeff, Phethu, Uys, Naidoo, Koohi, Dlamini, Chirwa and Holzemer,2008).

Stigma and discrimination related to HIV/AIDS are still widespread among Nigerian adults (NDHS,2013). Myths fuel the effect of stigma on HIV+ pregnant women. Which adversely affect PMTCT services causing people to avoid being tested. PLWH fear disclosure to family and friends and have a distrust of healthcare systems. Thus, contributing to the existing burden of HIV/AIDS in the African region (Okonofua,2012; Bwirire, Fitzgerald, Zachariah, Chikafa, Massaquoi, Moens, Kamoto, and Schouten, 2008; Adewuya et al., 2008). As a consequence of stigma, there is an associated high rate of psychological distress like low self-esteem, depression, self-harm among PLWH(Audet, McGowan, Wallston, and Kipp, 2013; Sumari-de Boer, Sprangers, Prins, and Nieuwkerk, 2012; Ekstrand, Bharat, Ramakrishna, and Heylen, 2012).Some works of literature had supported the link between HIV-related stigma, depression and general psychological distress in several countries, including Canada, Peru, and the United States (Ivanova et al., 2012). A study across Burkina Faso, Kenya, Malawi, and Uganda identified enacted stigma evidenced by physical or verbal abuse or social marginalisation when pregnant women disclose their HIV status. Some reported that they experienced rejection and divorce following disclosure (Hardon, Vernooij, Bongololo-Mbera, Cherutich, Desclaux, Kyaddondo, Ky-Zerbo, Neuman, Wanyenze, and Obermeye,2012).

The promotion of disclosure is one of the most pragmatic ways of improving the quality of life of PLWHA, as well as reducing HIV transmission (Crepaz and Marks 2003; Sowell and Phillips, 2010). Disclosure of an HIV serostatus by patients had been related to better physical and mental health outcomes and reduced levels of depression (Zea, Reisen, Poppen, Bianchi, and Echeverry, 2005). Disclosure had

been linked to improvement in immune functioning (Strachan, Bennett, Russo, and Roy-Byrne, 2007; O'Cleirigh and Safren, 2008). Better medication adherence, improved social support and self-esteem ((Stirratt, Remien, Smith, Copelan, Dolezal and Krieger, 2006; Simoni, Huang, Goodry and Montoya, 2005).Non-disclosure of a pregnant woman's HIV status to her partner has been associated with the suboptimal prevention of mother-to-child transmission and poor treatment adherence (Jasseron et al., 2013).

2.6 STRATEGIES ADDRESSING THE MENTAL HEALTH NEEDS OF PLWH

As the HIV epidemic continues to grow, it is essential to address the mental health needs of this population. HIV/AIDS is associated with a host of psychosocial issues at the personal, family and social levels (Varga and Brookes, 2008). Psychological support is a critical component of PMTCT programs but an often neglected care in the implementation of PMTCT programs by the health providers. The diagnosis of HIV infection during pregnancy usually marks the beginning of a period of crisis for a woman and her family hence the need for the provision of psychosocial support that requires methodical, compassionate, well-informed counselling and support. These students can benefit from behavioural or psychological intervention to improve their acceptance and also ensure their commitment to an ARV therapy program.

2.6.1 ACT as a strategy to improve mental health

Studies have examined the efficacy and effectiveness of ACT and CBT in treating depression and anxiety disorders using experimental designs. Given ACT's theoretical view of what improvement entails (that is, reduced experiential avoidance and increased engagement with values), most ACT studies also include measures of

ACT-related constructs and quality of life or life functioning (Hayes et al. 2006; Twohig, 2012; Ruiz, 2010). McCracken, Vowles, and Zhao-O'Brien in 2010 emphasised psychological flexibility to be a good predictor of emotional, physical and psychosocial functioning.

Markanday and colleagues (2012) evaluated ACT in treatment-resistant depression, mood and anxiety disorders. The intervention after four weeks resulted in improved AAQ-II scores. Lappalainen, Lehtonen, Skarp, Taubert, Ojanen, and Hayes (2007) in a Finnish study assessed Cognitive Behavioural Therapy (CBT) and ACT therapy among clients living with depression/mood problems and interpersonal problems. Treatment consisted of ten sessions and client outcome data was collected between sessions. Lappalainen et al. (2007) documented positive results related to better improvement in psychopathological symptoms with ACT clients. Folke, Parling, and Melin (2012) investigated the use of ACT in depression among individuals on long-term sick leave. Findings revealed that participants in the ACT condition improved significantly on measures of quality of life and general health. In a study by Twohig (2009), a client with chronic PTSD and major depressive disorder was treated with 21 sessions of an ACT. Findings from the study documented a decrease in PTSD severity, depression, and anxiety. There was also an increase in psychological flexibility. Bohlmeijer, Fledderus, Rokx and Pieterese (2011) explored an ACT-based intervention in adults with depression. The treatment documented a significant reduction in depressive symptoms, anxiety, and fatigue. The treatment effect was noted to be mediated by an increase in participants' level of acceptance (Bohlmeijer et al. 2011).

Roemer and Orsillo (2007) evaluated the effectiveness of ACT clients with general anxiety disorder (GAD). Findings from the study showed a substantial improvement in symptoms following completion of sixteen sessions of ACT therapy and at 3-month follow-up. Roemer and Orsillo (2007) further documented that clients displayed a significant decrease in experiential avoidance. Dalryample and Herbert (2007) conducted a pilot study on the effectiveness of ACT for Generalised Social Anxiety Disorder among individuals diagnosed with social anxiety. The intervention incorporated a 12-week integrated ACT program. Data from the findings revealed no changes across a 4-week baseline control period, followed by significant improvements from pre-treatment to follow-up. Treatment showed a substantial difference in the quality of life and ACT-consistent process measures. Eifert and colleagues (2009) conducted a study looking at the impact of the ACT for individuals with differential anxiety disorder diagnoses. Treatment involved 12 weeks individual ACT sessions.The results of this study showed positive pre- to post-treatment changes in ACT-relevant process measures, increase in quality of life, and significant reductions in anxiety and distress levels.

In a study conducted in 2007, Forman and colleagues compared ACT and cognitive therapy (CT) as treatments for anxiety and depression. This study concluded that ACT and CT improved depression, anxiety, quality of life and functioning of participants. However, the study identified that mechanisms of change amongst participants in the CT condition were mediated by observing and describing one's experiences, while the difference in the ACT condition was mediated by experiential avoidance, acting with awareness, and acceptance.In a study by Arch, Eifert, Davies, Plumb Vilardaga, Rose, and Craske (2012), assessed the effectiveness of

ACT and CBT in various anxiety disorders by exposing participants to 12 sessions of ACT or CBT. Findings revealed that participants in both therapy groups showed improvement across all measures. ACT group had higher scores on the AAQ-16, while CBT group had higher QOLI scores. The findings from a meta-analysis of acceptance-based interventions for the treatment of chronic pain by a Veehof, Oskam, Schreurs, and Bohlmeijer, 2011 study, hypothesised that acceptance-based interventions were not superior to CBT, but asserts that ACT is effective in improving both physical and mental health. Wetherall and colleagues (2011) explored the use of ACT in GAD through 12 individual sessions of ACTand CBT. Participants in the ACT group experienced significant reductions than the CBT group in worry and depression symptoms.

2.6.2 Telecommunications as a strategy to address mental health issues

Over the years, there has been an increased interest in the use of telecommunication to deliver health services. WHO in Ahmed, Gagnon, Hamelin-Brabant, Mbemba, and Alami (2017) described “Telehealth” as healthcare management and support through the use of telecommunication techniques for the purpose of trainning , provision of service and research. Istepanian and Lacal (2003) defined m-health as wireless telemedicine involving the use of mobile telecommunications and multimedia technologies and their integration with mobile healthcare delivery systems. Mobile health (mHealth) includes the use of mobile devices for the delivery of health services and information. mHealth can be used rapidly to assess and modify health-related behaviour and transform patients’ decision-making about their health (Kumar, Nilsen, Pavel,and Srivastava, 2013).

Mobile health interventions for health care consumers have been designed to increase healthy behaviour or improve disease outcome (Free, Phillips, Galli, Watson and Felix, 2013).

An increasing number of developing countries are using mobile technology to address health needs According to the National Communications Commission Mobile Subscriber base in Nigeria (2011), the adoption of mobile health (m-health) technology would, in no small measure, contribute to providing health care to consumers. M-Health will provide the opportunity to obtain, process, and understand the basic health information and services needed to make appropriate health decisions. For education, SMS messages are sent directly to users' phones, supplying information about testing and treatment, the availability of health services, and disease management. By promoting health-conscious behaviour, m-health education and awareness programs such as the Freedom HIV/AIDS Project in India, Learning about Living with HIV in Nigeria, Project Masiluleke in South Africa and Text to Change (TTC) – HIV Prevention through the SMS Quiz in Uganda are producing positive results. The cost-effectiveness of SMS is postulating a shift in paradigm. SMS has the advantage of engaging communities in a manner that respects their privacy and guides informed choices. Data collection process via smartphones, PDAs or mobile phones are ongoing in studies like Cell-PREVEN in Peru, Community Health Information Tracking System (CHITS) in the Philippines, EpiSurveyor in more than twenty countries in sub-Saharan Africa and pain outcomes in a low back pain clinical trial in 2012, to mention a few.

The Mobile Alliance for Maternal Action (MAMA) provides pregnancy and childcare health messages to pregnant and nursing mothers in developing countries via their mobile phones. MAMA provides core messages built around key health behaviours and topic-based messages on infant feeding, postpartum family planning, and other related information. Data from the study revealed an increase in pre and postnatal visits, knowledge around nutrition and other vital information. Kunutsor, Walkey, Katabira, Muchino, Balidawa, Namagala and Ikoona (2010), in a cross-sectional study conducted in Uganda, examined the use of mobile phones in improving clinic attendance in a rural setting. The result indicated that 177(64%) had access to cell phones, which is relatively high for a rural setting. A total of 176 clinic attendees for medication refills were monitored prospectively for 28 weeks. The total number of scheduled appointments recorded was 560, out of which 477 were on scheduled visits, while 62 (11% of meetings) were missed visits. Among the group that lost their visits, 49 (79%) of those who received reminders presented for treatment. They reported that adherence levels were significantly higher during the mobile phone intervention. Chen and colleagues (2010) in their study, compared the efficacy of SMS and phone reminders in improving attendance at a health promotion centre in China. A total of 1,891 participants were randomly assigned into three groups; the first group received SMS reminders and the second group received phone reminders, while the control group did not get any intervention. The participants were followed up for two months, and results showed that SMS and phone reminders attendance rate were 87.5% and 88.3% respectively which were significantly higher than that of the control group,80.5%, though without statistically significant differences.

Positive psychology specifically has gained from the use of smartphone-based methodology offering application-based strategies to boost happiness. The study revealed important findings about happiness seeking practices and the potential to enhance wellbeing through a smartphone–based application. The finding confirms the potential for further health-based intervention research using smartphones (Parks, Della Porta, Pierce, Zilca, and Lyubomirsky, 2012). M-Health devices have been used in addiction treatment to accompany the delivery of therapeutic interventions (Ly, Dahl, Carlbring,and Andersson, 2012; Clough and Casey, 2011) and to generate rich sets of real-world behavioural data (Dufau et al., 2011; Killingsworth and Gilbert 2010). Sin and Lyubomirsky (2009) conducted the first meta-analysis of positive interventions, demonstrating how positive interventions (short, simple cognitive and behavioural strategies) could significantly enhance wellbeing and also decrease depressive symptoms. Miller (2012) hypothesised that smartphones could ‘‘transform psychology even more profoundly than PCs and brain imaging’’. In an outcome depression study by Simon, Tutty, Operskalski, and Korff,(2004), telephone care management was evaluated against treatment recommendations/practice support plus telephone care management. Compared with usual care, the practice telephone support intervention led to lower mean depression scores. Ross, Sawatphanit, Mizuno and Takeo (2011) conducted a study among 40 HIV+ pregnant women in Thailand and asserted an improvement of depressive symptom through telephone support. In conclusion, formal studies and anecdotal evidence had demonstrated that health interventions had a measurable impact on, and a higher ability to influence, health outcomes.

2.7 SUMMARY OF CHAPTER

Prevention of MTCT of HIV had been a forefront global HIV prevention activity. The WHO (2010) identified that the integration of PMTCT interventions in high-burden countries like Nigeria would help advance the global PMTCT effort towards the elimination of paediatric HIV, and would make significant progress towards the Millennium Developing Goals. The commitments that guided the national HIV prevention response in Nigeria have been documented in different federal strategic documents with the backing of the significant development donors and partners such as UNICEF and the Centre for Diseases Control (CDC) (NACA,2014).HIV/AIDS is associated with a host of psychosocial issues at the personal, family and social levels which affect all sectors of life, physical, social and psychological sectors (Campbell et al., 2011; Varga and Brookes, 2008). Psychosocial support is a critical component of PMTCT programs but an often neglected care in the implementation of PMTCT programs by the health providers.

The efficacy of ACT has been demonstrated in some contexts and has been applied to a range of clinical conditions including, depression, anxiety and psychosis (Hayes et al. 2006; Twohig, 2012). Mobile health (mHealth) includes the use of mobile devices for the delivery of health services and information. mHealth can be used rapidly to assess and modify health-related behaviour and transform patients' decision-making about their health (Kumar, Nilsen, Pavel, and Srivastava, 2013).This study intends to evaluate the effectiveness of ACT to improve the mental health of pregnant women using mhealth.

CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

The research method is a systematic blueprint that guides the researcher in planning and implementing the study in a way most likely to achieve the intended goal. (Babbie and Mouton, 2001; Burns and Grove, 2005). Research Methodology describes the philosophical assumptions and the design strategies underpinning the research study. Research methodologies used in the survey include plans, the pilot study, sampling technique, research instruments, data collection techniques, cleaning of the data, and analysis methods while explaining the stages and processes involved in the study (Terre Blanche, Durrheim, and Painter, 2006). This chapter focuses on the research methods including the study area, target population, study population, research/study design, sampling technique, and the development of the instruments for data collection and intervention. It also discusses ethical considerations, validity, and reliability of the research instruments, data analysis and limitations of the study.

3.2 RESEARCH DESIGN

Research design can be described as a structured framework or guide used in the planning, implementation, and analysis of a study with maximum control over factors that may interfere with the validity of the findings (Polit and Beck, 2011; Burns and Grove, 2003; Joubert and Ehrlich, 2007). Polit and Beck further emphasise the seven design features that are considered in planning a quantitative evaluation study. These features are the intervention, control, blinding, comparisons, location, and time frame of the survey (Polit and Beck, 2011).

3.2.1 This study's design

To address the aim of this study, which is to strengthen the mental health status of pregnant women living with HIV and improve PMTCT outcomes in Nigeria through the use of Acceptance and Commitment therapy in PMTCT program; Solomon Four-Group design was selected. Solomon four is an experimental design that involved four randomly assigned groups (two control and two experimental groups) with two of the groups having before and after measures. Two of the groups are pretested (O) and two are not. Only one pretested and one not pretested group are then exposed to a treatment (X). All of the groups are post tested (O). Group I-PP (Pretest and post-test), Group C-PP (Pretest and post-test), Group I–Post (post-test), Group C-Post (post-test).

This design has the advantage of allowing for control of testing effects, if exposure to pretest increases the sensitivity to the experimental treatment, thus preventing generalization of results to an unpretested population. (De Vos, Strydom, Fouche and Delport, 2011). Solomon Four-Group design assesses the plausibility of pre-test sensitization effects, whether the exposure to pre-test influences scores on subsequent administrations (Brink and Wood, 1989). Per Huck and Sandler (1973), "Solomon Four–Group design adds a higher degree of external validity in addition to its internal validity and [is] thus the most desirable of all the basic experimental designs". According to Brink and Wood (1998), the use of Solomon four design will ensure researcher's confidence in inferring causal relationships with increased true treatment effect power of the study. Solomon Four-Group design was selected. Solomon four is an experimental design that involved four randomly assigned groups (two control and two experimental groups) with two of the groups having before and

after measures. Two of the groups are pretested (O), and two are not. Only one pretested and one not pretested group are then exposed to treatment (X). All of the groups are post-tested (O). Group I-PP (Pretest and post-test), Group C-PP (Pretest and post-test), Group I–Post (post-test), Group C-Post (post-test).

This design has the advantage of allowing for control of testing effects, if exposure to pretest increases the sensitivity to the experimental treatment, thus preventing generalisation of results to an unexposed population. (De Vos, Strydom, Fouche and Delport, 2011). Solomon Four-Group design assesses the plausibility of pre-test sensitisation effects, whether the exposure to pre-test influences scores on subsequent administrations (Brink and Wood, 1989). Per Huck and Sandler (1973), “Solomon Four-Group design adds a higher degree of external validity in addition to its internal validity and [is] thus the most desirable of all the basic experimental designs”. According to Brink and Wood (1998), the use of Solomon four design will ensure researcher’s confidence in inferring causal relationships with increased true treatment effect power of the study.

3.3 PARADIGM

A paradigm can be described as a framework, or an integrated cluster of substantive concepts that define the nature of the enquiry, within a discipline by providing lenses, frames and processes through which investigation is accomplished (Kuhn, 1996; Weaver and Olson, 2006). Cresswell (2009) identified four different paradigms as positivism/post-positivism, constructivism, advocacy/participatory and pragmatism.

The concept of Positivism is rooted in the 19th century thought based on the

philosophical ideas of the Philosophers like August Comte, Mill, Newton, and Locke. “Comte’s position led to a doctrine of positivism which held that all genuine knowledge is based on sense experience and can be advanced only employing observation and experiment” Cohen, Manion and Morrison (2007). Positivism is the traditional form of research called the scientific method of doing research and its assumptions hold true more for quantitative research. The positivists’ scientific approach involves using orderly, disciplined procedures with tight controls of the research situation to test phenomena being studied and the relationships among them. The modified positivist position which is known as positivism remains a dominant force in nursing research (Polit and Beck, 2011).

3.3.1 This study’s paradigm

The paradigm of this study is from the worldview of positivism perspective and uses the quantitative approach to determine the effects or outcomes of Acceptance and Commitment therapy. Quantitative designs utilise a set of orderly, disciplined procedures to acquire information through deductive reasoning (Polit and Beck, 2011).

3.4 RESEARCH SETTING

Nigeria is the largest country in the African region, covering a total surface area of approximately 923,768 square kilometres and 800km of coastline and inwards on latitudes 4° 1’, 13º 9’ North, longitudes 2º 2’ and 14º 30’ East (Federal Ministry of Health(FMoH), 2010). As noted by Falola and Heaton (2008) Nigeria gained her freedom from the United Kingdom in 1960. The nationalist advocates that won

independence opted to retain Nigeria's colonial borders and to govern the country as a federated republic. Initially, Nigeria was in three regions, with the Federal Capital Territory at Lagos. In 1991 the federal capital was moved from Lagos to Abuja, located in a new FCT in the centre of the country. The governing bureaucracy has three tiers – federal, state, and local – with each level of guaranteed specific responsibilities by the Nigerian constitution (UNGASS 2012).

The National Population Commission (2013) documented that Nigeria was initially twelve states in 1967; this increased to nineteen in 1976, twenty-one in 1987, thirty in 1991 and thirty-six states in 1996. The country has 36 states and the Federal Capital Territory (FCT). The states are in six geopolitical zones based on geographical considerations; North East (NE), North West (NW), North Central (NC), South West (SW), South East (SE) and South-South (SS). Each geopolitical zone is distinct with its unique size, the composition of population, ecology, language, norms, settlement patterns, economic opportunities and historical background. Within the states are 774 Local Government Areas (LGAs). The South West geopolitical zone is selected for this study (figure 9).

Nigeria's Culturally, Nigerians are influenced both by their indigenous traditions and by newer values and lifestyles that have been incorporated from the West. Traditional reliance on extended family and kinship networks remains strong throughout Nigeria, but a growing focus on smaller, nuclear families and individual achievement are recognisable, particularly in urban areas. While polygamy is still a common practice in the country, monogamous marriage is also common, particularly

among Christians and the educated elite. Approximately 50% of the population lives in urban areas with the rate of urbanisation estimated at 3.75% annual rate of change (Falola and Heaton, 2008).

Nigeria is the most populous African country with an estimated population of around 160 million (National Population Commission, 2014). The median age is 17.7 which translates to an overwhelmingly young community. The average life expectancy in Nigeria is forty-six years, as poverty, malnutrition, and the lack of necessary health care facilities and services keep life expectancies low. Nevertheless, the average population growth rate stands at around 2.5 percent, which means that the ratio of young to middle-aged and older persons continues to rise. With a population of children <5 years accounting for 20%, young people < 15 years account for 42%, and young people between 15-24 years are 19.3% (National HIV/AIDS prevention plan 2014-2015). Total Fertility Rate (TFR) of 5.5. Gender distribution reflects a 51% male and 49% female) (Federal Republic of Nigeria (FRN) Official Gazette, 2009; National Population Commission, 2013).population is very diverse with 250 ethnolinguistic groups. The languages include English (Official), Hausa, Yoruba, and Igbo. There are three primary major ethnic groups, Hausa, Yoruba, and Igbo. The Hausas, located in the northern savannahs, account for roughly 21% of the population, while the Yoruba, situated in the south-western part of the country, make up 20%, and the Igbos of the southeast 17%. Other ethnic groups include the Fulani of the savannah, the Ijaw of the Niger Delta region, the Kanuri of the Lake Chad region, the Ibibio in the southeast, the Nupe and Tivs of the middle belt region (UNGASS 2012; FMOH 2010).

Figure 9: Map of Nigeria

* Marked dark border signifies the study setting region

3.4.1 Study setting

The study centres were in South-western states of Nigeria. There are six major states in South-western Nigeria namely Oyo, Ogun, Ondo, Ekiti, Lagos and Osun States. The six states were listed, and four were randomly picked by ballot. Four of these states were randomly selected for the study. As at 2013, there are 5622 PMTCT centres in Nigeria. Four PMTCT centres from hospitals were selected randomly selected from the pool of PMTCT centres in southwestern states for this study. The selected centres are PEPFAR PMTCT centres in University College

Hospital, Ibadan; Oyo State Hospital, Ibadan; Ogun State Hospital, Ijebu Ode and Nigerian Institute of Medical Research, Lagos.

3.4.1.1 **Site One: Oyo state**

Oyo state Oyo state was created on the 3rd of February 1976 from the Western states, with Ibadan as the capital. Ibadan initially was the centre of administration of the old Western Region, Nigeria in the days of British colonial rule and the largest city in Sub-Saharan Africa till 1970. Ibadan is the fourth largest state economy in Nigeria and the second largest non-oil state economy in Nigeria after Lagos State. The main economic activities engaged by the people are àgriculture, trading, public service employment etc. The University College Hospital (UCH) is strategically located in Ibadan. It was set up to meet the training need of medical personnel and other healthcare professionals in the Sub-Region by an act of parliament in November 1952. The physical development of the hospital commenced in 1953 in its present site and was formally commissioned after completion on 20th of November 1957. UCH is the oldest teaching and research centre in Nigeria and is affiliated with the University of Ibadan. It is a tertiary health facility that serves as a resource for other designated hospital. The facility enjoys PEPFAR support through APIN/Harvard grant.

3.4.1.2 **Site Two: Ogun State**

Ogun state was created on the 3rd of February 1976 from the Western states. Abeokuta is the capital city. The 2006 census recorded 3,751,140 residents. Ijebu-Ode is one of the important cities in Ogun state. In the pre-colonial days, it was the capital of the Ijebu kingdom (https://en.wikipedia.org/wiki/Ogun_State). Ijebu-Ode is composed of a mixed people who majorly speak the general Yoruba language, as

opposed to the local dialect. It houses the state hospital, Ijebu-Ode, one of the facilities used for this study. The PMTCT program of the Ijebu-Ode state hospital, Ijebu-Ode is also managed by the Equitable Health Access Initiative (EHAI).

3.4.1.3 **Site Three: Ondo State**

Ondo State was created on 3rd of February 1976 from the former Western State by the then regime of General Murtala Mohammed with Akure as the state capital. Ondo State covers 14,606 square kilometres. Akure is the capital with a population of 588,000 people based on the 2006 population census (https://www.hotelsrepublic.com/akure). Ondo state has 38 PMTCT centres that provide comprehensive PMTCT programs. Prevention of Mother to Child Transmission of HIV/AIDS, (PMTCT) is provided in the antenatal clinics (ANC), labour wards as well as through some outreach programs/private facilities that incorporate antenatal care services. The PMTCT program of the state hospital, Akure is managed by the Equitable Health Access Initiative (EHAI), which is a sub-awardee to the Institute of Human Virology, Nigeria (IHVN) in the PEPFAR funded Centre for Disease Control and Prevention (CDC) (2012 – 2017) grant award GGH000925.

3.4.1.4 **Site Four: Lagos state**

Lagos State was the capital of Nigeria since its amalgamation in 1914 and was administered by the Federal Government as a Federal Territory until 1991 when the federal capital was moved to Abuja. The population of Lagos State given by the Lagos State Government is 17,553,924. Lagos is Nigeria's economic focal point, generating a significant portion of the country's GDP. Lagos has one of the highest standards of living in Nigeria and Africa. Lagos has a vibrant social life and is the

centre of the Nigerian movie and music scenes; it is also a significant tourist destination. The Nigerian Institute of Medical Research (NIMR) was established by the National Science and Technology Act of 1977, and the name was changed from Medical Research Council of Nigeria to National Institute of Medical Research (NIMR) in 1993. The institution researches diseases of public health importance in Nigeria and develops structures for health research, dissemination of research findings and training nationally and internationally. NIMR is a tertiary health facility that houses two ART programs: one run by the Government of Nigeria and a second operated by Harvard/APIN under PEPFAR. Although not a PEPFAR program, the GON ART clinic received PEPFAR funding. The facility attracts patients from some hospitals, non-governmental organisations and support groups throughout the country.

3.5 THE STUDY

3.5.1 Population and Target Population

A population is described as the entire set of individuals having common characteristics including all elements that meet set criteria for inclusion (Polit and Beck, 2008; Burns and Grove 2005). The population for this study were diagnosed HIV positive pregnant women in Nigeria. According to NACA (2012), the median National percentage of HIV-positive pregnant women who receive antiretroviral treatment to reduce the risk of mother-to-child transmission is 15.9%. Statistics from two of the centres in five years (2007 -2011) showed that a total of 3,291 new pregnant women were registered for ARV therapy over the five year period. Each of

the PMTCT centres logged an average of 150 newly pregnant women yearly into ARV therapy.

According to Delost, and Nadder, (2014), sampling is the process of selecting a portion of the population (people, events and behaviour) to represent the entire community (Burns and Grove, 2005; Polit and Beck, 2008). The sampling for this study was done in two stages. Firstly, four states were picked by ballot out of six states; then four PMTCT centres were randomly selected from the pool of listed 11 PMTCT centres in southwestern states of Nigeria. The selected centres were University College Hospital, Ibadan, Oyo State Hospital, Ibadan, Ogun State Hospital, and Ijebu-Ode and Nigerian Institute of Medical Research, Lagos. The second stage was the selection of diagnosed pregnant women attending any of the selected PMTCT centres. Due to the nature of the research protocol that included antenatal and ARV visits monitoring, the gestational age of the pregnancy must not be more than twenty-eight weeks at the time of registration to give room for adequate oversight of ARV documentation.

3.5.2 Sample and Sampling procedure

The sample size calculation was based on the expected effect size on the main outcome measure of psychological acceptance as measured by the Acceptance and Action Questionnaire (AAQ-II). On average, an individual should have a score of 60 out of 70 on the AAQ-II questionnaire scale, however, this value could be as low as 35 in individuals with HIV infection. If ACT can increase the score to 45 ±5, using the formula for comparison two means, as stated by Wang and Bakhai (2006), an

approximate minimum of 30 women was required in each arm of the study to achieve a study power of 90% at 95% level of confidence (α = type I error (significance level) = 0.05). This estimate was obtained as follows using Wang and Bakhai (2006) formula:

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 X \sigma^2}{(\mu_1 - \mu_2)^2}$$ Where,

μ_1= anticipated mean increase in mental health score in response to ACT = 10

μ_2= anticipated mean increase in mental health score in the control = 7

σ = standard deviation of response (assumed the same on both treatments) = 5

α = type I error (significance level) = 0.05

β = type II error = 0.1

$1 - \beta$ = power = 90%

$Z_{1-\alpha/2}$ = 1.96

$Z_{1-\beta}$ = 1.28

Therefore, $n = \frac{(1.96 + 1.28)^2 X 5^2}{(10-7)^2}$ = 29.2 = 30 participants in each arm of the study.

If some patients are lost to follow-up, this reduces the effective sample size. In order to adjust for loss to follow up (proportion 'Q'), the total sample size is multiplied by 1/ (1−Q) with an estimated 10% loss to follow-up = 30 x 1/ (1 – 0.1) = 30 x 10/9 = 33.3

Thus, 33 pregnant women were enrolled into the research in each of the PMTCT centres (Figure 10).

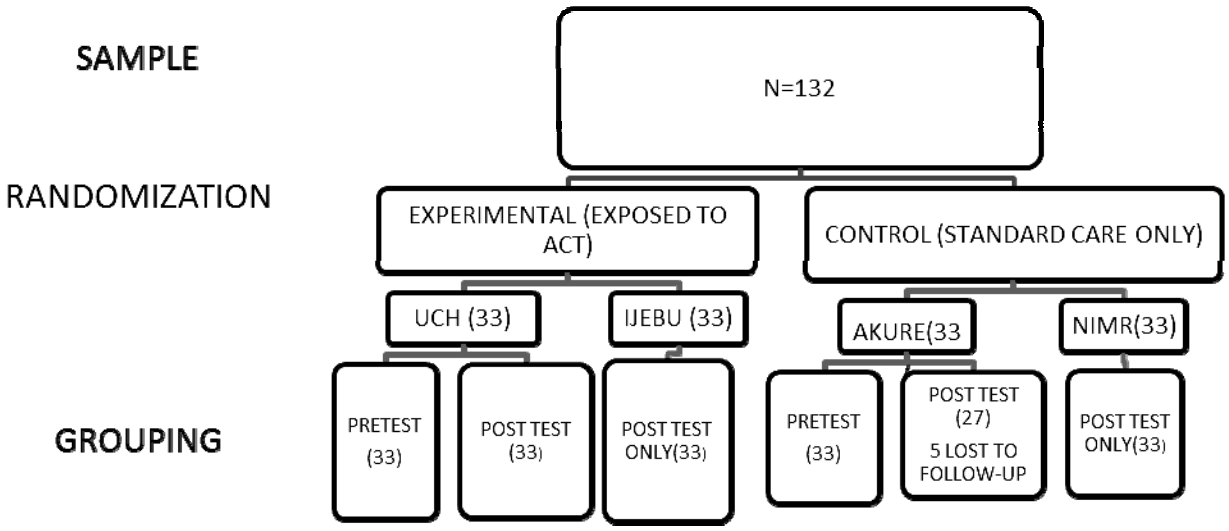


Figure 10: Sampling Process using Solomon Four

3.5.2.1 **Randomization**

Four states were picked by ballot out of six states; then four PMTCT centres were randomly selected from the pool of listed eleven PMTCT centres in southwestern states of Nigeria. Randomization of the hospitals into groups (2 intervention sites and two standards of care sites) was done by an independent person blinded to the aims of the study. A randomised group design was then used to recruit 132 pregnant women living with HIV. Respondents were blinded to their group intervention or control status and the research assistants that assessed the outcomes were also blinded to the clinic's status as intervention or control arm of the study.

3.5.3 Research Instrument

Joubert and Ehrlich (2007) stated that a questionnaire is a list of questions answered by the respondents which give indirect measures of the variables under investigation. The instruments utilised were Acceptance and Action Questionnaire-II

(Hayes, Strosahl, Wilson, Bissett, Pistorello, Toarmino, Polusny, et al., 2004), Depression Anxiety Stress Scales (Lovibond, and Lovibond, 1995) and HIV stigma scale (Berger, Ferrans and Lashley, 2001). All were used to assess the mental health status of the selected pregnant women. Permissions were taken before the use of the instruments. The psychometric properties of the tools were further described in Table 2. The instrument had three sections A, B, and C. Section A addressed questions on demography, section B was on mental health status and psychological flexibility while Section C focused on PMTCT outcomes.

Table 2: Psychometrics of Tools

TOOL	AUTHOR	DESCRIPTION	PSYCHOMETRICS
Acceptance and Action Questionnaire II	Hayes, Strosahl, Wilson, Bissett, Pistorello, Toarmino, Polusny, et al, (2004)	The 10 item Acceptance and Action Questionnaire is a brief self-report measure of general Experiential Avoidance/Acceptance. The AAQ-II requires respondents to rate each item truthfully on a 7 point Likert scale ranging from 1 (Never True) to 7 (Always True). The total score on the AAQ- II scale ranges from 1- 70. Items 2, 4, 5, 7, 8 and 9 were reverse scored and summed with the remaining items for a total score out of 70. A higher score indicates higher levels of acceptance while lower score indicate a predominance of Experiential Avoidance.	Internal consistency was found to be adequate (Cronbach's α = 0.83) as well as test-retest reliability (*r*) 0.79 (Bonds et al.,2011)
Depression Anxiety Stress Scales (DASS)	Lovibond, and Lovibond, (1995)	This self-report measure is the 42 item version. The DASS is a set of 3 scales designed to assess distress along the dimensions of depression, anxiety and stress/tension. The 42 item version has three sub-scales with 14 items each concerning Anxiety (Items 2,4,7,9,15,19,20,23,25,28, 30,36,40 and 41). Depression (Items3,5, 10, 13,16, 17,21,24, 26,31,34,37,38, and 42) and Stress (Items 1,6,8,11,12, 14,18,22, 27,29, 32, 33 and 35). Interpretation of the DASS is based primarily on the use of cut-off scores ratings from 'normal' to 'extremely severe' on the basis of percentile scores, with 0-78 classified as 'normal', 78-87 as 'mild', 87-95 as 'moderate', 95-98 as 'severe', and 98-100 as 'extremely severe'.	The Cronbach's alpha, were .90 for anxiety, .95 for depression, .93 for stress and .97 for the total scale (Henry and Crawford, 2005).

HIV stigma scale	Berger, Ferrans, and Lashley. (2001)	The 40 items of the HIV Stigma Scale focus on experiences, feelings, and opinions as to how people living with HIV feel and how they are treated. The person living with HIV responds to these items using a four-point scale to indicate level of agreement or disagreement. Subscale scores are calculated by summing the scores for the items belonging to each subscale, and an overall stigma score is calculated by summing the ratings for all 40 items. For the total HIV Stigma Scale, scores ranged from 40 to 160 [1 x 40 items to 4 x 40 items]. For the personalized stigma subscale, scores ranged from 18 to 72. For the disclosure subscale, scores ranged from 10 to 40. For the negative self-image subscale, scores ranged from 13 to 52. For the public attitudes subscale, scores can range from 20 to 80.	Coefficient α ranging from 0.90 to 0.93. The test-retest reliability ranged from 0.89 to 0.92 (Berger et al., 2001)

3.5.3.1 **Translation process**

The questionnaire, training manual and the developed value-based messages were given to a lecturer in Yoruba language for translation. After, which a bilingual (Yoruba and English) expert in the university assessed both the forward versions and the Yoruba versions. The back conversion was done to English language. The questionnaire was pretested among pregnant HIV+ women at mother and child hospital, Akure. The Cronbach's alpha for each the scale on the questionnaire was not less than 0.68. The questionnaires were administered by the researcher and four nurses who were trained as research assistants by the principal investigator.

3.5.3.2 **Acceptance and Action Questionnaire (AAQ-II)**

The 10 item Acceptance and Action Questionnaire is a brief self-report measure of general Experiential Avoidance/Acceptance developed by Hayes et al. (2004). Respondents rate how each item truthfully applied to themselves on a 7 point Likert scale ranging from 1 to 7 denoting (Never True and Always True). On the AAQ-II items 2, 4, 5, 7, 8 and 9 are reverse scored and summed with the remaining items to

give a total possible score ranging between 1 and 70. The higher the score, the higher the individual's level of psychological flexibility which denotes acceptance.

According to the tool originators, the items of the scale tap different aspects of experiential avoidance/acceptance. Ranging from the individual's ability to take effective action when experiencing inhibitory thoughts (item 1) or feelings (item 3). The use of day-dreaming as a form of behavioural regulation (item 2) and an attempt to control or eliminate private events (items 4 and 9). The presence of fear or negative evaluations of private events (items 5 and 8) and the ability to distance one-self from the real content of negative evaluations (items 6 and 10). Lastly is the presence of negative comparisons with others (item 7) (Hayes et al., 2004).

During the validation study carried out by the authors on 460 clients from a student counselling centre, internal consistency was found to be adequate (Cronbach's α = 0.70) as well as test-retest reliability (r = 0.64). Moderate to high correlations with measures of psychopathology (e.g. Depression, anxiety, post-traumatic stress), measures of specific coping (e.g. thought suppression, dissociation, specific avoidance) and Quality of Life was found in the construct validity of the AAQ. This finding indicates that the AAQ was a valid measure for the construct of general experiential avoidance as a broad-based phenomenon (Hayes et al., 2004).

3.5.3.3 **Depression Anxiety and Stress Scales - 42 (DASS 42)**

This subjective mental health distress self-report measure is the 42-item version of the Depression Anxiety and Stress Scales (DASS) self-report measure of anxiety, depression and stress developed by Lovibond and Lovibond, (1995). The

psychometric properties of the tool is described in Table 5. The developers originally intended to create a measure that would maximally discriminate between depression and anxiety. During the scale's development, items not specifically related to depression and anxiety were not included in the measure but were regarded as controls. However, it was revealed that the control items tended to form a third group characterized by chronic nonspecific arousal. More items were added to this group, and the third scale - the stress scale - emerged.

As described by Lovibond and Lovibond, (1995) the DASS is a set of 3 scales designed to assess mental health distress along the dimensions of depression, anxiety and stress/tension. The 42 item version has three sub-scales with 14 items each concerning Anxiety (Items 2, 4, 7, 9, 15, 19, 20, 23, 25, 28, 30, 36, 40, and 41), Depression (Items 3, 5, 10, 13, 16, 17, 21, 24, 26, 31, 34, 37, 38, and 42) and Stress (Items 32, 29 , 1, 6, 8, 11, 12, 14, 18, 22, 27, 33 and 35). In a 4 point, likert scale ranging between 0 (Did not apply to me at all) and 3 (Applied to me most of the time) the respondents indicate the frequency or extent to which they experienced each of the symptoms described on the items. The scores for each scale are obtained by summing the responses, with a total obtainable score of 126.

The DASS depression sub-scale DASS Q13 and Q26 questions reflect dysphoria (mental dissatisfaction), DASS Q37 and Q10 questions reflecting hopelessness, DASS Q38 and Q21 questions reflecting devaluation of life, DASS Q34 and Q17 questions reflecting self-depreciation, DASS Q16 and Q31 questions reflecting lack of interest/involvement, DASS Q3 and Q24 questions reflecting anhedonia (loss of capacity to experience pleasure), and DASS Q5 and Q42 questions reflecting inertia.

The DASS anxiety subscale DASS questions 25, 19, 2, 4 and 23 reflect autonomic arousal (state of emotional apprehension), DASS Q7 and Q31 questions reflect skeletal musculature effects, DASS Q40, Q9 and Q30 questions reflect situational anxiety, DASS 28, 36, Q20 and Q15 questions reflect subjective experience of anxious affect. The DASS stress subscale DASS Q22, Q29 and Q8 questions reflect difficulty relaxing, DASS Q12 and Q33 questions reflect nervous arousal, dass Q11, Q1 , Q39, Q6, Q27 and Q18 questions reflect easily upset/agitated, dass35,14 and 32 questions reflect impatience, and lastly, DASS Q6, Q27 and Q18 questions reflects irritablility.

The reliability of the DASS scales, utilising the Cronbach's alpha, were .90 for anxiety, .95 for depression, .93 for stress and .97 for the total (Henry and Crawford, 2005). The interpretation of the DASS is based on cut-off scores. Lovibond and Lovibond (1995) presented 'normal' to 'extremely severe' ratings. This was on the basis of percentile scores, with 0-78 classified as 'normal', 78-87 as 'mild', 87-95 as 'moderate', 95-98 as 'severe', and 98-100 as 'extremely severe' (https://pdfs.semanticscholar.org).

As discussed on "https://www.psychologyroots.com/depression-anxiety-stress-scales-dass/ the characteristics of high scorers on the DASS scale are:

Depression scale: "Self-disparaging, gloomy, unable to become interested or involved, pessimistic about the future, unable to experience enjoyment or satisfaction, slow, lacking in the initiative and convinced that life has no meaning or value.

Anxiety scale: apprehensive, panicky, shaky, pounding of the heart, aware of dryness of the mouth, breathing difficulties, sweatiness of the palms and possible loss of control.

Stress scale: over-aroused, tense, unable to relax, touchy, easily upset, irritable, easily startled, nervy, jumpy, fidgety and intolerant of interruption or delay.

However, these original norms were based predominantly on students. DASS is recommended for research purposes and as a routine clinical outcome measure for anxiety, depression and stress (Lovibond and Lovibond, 1995).

3.5.3.4 **HIV Stigma Scale and Subscales**

The HIV Stigma Scale was designed at the College of Nursing, the University of Illinois at Chicago and initiated based on the literature on stigma and psychosocial aspects of having HIV (Berger, Ferrans, and Lashley. 2001). The 40 items of the HIV Stigma Scale focus on feelings, experiences and opinions on how PLWH feel and how they are treated. The individual responds to these questions using a four-point scale to indicate the level of agreement or disagreement. Subscale scores are sum of all the scores on each subscale, and a total stigma score is the sum of all the 40 items (Berger, Ferrans, and Lashley. 2001).

Berger, Ferrans, and Lashley (2001) documented that the items of the HSS are scored on a scale of 1-4: strongly disagree (SD) 1, disagree 2, agree 3 and strongly agree = 4. If a subject selects a response in between SD and D, a numerical value midway between the two options is used (e.g., 1.5). Questions 8 and 21 were reverse-scored. After reversing, each score is calculated by adding up the raw values of the items belonging to that scale or subscale. Sixteen questions belong to more than one subscale, reflecting the inter-correlation of the factors on which the

subscales were based. For the total HIV Stigma Scale, scores ranged from 40 to 160 (1 x 40 items to 4 x 40 items). For the personalised stigma subscale, scores ranged from 18 to 72. For the disclosure subscale, scores ranged from 10 to 40. For the negative self-image subscale, scores ranged from 13 to 52. For the public attitudes subscale, scores can range from 20 to 80. The instrument showed satisfactory internal consistency for the subscales and overall scores with coefficient α between 0.90 to 0.93. The reliability test between 2-3 weeks ranged from 0.89 to 0.92 (Berger, Ferrans, and Lashley. 2001).

3.5.4 Validity and Reliability of instrument

3.5.4.1 **Reliability**

Reliability of the data collection instrument refers to the degree of similarity of the results of tests using the same group. It is an indication of the extent of random error in the measurement method (Burns and Grove, 2005; Polit and Beck, 2008). The different types of reliability include: inter-rater, test-retest, parallel forms (external), split half, and internal reliability. In this study, the questions are divided into sections to capture a particular construct per section as an assessment of internal reliability. Also, the split-half reliability ensures careful and accurate phrasing of each question to avoid ambiguity. Pre-testing of the instrument provides a reliable and dependable tool.

3.5.4.2 **Validity**

The Validity of a research instrument is determined by its ability to accurately measure what it is supposed to regulate (Burns and Grove, 2005; Joubert and Ehrlich, 2007). The research instrument is invalid if it measures a concept

repeatedly higher or lower than the real value. The different concepts of validity in use are content, face, predictive, criterion-related and construct.

Face Validity: Face validity can be defined as a subjective judgment about whether the research instrument appears to measure what it is supposed to measure or not (Burns and Grove, 2005). Joubert and Ehrlich (2007) illustrated that face validity is the extent to which the measure of an instrument makes sense to those knowledgeable about the subject. The data collection instrument was critically reviewed by the research supervisor who is a mental health expert as well as a PMTCT consultant (expert) to ensure that it captures the variables in the objectives.

Construct Validity: Construct validity according to Burns and Grove (2005) relates to the ability of the research instrument to measure the theoretical constructs it purports to measure. The psychometrics of the instruments for the key constructs can be seen in Table 5.

Content Validity: Content validity represents the extent to which the method of quantification included all the elements relevant to the construct being evaluated and adequately addresses the key objectives and theoretical framework of the study (Burns and Grove, 2005; Joubert and Ehrlich, 2007). The instrument includes the fundamental constructs present in the process of acceptance of a diagnosis of HIV positive with depression, anxiety, stress, stigma and then psychological acceptance to assess the ACT theory (table 3).

Table 3: Content and Construct Validity

OBJECTIVES	FRAMEWORK	QUESTIONNAIRE
To ascertain the effect of Acceptance and Commitment therapy (delivered by mobile phone) on the mental health status of pregnant women attending PMTCT centres in the South Western states of Nigeria.	Relational frame model is a scientific theory of human language and cognition based on the belief that core human language and cognition is learnt and contextually controlled. RFT is the theoretical root of Acceptance and Commitment Therapy based behavioural therapy that utilizes an eclectic mix of metaphor, paradox, and mindfulness skills, along with a wide range of experiential exercises and values-guided behavioural interventions. The goal is to create a rich and meaningful life, while accepting the pain that inevitably goes with it. (Hayes, 2009).	AAQ II- Questions 1-10 assessed psychological flexibility DASS- Questions 1-42 assessed depression, anxiety and stress HIV stigma scale Questions 1-40 assessed personalized stigma, disclosure, negative self-image and public attitude.
To evaluate the effect of Acceptance and Commitment Therapy (delivered by mobile phone) on PMTCT service outcomes among pregnant women attending PMTCT centres in South Western states of Nigeria.	The Logic Model Process provided a structured framework to discuss the intervention and includes the aim of the intervention which relates to the long term outcome of the intervention, the objectives of the program which relates to the impact of the program or medium term outcomes (the focus of the trial), the short term outcomes (training outcomes) and the structure and component of the program (input, processes and activities).	PMTCT outcome Questions 1-8

3.5.5 Data Collection Procedure

Permission to access the respondents was given by the PMTCT centre managers at the different sites following institutional approvals from their ethics committee. Data was collected by four trained research assistants, who were blinded to treatment assignment. The research assistants were trained for two days by the principal investigator on PMTCT issues and the study. Participants (n= 132) were

part of the PEPFAR/APIN institutional projects and were recruited at the point of registration for PMTCT services (usually before the 28th week of pregnancy) from the four selected centres (for pretest and posttest groups). The researcher designed a schedule of visits to coincide with the participants ANC/PMTCT clinic days of the health centres covered as they have different antenatal days. At the ANC, participants were informed about the study, the aims and objectives of the study and the benefits of the research were discussed, and participants were recruited from the clinics. Following initial contact with prospective participants, the research assistants engaged them to determine initial eligibility for the study. Following eligibility assessment, participant's unique study identifiers were written at the top of the questionnaires for data confidentiality. Participants in the experimental centres were then given appointments for their ACT session on their next antenatal visit. Participants then signed the informed consent forms, completed their questionnaire and their scheduled subsequent visits were noted. The mode of data collection was by the use of paper and pencil. The questionnaire was read to each participant in their chosen language to eliminate potential confounders related to literacy. The pregnant women were monitored throughout pregnancy till their baby is six weeks. The post-test assessments were also done on individual postnatal visit days (for pretest and posttest groups). Data were collected for a period of 13 months beginning in May 2014 to June 2015.

3.6 THE INTERVENTION: THE PSYCHOLOGICAL FLEXIBILITY TRAINING PROGRAM USING THE LOGIC MODEL

The logic model is a framework and a process for planning an intervention and evaluating the desired outcome (Millar, Simeone, and Carnevale, 2001). The Logic Model Process is used to provide a structured framework to discuss the intervention

(figure 13). It includes the aim of the intervention which relates to its long term outcome, the objectives of the program which relates its impact or medium term outcomes (the focus of the evaluation in this study), the short term outcomes (training outcomes), and the program's structure and its components (input, processes and activities). Inputs are the things we invest in the intervention in terms of resources (Kellogg Foundation Logic Model Development Guide, 2004). The process and activities are the activities, services, events, products, and participation generated by the intervention. Reporting on these activities (what we do) and participation (the people that we reach) is usually used to describe the outputs of the program. The outcome of the intervention is measured in terms of its immediate or short-term impact (linked to the objectives of the intervention) and its long-term impact (linked to the aim of the intervention) (Kaplan and Garrett, 2005).

3.6.1 Aims of the intervention

The intervention aimed to improve PMTCT outcomes through the reduction of mother to child transmission and contribute to the achievement of Millennium Development Goals 4, 5 and 6. Goal 4 - Reduce the mortality of infants by preventing mother to child HIV transmission. Goal 5- Improve maternal health and mortality through improved mental health. Goal 6 -Halting and reversing the spread of HIV/AIDS through an improved commitment to the PMTCT program by pregnant women living with HIV.

3.6.2 The objectives of the intervention

- To ascertain the effect of Acceptance and Commitment therapy (delivered by mobile phone) on the mental health status of pregnant women attending PMTCT centres in the South Western states of Nigeria.

- To evaluate the effect of Acceptance and Commitment Therapy (delivered by mobile phone) on PMTCT service outcomes among pregnant women attending PMTCT centres in South Western states of Nigeria

3.6.3 Assumptions of the intervention

Assumptions refer to the "theory" and underlying beliefs about the program which are validated through research and experience (Kaplan and Garrett, 2005). Assumptions are principles, beliefs and ideas about the problem or situation, the knowledge base, internal and external environment and lastly what the program intends to achieve. The assumptions of this intervention are:

1. Acceptance and Commitment therapy (ACT) will strengthen the mental health status of pregnant women attending PMTCT centres in South Western states of Nigeria.

2. The training will have a direct effect on antiretroviral therapy visits among pregnant women attending PMTCT centres in South Western states of Nigeria.

3. ACT training will improve antenatal attendance among pregnant women attending PMTCT centres in South Western states of Nigeria.

4. The pregnant women will adopt the preferred choice of delivery based on informed decision-making.

5. ACT training will assist in guiding infant feeding practices of pregnant women attending PMTCT centres in South Western states of Nigeria.

6. The training will promote early paediatric initiation of antiretroviral therapy for babies into PMTCT programs in South Western states of Nigeria.

3.6.4 The intervention structure and components

The structure and components of the intervention is described in terms of the inputs into the program.

Control sites were offered the post counselling PMTCT standard of care while the experimental intervention arms were exposed to post counselling standard of care and the Intervention (one Acceptance Commitment Therapy (ACT) session at first contact during which the concept of Acceptance and Commitment Therapy using the Matrix was taught. This was followed up by weekly value-based mental health education messages for eleven weeks during pregnancy).

Baseline measures for outcomes were taken, and the outcome was measured after the three months Intervention. Outcome measures included psychological acceptance, depression and anxiety, stigma and a number of health service outcomes such as the patients' antenatal attendance, choice of delivery, infant feeding option, and attendance at postnatal clinic. Record of ARV prophylaxis for both mother and child were also documented. In addition, the pregnant women were monitored weekly throughout pregnancy until delivery, and both mother and child were followed for three months post-delivery with continued access to the researcher after the conclusion of the study.

3.6.4.1 **Funding and Materials for the Intervention**

The funds for this program was from the Medical Education Partnership Initiative in Nigeria (MEPIN) Mentored Research Award to support the development of research scientists through the provision of funds for a one year project. The mechanism is aimed towards generating some preliminary data that can be used for future grant opportunities. Various materials were required, specifically; staff

to provide the training, training manuals and the technology to deliver the mobile messages.

3.6.4.2 **Staff**

Four research assistants were trained by the researcher to utilise the questionnaire to collect data and monitor the patients throughout the study. One research assistant was attached to each of the centres for data monitoring. The existing personnel at the PMTCT centres like nurses and mentors also assisted in monitoring the pregnant women throughout the study.

3.6.4.3 **Materials**

A training manual on psychological flexibility was developed by Dr Kevin Polk, a dedicated member of the mental flexibility group, whose original idea led to the development of the Matrix (co-developed with Mark Webster and Jerold Hambright). The Matrix is a simple to use format for psychological flexibility training. It was developed initially for groups, but then came into wide use with individuals. This manual includes learning to discriminate between direct experiencing with the senses and indirect experiencing in the mind. It also establishes the idea of sorting behaviour in two directions -towards and away behaviours, on the journey into valued living known as psychological flexibility.

The manual is about learning how to identify what is important and about discovering what works in terms of both internal and external behaviours to guide the movement in those important directions. The movement is an evolving process that needs constant toward and away fine-tuning with a valued life as a

moving target. The consent to use the training manual was given by Dr Kevin Polk.

3.6.4.4 **Technology**

The Health software was used to send Short Message Service (SMS) messages directly to users' phones to offer information on psychological flexibility to promote Moving towards behaviours in the PMTCT program (figure 11). Personal phones of the sixty-six pregnant women in the experimental group were used to receive the value-based messages. The SMS alerts were sent at patients' preferred time of the day to be relatively unobtrusive, offering recipients' confidentiality (table 4).

The software developer designed the specialised software applications to handle message content and delivery schedule. Also, message routing services were used to deliver messages through multiple cellular network carriers. The SMS software supports texting, replying, scheduling and routing to an SMS gateway based on pre-configured algorithms.

The researcher developed the value based mental health messages using different literature sources. The software developer entered the message script on the SMS messaging application. The SMS software has the capability to track data such as the number of messages that are sent and the delivery status (delivered or undeliverable) but has no facility to monitor whether they were read. The project was limited to the provision of value-based mental health messages with the use of simple, unidirectional texting to the listed HIV positive pregnant women. Messages were carefully composed considering the literacy level and

ability of the target audience. The messages were short, concise and engaging. Content did not exceed a 5th grade reading level and it contains no terminology that is difficult to understand. Abbreviations were used sparingly - only when they were easily understood and did not change the meaning of the message. The messages were also translated into Yoruba which is the predominant language of the south-western states population. The text messages were sent through an SMS gateway called SMS Africa which is a website that allows SMS messages to be sent via computer by establishing connections with Multiple Network Operators' (MNOs) communication protocols. MNOs are the actual telephone companies that own the networks through which the messages are transmitted.

Figure 11: ACT Text Message Procedure

Text message message platforms can upload lists of recipients and their cell phone numbers onto the platform. Only the unique identification numbers linked to the patients' cell phones were uploaded on the SMS platform to maintain confidentiality. The researcher logged in weekly on the SMS Africa gateway to select the value-based message for the week and the recipients based on the patients preferred time for receiving messages (table 4).

Table 4: Preferred means of communication of health messages among respondents in South Western states of Nigeria

	Control Groups		Intervention Groups			
	Group C-PP	Group C-Post	Group I-PP	Group I-Post	Test	p-value
Preferred time for health messages						
Morning	14(42.4)	20(60.6)	9 (27.3)	31(93.9)	X^2=48.5	p<.001
Afternoon	3 (9.1)	1(5.9)	13(39.4)			
Night	16(48.5)	12 (36.4)	11 (33.3)	2 (6.1)		
Preferred language for communication of health messages						
English	8 (24.2)	29 (87.9)	11 (33.3)	31(93.9)	X^2=61.3	p<.001
Yoruba	25(75.8)	4 (12.1)	22 (66.7)	2 (6.1)		

The preferred preferred period and language for communication for mental health messages and access to information among respondents are shown in the table above. In total, the mean and standard deviation (sd) values of respondents that reported they preferred the morning in Group I-Post was 31 (93.9) for health message communication compared to those in Group C-Post - 20(60.6), Group I-PP - 9 (27.3) and Group C-PP - 14(42.4). A significant difference was observed in the preferred time for health messages among the groups (X^2=48.5, p<.001). A majority of Group I-Post and Group C-Post favoured English language for communication of health messages compared to those in Group I-Post (31 (93.9) and Group C-Post (29 (87.9). A majority of respondents from Group I-PP and Group C-PP preferred Yoruba language. A significant difference was observed in the preferred language for communication between the groups *(X^2=61.3, p<.001).*

3.6.5 Activities of the intervention

3.6.5.1 **Pre-Intervention**

- Developed a psychological flexibility training program to improve PMTCT outcomes.
- Developed value based messages based on existing literature sources.
- Determined time of messages according to patients preferred time for receiving text messages.
- Engaged and trained the pregnant women in activities that will improve Acceptance of HIV status.

Following recruitment, the aim and objective of the study was explained and consent was gained.

3.6.5.2 **During the Intervention**

- Deliver health messages to promote mental health status.
- Messages were sent by mobile phone for a period of three months using them Health software application on a weekly basis.

Pre mHealth Training – Week One

At first contact, which was the training of the participants, they were exposed to a session of ACT during which the concept of Acceptance and Commitment Therapy using the Matrix was taught (figure 12).

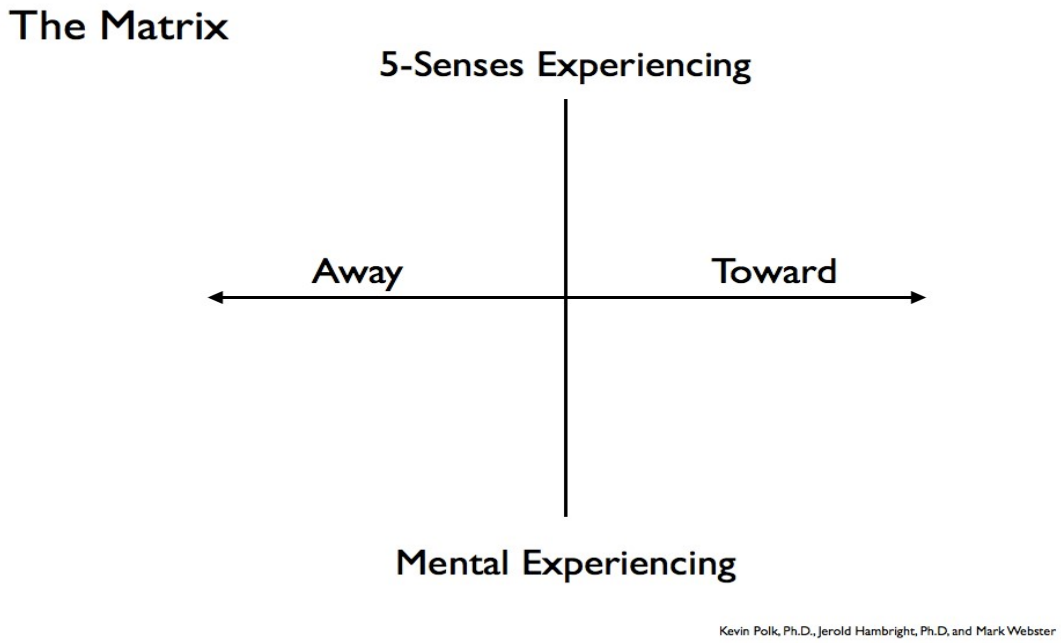


Figure 12: The Matrix

Four main ACT activities were performed: how to notice the difference between sensory and mental experiences, moving away behaviour, moving toward behaviour, and assigning percentages to these behaviours. The script for these four activities can be seen below:

1. How to notice the difference between sensory and mental experiences

Step 1: Use any handy object and notice it through your five senses. A piece of candy was used. See the object, hear the object (tap on it), Touch the object, Smell the object and Taste the object.

Step 2: Put the candy away, so that it's out of the way of your five senses. Close your eyes and imagine experiencing those same five senses. See it, hear it, Touch it, Smell it, Taste it

Step 3: Notice the contrariness between your five-senses experiencing the object and your mental experiencing the object. If you don't at first notice the difference, that's okay, just keep practising and you will get the hang of it".

2. Moving away experiences

Step 1: Identify some mental experiencing that you often move Away from. Recall that some of your unwanted mental experiences might be: Fear, Sadness, Anger, Frustration, Depression, Boredom etc.

Step 2: Identify some of the behaviours that you do to move away from your unwanted mental experiencing. Recall that some possible behaviours you might do to move away are: acceptance of HIV status, receiving antiretroviral, antenatal care, immunisations etc.

Step 3: Link up the unwanted mental experiencing the behaviour that you use to move away from it. For example, fear might be matched up with denial of HIV status.

Fear ---------- Denial of HIV status

Link up some more of your unwanted mental experiencing the behaviours you do to move away from them.

3. Moving toward behaviours

Step 4: Identify some important ideas that you move toward. Recall the following list of possible things that are important to you. If your essential ideas are not on this list, by all means, add your own -family, health, work, education, spirituality, friends etc.

Step 5: Identify some of the behaviours that you do in the service of moving toward these critical ideas. Recall that some behaviours are: acceptance of HIV status, receiving antiretroviral, antenatal care, immunisations etc.

Step 6: Link up the important idea with the behaviour that you use to move toward it. For example, health might be matched up with receiving treatment for HIV

Health ---------- Receiving treatment for HIV

Now you can practice noticing the feeling of moving toward important ideas and the feeling of moving Away from unwanted mental experiencing. Once you learn to quickly notice these, it will be easy for you to sort your Away and toward behaviours.

2. Assigning Away and Toward Percentages to Behaviours

You might have already been noticing that the same behaviour can be used to move either toward or away. For example, 'Acceptance' can move you away from stress, or it can move you toward health.

You may have also been noticing that at times a behaviour is in the service of moving away and toward at the same time. As in the walking above, you might in part be walking to move away from stress, but at the same time you are also walking to move toward health. In cases like this, you can assign percentages to the behaviour. For example, you might say that 60% of the behaviour was for moving away from stress and 40% was for moving toward health. The accuracy is not important - just make your best guess.

Away	Toward
40%	60%

Mhealth using Text messages (Week 2-12)

Messages were sent by mobile phone for three months using the mHealth software application. This software sends text messages to the HIV-positive pregnant women

at the clients' preferred time of the day. It also captures the delivery status of the messages sent.

Week 2 – "Accept yourself: acceptance is the voluntary adoption of an intentionally open, receptive, flexible and non-judgmental posture with respect to moment to movement experience. It is supported by a willingness to make contact with distressing private experience situations, events or interactions that will likely trigger them to accept your status."

Week 3 –"Be loving to your negative faults. Faults are demeaning; let go of negative thoughts today and walk away from limiting beliefs, judgments and assumptions that no longer serve you now and in the future. I permit myself to let go. Be yourself; there is a point in life where it is no longer necessary to try and impress anyone. They like the way you are good. If they don't, it is their loss. Never try to hide who you are - the only shame is to have Shame always stand up for what you believe."

Week 4 –"Meditation creates space in your mind and help you become connected with yourself in mind and body. Meditations: lie or sit quietly, close your eyes, take a few deep breathes, say something meaningful to yourself - I am healed, I forgive myself etc.Laugh to receive healing, create humour, make yourself happy, keep smiling and one day life will get tired of upsetting you."

Week 5 –"Be kind to your mind, don't hate yourself for having fault, you have the right to be loved because you exist. Think well of yourself - it is an act of kindness. Love yourself enough to stop scaring yourself; don't make a mountain out of a

molehill. Create a beautiful image of something that you love and store it in your memory when those negative thoughts come remember that beautiful image."

Week 6 –"God's very being is love, and he gave us this instruction - love thy neighbour as thyself". You cannot be a loving person to others without loving yourself. Stop criticising yourself. Criticism changes your thinking automatically to the negative. Negative thoughts scare the mind. From today, make a vow to stop. Make a commitment to be faithful to that which exists nowhere but within yourself."

Week 7 –"Worrying doesn't take away today's trouble; it takes away today's peace. Give yourself permission to let go - release with love. If an egg is broken by outside force, life ends. If broken by inside force, life begins. Great things always begin from inside. All you need is already inside you. You possess the ability to heal and thrive; it is divine nature."

Week 8 –"Out of clutter, find simplicity. From discord, find harmony. In the middle of difficulty lies opportunity. Set your limits. Dream big, take action and achieve the life you desire. Never regret the past - it is a waste of time. There is a reason for everything, every mistake, every terrible thing you might have done. Forgive yourself and grow from it".

Week 9 –"Find a place inside you where there is joy, and the joy will burn out the pain. Worrying is stupid. It is like walking around with an umbrella waiting for it to rain. Look back, look for the happy spot in life. There are plenty. Man cannot unveil new oceans unless he dares to love the sight of the shore. Move on and be happy".

Week 10 –“Appreciate yourself. Happiness is for those who appreciate what they already have. Praise yourself as much as you can. Relaxation is essential for the healing process. Close your eyes, take 2 or 3 deep breathes, exhale and let go, release all fear, and say silently, “I love you, all is well”.

Week 11 –“What is the purpose of your life? Figure out your passion go for it and be yourself. Live the life, you have dreamed. Take care of your body. It is the house you live in, take care of it. Nourish, cherish, nurse and love it. First thing in the morning, look in the mirror and say, “I love you”.

Week 12 –“Confidence is something you create within yourself by believing in who you are. You are nothing outside of yourself that can ever enable you; everything exists within you. Seek nothing outside of yourself. Life is short; time is fast - no replay, no rewind, so enjoy every moment as it comes. Find ways to support yourself. Be happy. Ask for help when you think you need it. No second chance in life. I am committing to choosing life for myself and my baby’’.

3.6.5.3 **Outcome Measures**

Outcomes Outcomes are the intended results or changes of the program for individuals, families, and communities. Outcomes answer the questions "So what?", "What difference impact does the program make in people's lives?" The outcomes may be real or imagined; positive and negative. Outcomes can be short-term/immediate/initial/proximal, through medium-term/intermediate, to long-term/final/distal outcomes often synonymous with impact.

Short-term outcomes are evidence by learning changes in awareness, knowledge, attitudes, skills, opinion, aspirations, motivation and behavioural intent. The short-term results of this program are:

- Increased awareness of noticing the difference between sensory and mental experiencing.
- Identifying away and towards behaviours.
- Eliminating away behaviours.
- Encouraging toward behaviour.
- Increasing knowledge about the effects of sensory and mental experiencing.

Medium-term outcomes are action-based changes in behaviour, decision-making, social actions and policies. They are:

- Increased acceptance of HIV status through psychological flexibility.
- Improved mental health status through the reduction of depression, anxiety and stress.

- Reduction in the level of perceived stigma among the pregnant women living with HIV.

Long-term outcomes are condition-based changes like health changes.

- Improved PMTCT outcomes through increased commitment to antiretroviral therapy and increased participation in prevention of mother to child transmission of HIV programs.
- Reduced mother to child transmission of HIV. Improved achievement of Millennium development goals 4, 5 and 6.

The impact or the medium-term outcomes were the primary focus of the study and will be presented in the results chapter.

The aim of the intervention is to improve PMTCT outcomes through the reduction of mother to child transmission and thereby contributing to the Millennium development Goals 4, 5 and 6.

Inputs	Outputs		Outcomes – Impact		
	Activities	*Participation*	Short	Medium	Long
• Funding • Mobile system • Training manual	• Develop a psychological flexibility training program to improve PMTCT outcomes. • Deliver mHealth messages to promote mental health status. • Engage the pregnant women in activities that will improve Acceptance of HIV status.	•Pregnant women living with HIV in South Western states of Nigeria.	• Increased awareness of noticing the difference between sensory and mental experiencing. • Identifying Away and Towards behaviours • To eliminate Away behaviour. • Encourage Towards behaviour. • Increased knowledge about the effects of sensory and mental experiencing.	• Increased Acceptance of HIV status through psychological flexibility. • Improved mental health status through the reduction of depression, anxiety and stress. • Reduction in the level of perceived stigma among the pregnant women living with HIV.	• Improved PMTCT outcomes through increased commitment to antiretroviral therapy and increased participation in prevention of mother to child transmission of HIV programs. • Reduced mother to child Transmission of HIV. • Improved achievement of Millennium development goals 4, 5 and 6.

Figure 13: The Acceptance and Commitment Logic Model

3.7 DATA ANALYSIS PROCEDURE

3.7.1 Scoring of scales

Scales were scored according to the standard instructions for each of the scales.

The AAQ-II requires respondents to rate each item truthfully on a 7 point Likert scale ranging from 1 (Never True) to 7 (Always True) . The total score on the AAQ- II scale ranges from 1- 70. Items 2, 4, 5, 7, 8 and 9 were reverse scored and summed with the remaining items for a total score out of 70. A higher score indicates higher levels of acceptance while a lower score indicates a predominance of experiential avoidance.

The Depression Anxiety and Stress Scales - 42 (DASS 42) self-report were recorded on a 4 point Likert scale ranging between 0 (Did not apply to me at all) and 3 (Applied to me very much or most of the time). The scores for each subscale were obtained by summing the responses. Total scores were calculated out of 126 with 10- 28+ seen as caseness for depression as a syndrome on its subscale and 8 - 20+ for anxiety subscale and 15 -34+ for stress subscale. Interpretation of the DASS is primarily on the use of cut-off scores. The scores rated from 'normal' to 'extremely severe' on the basis of percentile scores, with 0-78 classified as 'normal', 78-87 as 'mild', 87-95 as 'moderate', 95-98 as 'severe', and 98-100 as 'extremely severe'.

The HIV Stigma Scale is scored as follows: strongly disagree 1, disagree 2, agree 3 and strongly agree 4. Questions 8 and 21 were reverse-scored. Following reversal of these two items, each scale or subscale's score was calculated by just adding up the raw values of the elements belonging to that scale or subscale. The overall stigma score is calculated by summing the ratings for all 40 items out of possible scores

ranged from 40 to 160. For the personalised stigma subscale, scores ranged from 18 to 72. For the disclosure subscale, scores ranged from 10 to 40. For the negative self-image subscale, scores ranged from 13 to 52. On the public attitudes subscale, scores can range from 20 to 80.

3.7.2 Cleaning and checking of data

Data were captured from the paper version of the questionnaire to excel sheets. Before analyses, all data were observed for missing data or data entry errors. Missing values were left blank and paired wise exclusion of data was used to calculate variables. A missing values analysis for each variable of interest (interval or ratio) revealed that missing values did not exceed 5% per item or 20% per subject and that these were missing completely at random (Chavance, 2004; Fox-Wasylyshyn and El-Masri, 2005).

3.7.3 Analysis

Univariate analyses were used to describe the demographic characteristics of the sample and the survey measures. All variables were assessed for skewness and kurtosis to ensure they all met the assumptions for parametric analysis. To assess for effectiveness, three tests were done: Tests within group (comparison of outcome measures pre and post), tests between groups (comparisons of mean differences between Intervention and control groups; and tests for pre-test sensitisation.

Analysis Comparison 1 = Group I-PP----Pre-Test Vs Post-Test

Analysis Comparison 2 = Group I-PP and Group C-PP --- Post-Test Vs PostTest

Analysis Comparison 3 = Group C-PP and Group I-Post – Pre-Test Vs Post-Test

Analysis Comparison 4 = Group C-Post and Group I-Post --Post-Test Vs Post-Test

To determine whether evidence of pre-test sensitisation exists, that is, whether ACT affects mental health status for the pre-test groups, 2 X 2 between-groups analysis of variance (ANOVA) on the four post-test scores was done(figure 14). The factors were treatment (yes vs no) and pre-test (yes vs no). For some of the scales, the preceding pattern was present, the analysis terminated with the conclusion that there was proof of a treatment effect. Where evidence of pre-test sensitisation was detected, a significant simple effect for treatment in the pre-test was noted for the pretested groups; hence we concluded that there was thus pre-test sensitisation for the scale of measurements. For the unpre-tested groups 3 and four where the simple effect was significant (assuming a significant interaction in 2 x 2 ANOVA, we concluded that there was evidence that pre-test sensitisation is present, with emphasis that it merely enhances the effect of the treatment, because it was detectable even in an unpretested sample. For some of the scales, the interaction was not significant, hence, the conclusion that there was no evidence of pre-test sensitisation.

To check for a treatment effect, we used a two-group analysis of covariance (ANCOVA) on the post-test scores. Co-varying the pre-test scores, a two-group (independent) t test on "gain" (i.e., post minus pre) scores, or the test of the interaction in a 2 X 2 ANOVA, with treatment (yes = Group I-PP vs. no = Group C-PP) and time (pre vs. post) as the factors. If the test is significant, we concluded that evidence of treatment effects unqualified by pre-test sensitisation is obtained. For non-significant results, testing continued using the data of Groups 3 and 4 for independent t-test if the test is significant, there is evidence for unqualified treatment

effects, and we conclude. However, if not significant we combine the test in Groups 1 and 2, with the test of Groups 3 and 4 using an ANCOVA on one pair of groups within the experiment with a t-test on a different pair of groups to conclude.

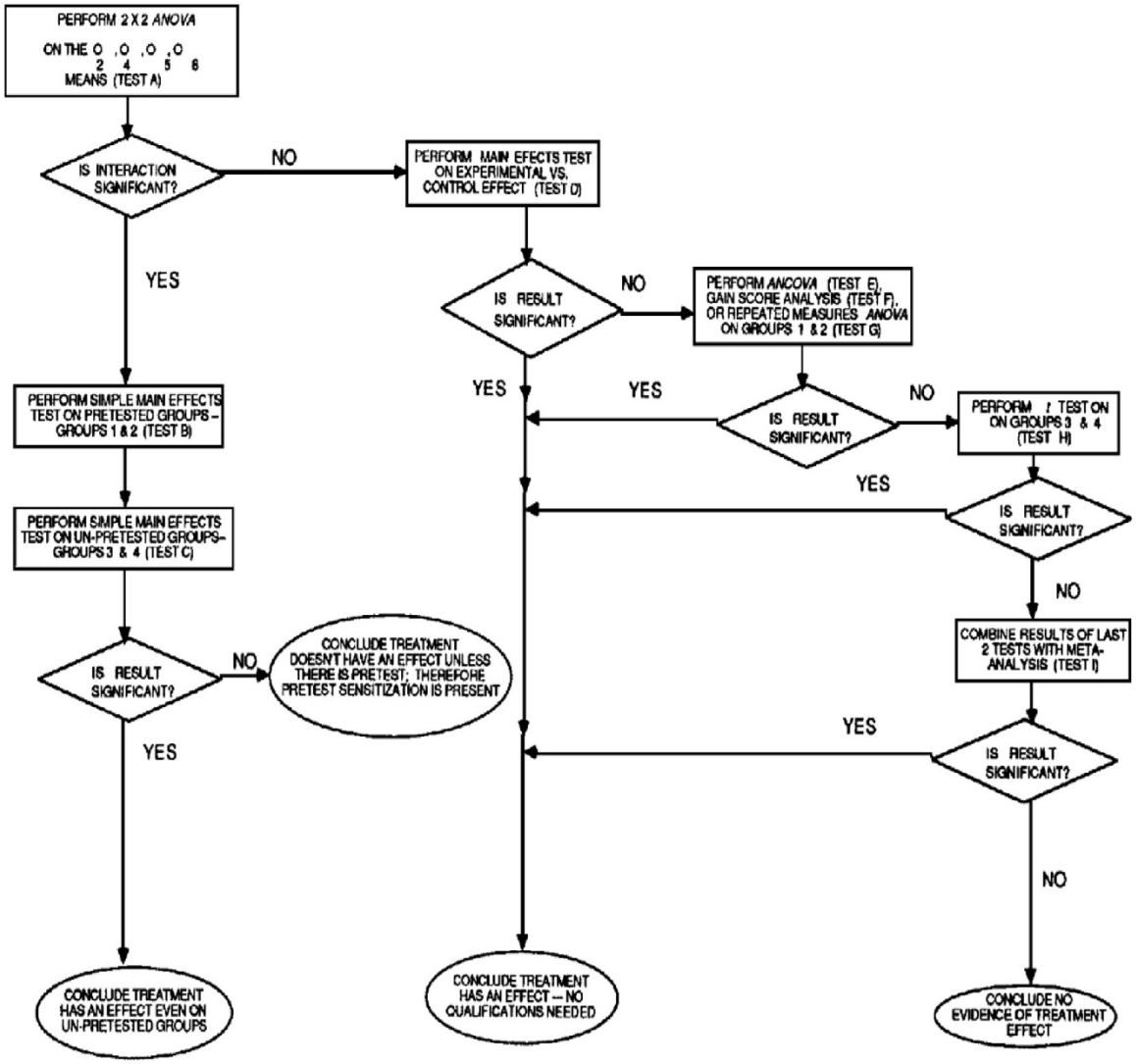


Figure 14: Flowcharts of tests and conclusions
Source: Braver and Braver,1988

3.8 ETHICS

The proposal was reviewed by different institutional ethics committee. Ethics approvals were received from the University of Western Cape Health Research

Committee (Registration no 13/6/15), UI/UCH Research Ethics Committee (Protocol No NHREC/05/01/2008a), the Oyo state Research Ethics Committee (Protocol No. ad13/479/558), Ondo state Research Ethics Committee (Protocol No.G8061/36) the National Institute of Medical Research (Protocol No IRB/14/242), and Mother and Child Hospital Research Ethics Committee (Protocol No.20143/2). Permission to access PLWH was also obtained from the PEPFAR review team for the conducting of research.

3.8.1 Consent

The respondents' information sheet was given to each patient to study before making a decision about whether to participate. Informed consent was obtained which included permission to give the contact details to the research team, access to medical file information, participation in the experimental or control condition, and access to their CD4 count results and their babies' Polymerase Chain Reaction (PCR) results when they delivered. Issues of confidentiality were addressed by attributing a coding number to each participant's data and by keeping all data in secured locations (both physical and digital). All participants were made aware of these confidentiality procedures. Also, participants were informed that participation in the study was voluntary and that they were free to discontinue their involvement without their standard of care being affected in any way.

3.9 SUMMARY OF THE CHAPTER

This chapter outlined the research paradigm, research methodologies, strategies and design used in the study. It defined the data collection tools and analysis methods. The section also described the intervention psychological flexibility training

program for Acceptance and Commitment Therapy in the prevention of mother to child transmission of HIV in Nigeria using the Logic model as a framework. It included the aim, the objectives, the inputs and activities, and the output and outcomes of the intervention or ACT program. The research design for this study was an experimental study that was analysed mostly through quantitative methods.

CHAPTER 4: RESULTS

4.1 INTRODUCTION

This chapter presents the finding of the study of the Acceptance and Commitment therapy using mobile intervention. Using a randomized control trial with four groups recruited from four PMTCT centres in four south western states of Nigeria, the study sought to answer the following questions:

- What is the effect of mobile phone delivered Acceptance and Commitment therapy on the mental health status of pregnant women attending PMTCT centres in South Western states of Nigeria?
- What is the effect of mobile phone delivered Acceptance and Commitment therapy on service-related activities (antiretroviral therapy, antenatal attendance visits, and choice of delivery mode, attending PMTCT centres, infant feeding patterns, and postnatal attendance among pregnant women attending PMTCT centres in South Western states of Nigeria?

This chapter presents the study enrolment and retention, the demographics of the groups, the baseline clinical information and the effect of ACT on mental health and service related activities.

4.2 STUDY ENROLMENT AND RETENTION

Recruitment of women was done using group randomized design to recruit 132 pregnant women living with HIV from four randomly selected PMTCT centres in South Western states of Nigeria.

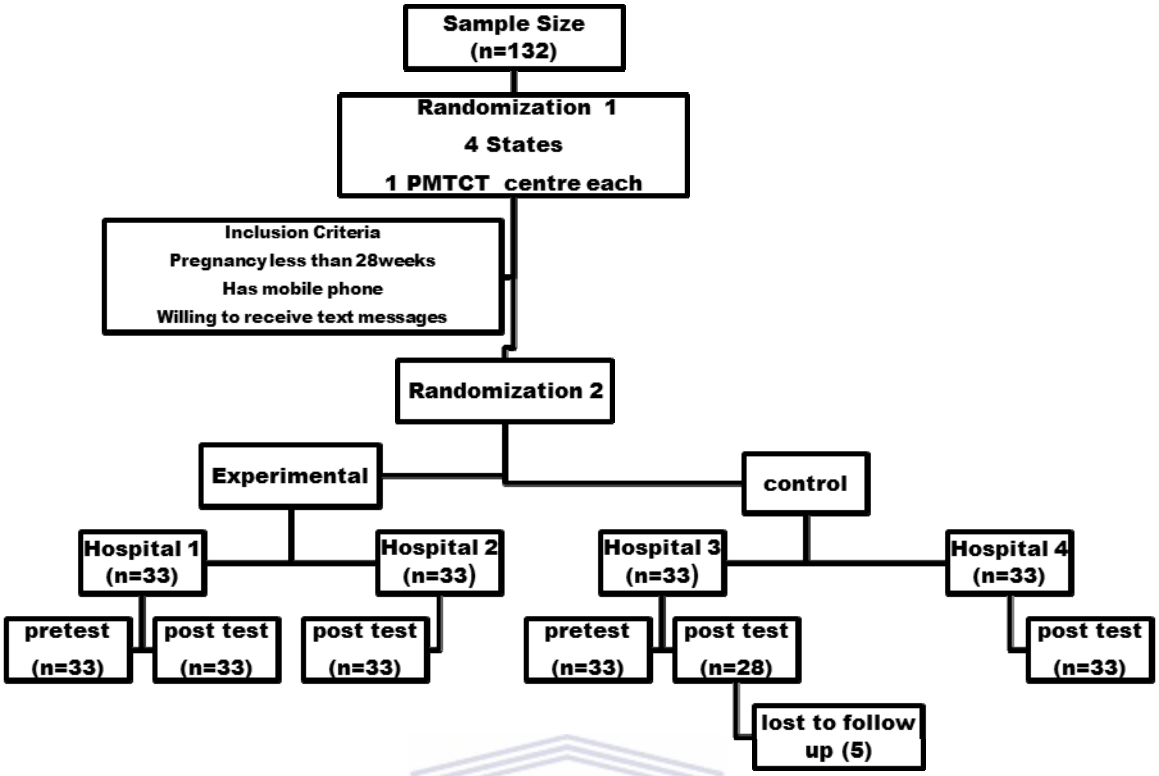


Figure 15: Enrolment of respondents

The hospitals were randomly assigned as intervention sites or standard of care sites. Both the pretest posttest groups and the posttest only groups were recruited into the study perinatally. Intervention sites were offered the post counselling PMTCT standard of care while the experimental arms were exposed to post counselling standard of care and one ACT session and followed up with weekly value based mental health education messages throughout the period of pregnancy.There were 132 pregnant women in the study (33 women per group). The response rate was 96.2% (127 respondents). Five pregnant women were lost to follow up resulting in 127 participants completing the study.

4.3 DEMOGRAPHICS

In considering the demographics of the groups, the design of the study is important. This design involves four randomly assigned groups (two control and two

intervention groups) and two groups being involved in before and after measures. All the groups were recruited at baseline before the intervention (Group 1 (Group I-PP) and Group 2 (Group C-PP) had pretest questionnaires filled, while Group 3 (Group I-Post) and Group 4 (Group C-Post) had only their sociodemographics and clinical information data collected. Therefore, the presentation of the stable demographics such as age, gender, employment and education are presented using the post measurements for all 4 groups.

The average age of the pregnant women was 31.6 years (sd 4.5, range 20 – 41 years) with most participants being married (n=121, 92%) and a majority engaging in a monogamous type of marriage. Nearly three quarters have at least secondary education (n=91, 69%).There were no significant differences between the groups in terms of most demographics, though there were significant differences in the type of marriage, with both Group I-PP and Group C-PP having the lowest percentage in monogamous relationships (78.4%) respectively (Table 8). A significant difference was also observed in the occupational status with Group I-PP, having the highest percentage in self-employment (84.8%) and Group C-Post, having the highest percentage in civil employment (87.9%), (Table 8). Further differences were also found between preferred language with the majority of the women in Group I-Post (31, 93.9%) and of Group C-Post (29,87.9%) preferring English language for communication compared to the majority of respondents from Group I-PP (22, 66.7%) and Group C-PP (20, 75.8%) preferring Yoruba as the language of communication (X^2=61.3, p<.001)(Table 8).

Table 5: Enrolment demographic characteristics of all groups at post measurement

	Control Groups		Intervention Groups			
	Group C-PP n=28	Group C-Post n=33	Group I-PP n=33	Group I-Post n=33	Test	p-value
Age (SD)	31.3 (4.5)	31.4 (4.6)	31.9 (4.4)	32.1 (4.5)	*K*=0.4	p=.934
Secondary Education and above (%)	20(76.9%)	29 (87.9%)	20(64.5%)	22(66.7%)	X^2=5.8	p=.127
Married (%)	26 (100%)	30 (90.9%)	33 (100%)	32 (97%)	X^2=3.9	p=.249
Type of Marriage (%)						
Monogamous	26(78.4%)	30 (90.9%)	26(78.4%)	32 (97%)	X^2=13.1	p=.012
Occupation						
Civil	4(12.1%)	29(87.9%)	2(6.1%)	23(69.7%)		
Self	20(75.8%)	4(12.1%)	28(84.8%)	10(30.3%)		
Unemployed	4(12.1%)		3(9.1%)		X^2=76.4	p<.001
Preferred language						
English	8 (24.2%)	29 (87.9%)	11 33.3%)	31(93.1%)	X^2=61.3	p<.001
Yoruba	20 (75.8%)	4 (12.1%)	22(66.7%)	2 (6.1%)		

Independent Samples Kruskall WallisTest (*K*) and Fisher Exact Chi-square Tests (X^2)

4.3.1 Clinical characteristics for all groups at enrolment

The pretest posttest group (Group 1 (Group I-PP) and Group 2 (Group C-PP) had pretest questionnaires filled, while Group 3 (Group I-Post) and Group 4 (Group C-Post) had only their sociodemographics and clinical information data collected. Results as shown in Table 9 show the clinical characteristics at enrolment for all groups for the stable characteristics (Years since diagnosis, Parity, Number of deliveries post diagnosis, Gestational age, Person close to participant with HIV). There were significant differences between the groups in terms of all the clinical characteristics except for having a close person with HIV. A significant difference in the average number of years since diagnosis was observed, with both Group I-PP (4.7 years) and Group C-Post (5.2 years) having a longer time of knowing their HIV status (*K*=13.1, p=0.005). For parity, Group C-PP had the highest average number of pregnancies (2.1 pregnancies, *K*=14.9, p=0.002) but Group I-Post had the highest mean number of deliveries following diagnosis (1.8 deliveries, *K*=14.4, p=0.002).

Patients from Group I-PP had the lowest average gestational age of pregnancy at enrolment (19.7 weeks, *K*=34.6, p<.000). There were no significant differences between the groups in terms of having a close person living with HIV (X^2=3.6, p=.296) with patients in Group I-Post having the lowest percentage of 15.2%.

Table 6: Enrolment clinical characteristics of all groups post measurement

	Control Groups		**Intervention Groups**			
	Group C-PP	**Group C-Post**	**Group I-PP**	**Group I-Post**	**Test**	**p-value**
Years since diagnosed (SD)	2.7 (1.3)	5.2 (3.6)	4.7 (2.8)	3.6 (2.3)	*K*=13.1	p=.005
Parity	3.1(1.1)	2.5(1.0)	2.9(1.3)	2.1(1.2)	*K*=14.9	p=.002
No of deliveries after diagnosis	1.6(.56)	1.7(.89)	.97(.92)	1.8(.94)	*K*=14.4	p=.002
Gestational age in weeks	22.1(4.5)	25.8(3.2)	19.7(5.6)	25.1(1.5)	*K*=34.6	p<.001
Have close person with HIV	10 (30.3)	10 (30.3)	9 (27.3)	5 (15.2)	X^2=3.6	p=.296

Independent Samples Kruskall WallisTest (*K*) and Fisher Exact Chi-square Tests (X^2).

In situations where the clinical characteristics were dependent variables for the study (CD_4 count, satisfaction with health status and information access), baseline data is only included for Group I-PP and Group C-PP prior to intervention (Table 10). The CD_4 count of participants in Group C-PP were significantly higher than in Group I-PP (T= 2.4, p=.021). Satisfaction with their health status for Group C-PP(66.7%) was higher than for Group I-PP (30.3%) with a significant difference between the groups (X^2= 8.7, p<.003). Most the women at pre-test indicated that they had disclosed their status to another person, with spouses being most commonly the person they had disclosed to (67.7% and 69.2% respectively) (Table 3). There were no significant differences in the two groups. A significant difference was reported between the two groups at pre-test to the question on having access to information on daily life needs,

with Group I-PP having significantly less access (36.4%) as opposed to 81.8% in Group C-PP (X^2= 14.1, p<.001)(Table 10).

Table 7: Enrolment clinical characteristics (dependent variables) of groups' pre measurement

	Pre-test Only Groups			
	Group I-PP n=33	**Group C-PP n=33**	**Test**	**p-value**
Present CD4 count	442.1(157.1)	556.1(222.1)	*T=2.4*	p=.021
Satisfied with health status	10(30.3%)	22 (66.7%)	X^2=8.7	P=.003
Ever disclosed HIV status	31 (93.9%)	26 (78.8%)	X^2=2.1	P=149
Spouse HIV status disclosed	21 (67.7%)	18(69.2%)	X^2=4.1	P=207
Have access to information needed for daily life	12 (36.4%)	27(81.8%)	X^2=14.1	p<.001

Independent T-Test (*T*) and Fisher Exact Chi-square Tests (X^2).

4.4 EFFECTIVENESS OF PSYCHOLOGICAL FLEXIBILITY TRAINING (ACT) ON MENTAL HEALTH STATUS

To measure the effectiveness of psychological flexibility training using Acceptance and Commitment therapy (ACT) on mental health status, three constructs were hypothesized as outcome variables and these were measured with three different scales as discussed in Chapter 3. These included the measurement of psychological flexibility to accept the diagnosis using the revised Acceptance and Action Questionnaire (AAQ-II), subjective mental health distress using the Depression, Anxiety and Stress scale (DASS) and lastly the perception of stigma as measured with the HIV stigma scale (HSS).

4.4.1 Psychological Flexibility Outcome Measures

Changes in psychological flexibility were assessed using AAQ-II items. Psychological flexibility was measured using participants' scores on the AAQ-II with

higher scores indicating more acceptance and flexibility. To test for pre-test sensitisation between groups, an analysis of variance (ANOVA) was conducted on the post-tests using intervention and pre-tests fixed factors. To test for the intervention effect, paired and independent t-tests were conducted. Significance was tested at a 5% level.

4.4.1.1 Comparison of baseline psychological flexibility scores of Group I-PP and Group C-PP

The psychological flexibility score as measured by the AAQ-II scale were not significantly different between Group I-PP and Group C-PP at baseline with psychological flexibility scores of 44.7 (7.5) and 46.2 (8.8), p=.361 respectively.

The difference between the AAQ II pre-test scores for both groups is Group I-PP(44.5, 7.5) with Group C-PP having a higher score (46.2, 8.8)(Table 8).

Table 8: Baseline AAQ item responses among respondents in South Western states

Variables (out of 7)	Group I-PP N=33 (mean, sd)	Group C-PP N=33 (mean,sd)	Test U	Significance
It's ok if I remember something unpleasant	1.0(.00)	2.5(2.1)	4.6	<.001
My painful experiences and memories make it difficult for me to live a life that I would value	4.0(1.6)	5.6(2.1)	3.0	.003
I'm afraid of my feelings	2.5(1.7)	2.2(1.8)	1.1	.292
I worry about not being able to control my worries and feelings	4.6(1.7)	5.7(1.9)	2.6	.008
My painful memories prevent me from having a fulfilling life	4.7(1.9)	5.6(2.1)	1.7	.078
I am in control of my life	5.3(1.1)	3.1(2.4)	3.8	<.001
Emotions cause problems in my life	5.3(1.7)	5.5(2.2)	0.7	.472
It seems like most people are handling their lives better than I am	5.9(1.5)	6.5(1.2)	2.3	.021
Worries get in the way of my success	6.1(1.3)	6.0(1.7)	0.6	.550
My thoughts and feelings do not get in the way of how I want to live in my life	5.1(1.4)	3.7(2.7)	1.6	.121
Pre-test aaq score (/70)	**44.4(7.5)**	**46.2(8.8)**	**0.9**	**.361**

Mann-Whitney (U) Test

4.4.1.2 Comparison of post-test psychological flexibility scores of all the groups

The post-test total psychological flexibility score as measured by the AAQ-II scale were significant across all the groups (X^2 =28.5, p<.001) denoting changes in psychological flexibility across group with Group C-Post having the highest overall mean score (50.7, sd = 8.8) (Table 9).

Table 9: Post-test AAQ-II psychological flexibility scores

	Intervention		Control		Test	pvalue
	Group I-PP N=33 (mean, sd)	Group I-Post N=33 (mean, sd)	Group C-PP N=28 (mean, sd)	Group C-Post N=33 (mean, sd)	X^2	
It's ok if I remembers something unpleasant.	1.2(.58)	2.9(1.1)	2.6(1.9)	3.8(2.3)	41.0	<.001
My painful experiences and memories make it difficult for me to live a life that I would value.	5.7(1.9)	6.1(1.4)	4.7(1.6)	5.7(2.0)	14.8	.002
I'm afraid of my feelings.	1.9(1.6)	2.5(1.5)	3.6(1.4)	2.5(1.7)	19.1	<.001
I worry about not being able to control my worries and feelings.	6.5(1.0)	6.0(1.4)	4.8(2.0)	5.9(1.6)	17.5	.001
My painful memories prevent me from having a fulfilling life.	5.9(1.9)	5.6(1.7)	4.5(2.0)	6.1(1.6)	14.5	.002
I am in control of my life.	5.5(2.0)	3.0(1.9)	3.1(2.0)	5.2(2.1)	35.3	<.001
Emotions cause problems in my life.	6.2(1.5)	6.0(1.4)	5.0(1.7)	5.8(1.6)	12.9	.005
It seems like most people are handling their lives better than I am.	5.8(1.8)	6.2(1.3)	5.1(1.7)	5.7(1.6)	10.8	.013
Worries get in the way of my success.	6.7(.65)	5.9(1.5)	4.4(1.8)	6.2(1.5)	33.3	<.001
My thoughts and feelings do not get in the way of how I want to live in my life	2.9(2.3)	2.7(1.8)	3.3(2.2)	4.2(2.8)	7.3	.063
Post- test aaq score(/70)	**48.1(6.8)**	**46.7(5.7)**	**41.1(6.1)**	**50.7(8.8)**	**28.5**	**<.001**

Fisher Exact Chi-square Tests (X^2).

4.4.1.3 **Comparison of pre-and post-test psychological flexibility scores**

There was a significant increase in psychological flexibility with pre-and post-test psychological flexibility scores with Group I-PP (intervention group) significantly increasing from 44.4 (7.5) to 48.1 (6.8), p=.023. By contrast, there was a significant decrease in psychological flexibility with pre- and post-test AAQ-II scores within Group C-PP (control group) significantly decreasing from 46.0 (9.4) to 41.1 (6.1), p=.027(Table 13). Significant pre-and post-test differences were found in AAQ-II scores within Group I-PP (intervention group) where the AAQ-II score increased by 3.7 [0.5 to 6.9 95% CI] (p=.023) (Table 10). By contrast, within Group C-PP (control group) the AAQ-II scores decreased by 4.9 [0.6 to 9.2 95%CI] from the pre- to the post-test (p=.027) (Table 10).

Table 10: Mean pre-and post-test AAQ-II scores

AAQ II	**Pre Test**	**Post Test**	**Difference (d) 95%CI**	**Test**	**p-value**
Group I-PP (n=33)*	44.4 (sd 7.5)	48.1 (sd 6.8)	3.7 [0.5 to 6.9]	*t=2.4*	p=.023
Group C-PP (n=28)	46.0 (sd 9.4)	41.1 (sd 6.1)	-4.9 [-0.6 to -9.2]	*t=2.2*	p=.027
Group I-Post (n=33)*		46.7 (5.7)			
Group C-Post (n=33)		50.7 (sd 8.8)			

Independent Samples T-Tests(*T*)
*Intervention

4.4.1.4 **Comparison of pre-and post-test psychological flexibility score differences between Group I-PP and Group C-PP**

An independent sample t-test was used to compare the pre-and post-test score differences (d) between Group I-PP (Intervention Group) (M=3.6, SD=8.9) and Group C-PP (Control Group) (M=-4.9, SD=11.1), there was also a significant

psychological flexibility improvement in participants following ACT intervention (T=3.4, p=.001)(Table 11).

Table 11: Comparison of AAQ-II pre-and post-difference between the Group I-PP and Group C-PP

	Intervention Grp 1(N=33) (mean sd)	Control Group C-PP (N=28) (mean sd)	Test	p-value
AAQ-II	3.6 (sd 8.9)	- 4.9 (sd11.1)	*T*=3.4	p=.001

Independent Samples T-Tests.

4.4.1.5 **Assessing for pre-test sensitization**

On average, the Intervention Group psychological flexibility scores were higher than the Control Groups (47.4 (6.3) vs 46.3(9.0). To test for pre-test sensitization, a comparison of post-test psychological flexibility scores was completed for groups with and without a pre-test. Groups without a pre-test had significantly higher psychological flexibility (44.9 (7.3) versus 48.7 (7.6) respectively. This was largely due to the high psychological flexibility score of Group C-Post (50.7, 8.8) (Table 12).

Table 12: Pre-test sensitization

	Intervention M (SD)	No Intervention M (SD)	Average score M (SD)
Pre-test	48.1 (6.8)	41.1 (6.1)	44.9 (7.3)
No Pre-test	46.7 (5.7)	50.7 (8.8)	48.7 (7.6)
Average score	47.4 (6.3)	46.3 (9.0)	

To further test for pre-test sensitization a 2x2 ANOVA with intervention and pre-test as factors was conducted on the post-test scores (Table 13). The 2x2 ANOVA found a significant interaction between the intervention and pre-test factors (Intervention x Pre-test, F (1,123) =19.3, p<.001), suggesting pre-test sensitisation being present. When Group C-Post was removed from the analysis, the interaction disappears. A

simple main effects analysis showed that for respondents with the intervention, the pre-test had no effect (F (1,123) = 1.47, p = .227) but for respondents with no intervention, the pre-test had an effect (F (1,123) = 10.83, p =.001).

Table 13: Effect analysis

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1443.950[a]	3	481.317	9.910	.000	.195
Intercept	275066.907	1	275066.907	5663.380	.000	.979
Intervention	71.488	1	71.488	1.472	.227	.012
Test	525.878	1	525.878	10.827	.001	.081
intervention * Test	**936.134**	**1**	**936.134**	**19.274**	**.000**	**.135**
Error	5974.035	123	48.569			
Total	286459.000	127				
Corrected Total	7417.984	126				

a. R Squared = .195 (Adjusted R Squared = .175)

4.4.2 DASS Assessment of Mental Health Status of Respondents

This section discusses the assessment of respondents' mental health status using DASS, reflecting statements on depression, anxiety and stress among the women both at the pre-test and post-test level of the study.

4.4.2.1 **Comparison of total baseline DASS scores of groups**

Table 14 provides the baseline responses reflecting responses for the DASS scale. There were no significant difference between Group I-PP and Group C-PP at baseline. Depression (p= .754), Anxiety (p= .652), Stress (p= .588) and the total DASS scores for all group (p= .560).

Table 14: DASS assessment of Respondents

Items (out of 3)	Group I-PP Mean(sd)	Group C-PP Mean(sd)	Test U	P value
I found myself getting upset by quite trivial things	.33(.54)	.67(.89)	1.3	.181
I was aware of dryness of my mouth	.12(.33)	.55(.94)	2.2	.028
I couldn't seem to experience any positive feeling at all	.12(.33)	.52(.76)	2.4	.015
I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in d absence of physical exertion)	.12(.33)	.27(.72)	0.5	.628
I just couldn't seem to get going	.09(.29)	.58(.94)	2.5	.011
I tend to over-react to situations	.21(.42)	.58(1.0)	1.2	.238
I had a feeling of shakiness(e.g. legs going to give way)	.12(.42)	.24(.44)	1.6	.119
I found it difficult to relax	.06(.24)	.42(.75)	2.4	.017
I found myself in situations that made me so anxious I was almost relieved when they ended	.36(.55)	.58(.87)	0.6	.553
I felt that I had nothing to look forward to	.03(.17)	.33(.60)	2.7	.006
I found myself getting upset rather easily	.24(.44)	.64(.82)	2.0	.050
I felt that I was using a lot of nervous energy	.09(.29)	.48(.80)	2.3	.021
I felt sad and depressed	.70(.53)	.61(.79)	1.0	.301
I found myself getting impatient when I was delayed in any way	.33(.48)	.45(.75)	0.2	.863
I had a feeling of faintness	.27(.52)	.21(.49)	0.6	.564
I felt that I had lost interest in just about everything	.06(.24)	.55(.79)	3.1	.002
I felt I wasn't worth much as a person	.12(.33)	.58(.79)	2.7	.007
I felt that I was rather touchy	.21(.42)	.52(.80)	1.6	.118
I perspired noticeably in d absence of high temperatures or physical exertion	.00(.00)	.64(.93)	4.0	.000
I felt scared without any good reason	.15(.36)	.73(1.0)	2.5	.011
I felt life wasn't worthwhile	.45(.51)	.64(.96)	.04	.965
I found it hard to wind down	.00(.00)	.36(.60)	3.4	.001
I had difficulty in swallowing	.15(.36)	.27(.57)	0.7	.467
I couldn't seem to get any enjoyment out of the things I did	.09(.29)	.45(.75)	2.3	.023
I was aware of the action of my heart in the absence of physical exertion	.15(.44)	.42(.79)	1.6	.109
I felt down-hearted and blue	.18(.39)	.42(.83)	0.9	.388
I found that I was very irritable	.21(.42)	.39(.75)	0.6	.551
I felt I was close to panic	.88(.60)	.36(.60)	3.5	.001
I found it hard to calm down after something upset me	.00(.00)	.36(.70)	3.0	.003
I feared that I would be "thrown" by some trivial but unfamiliar task	.00(.00)	.52(.80)	3.6	.000
I was unable to become enthusiastic about anything	.00(.00)	.61(.90)	3.8	.000
I found it difficult to tolerate interruptions to what I was doing	.09(.29)	.64(.96)	2.8	.005
I was in a state of nervous tension	.03(.17)	.52(.76)	3.4	.001
I felt I was pretty worthless	.09(.29)	.52(.91)	2.3	.023
I was intolerant of anything that kept me from getting on with what I was doing	.06(.24)	.48(.87)	2.4	.016

I felt terrified	.85(.57)	.52(.76)	2.4	.017
I could see nothing in the future to be hopeful about	.06(.35)	.48(.87)	2.7	.007
I felt that life was meaningless	.48(.51)	.48(.80)	0.8	.450
I found myself getting agitated	1.00(.56)	.45(.75)	3.5	.000
I was worried about situations in which I might panic and make a fool of myself	.33(.54)	.42(.71)	0.2	.811
I experienced trembling(e.g. in d hands)	.09(.29)	.30(.68)	1.1	.232
I found it difficult to work up the initiative to do things	.03(.17)	.48(.80)	3.0	.003
P depression score(/42)	2.52(2.75)	7.24(9.87)	0.3	.754
P anxiety score(/42)	3.61(2.72)	6.03(7.60)	0.5	.652
P stress score(/42)	2.88(2.47)	6.97(9.0)	0.5	.588
P dass total score(/126)	9.00(5.10)	20.24(26.14)	0.6	.560

Mann-Whitney U

4.4.2.2 **Comparison of total post-test DASS scores of groups**

Table 15 provides the total DASS total scores for the Solomon Four Group Design. Significant pre-and post-test differences were found on all statements of the DASS scale except for items 10, 12 and 26 for Group I-PP and items 15 and 18 for Group I-Post and Group C-Post where there is no difference.

Table 15: Post-test Total DASS Scores of Groups

Items (out of 3)	**Group I-PP n=33** Mean(sd)	**Group C-PP n=33** Mean(sd)	**Group I-Post n=33** Mean(sd)	**Group C-Post n=33** Mean(sd)	**X^2**	**p-value**
I found myself getting upset by quite trivial things	.33(.54)	1.11(.79)	.36(55)	.91(.91)	23.8	<.001
I was aware of dryness of my mouth	.00(.00)	1.36(1.03)	.24(.50)	.21(.49)	51.6	<.001
I couldn't seem to experience any positive feeling at all	.09(.29)	1.36(1.06)	.09(.29)	.36(.65)	44.1	<.001
I experienced breathing difficulty (e.g,excessively rapid breathing, breathlessness in d absence of physical exertion)	.03(.17)	1.32(1.02)	.03(.17)	.42(.75)	58.1	<.001
I just couldn't seem to get going	.00(.00)	.93(.90)	.12(.49)	.33(.54)	44.1	<.001
I tend to over-react to situations	.21(.42)	1.39(.92)	.18(.39)	.61(.90)	39.5	<.001
I had a feeling of shakiness(eg legs going to give way)	.03(.17)	1.39(.92)	.15(.36)	.21(.49)	61.1	<.001
I found it difficult to relax	.03(.17)	1.43(.79)	.27(.45)	.36(.65)	58.5	<.001

I found myself in situations that made me so anxious I was almost relieved when they ended	.39(.50)	1.39(.83)	.12(.33)	.55(.75)	39.4	<.001
I felt that I had nothing to look forward to	.03(.17)	1.29(1.18)	.03(.17)	.18(.47)	50.1	<.001
I found myself getting upset rather easily	.21(.42)	1.43(1.03)	.24(.44)	.67(.85)	34.9	<.001
I felt that I was using a lot of nervous energy	.09(.29)	1.32(1.09)	.15(.36)	.58(.79)	36.6	<.001
I felt sad and depressed	.64(.65)	1.00(.98)	.18(.39)	.61(.66)	17.6	<.001
I found myself getting impatient when I was delayed in any way	.30(.68)	1.18(1.15)	.12(.33)	.70(.77)	29.2	<.001
I had a feeling of faintness	.03(.17)	1.61(1.03)	.09(.29)	.09(.38)	79.7	<.001
I felt that I had lost interest in just about everything	.00(.00)	1.57(1.07)	.18(.47)	.18(.39)	64.7	<.001
I felt I wasn't worth much as a person	.06(.24)	1.64(.87)	.06(.24)	.36(.72)	78.2	<.001
I felt that I was rather touchy	.36(.70)	1.50(1.00)	.15(.36)	.45(.71)	43.7	<.001
I perspired noticeably in the absence of high temperatures or physical exertion	.12(.55)	1.07(.90)	.18(.39)	.30(.77)	38.4	<.001
I felt scared without any good reason	.18(.39)	1.00(.86)	.15(.36)	.18(.47)	33.0	<.001
I felt life wasn't worthwhile	.36(.55)	1.29(.66)	.03(.17)	.24(.50)	61.4	<.001
I found it hard to wind down	.12(.42)	1.57(1.00)	.09(.29)	.27(.63)	62.4	<.001
I had difficulty in swallowing	.03(.17)	1.68(1.09)	.09(.29)	.15(.57)	71.9	<.001
I couldn't seem to get any enjoyment out of the things I did	.18(.47)	1.86(1.15)	.06(.24)	.30(.53)	61.2	<.001
I was aware of the action of my heart in the absence of physical exertion	.03(.17)	1.39(.92)	.03(.17)	.24(.50)	69.1	<.001
I felt down-hearted and blue	.18(.39)	1.18(.82)	.09(.29)	.55(.62)	45.7	<.001
I found that I was very irritable	.06(.24)	1.11(.99)	.09(.29)	.36(.78)	37.4	<.001
I felt I was close to panic	.45(.67)	1.21(.92)	.06(.24)	.24(.61)	43.3	<.001
I found it hard to calm down after something upset me	.12(.42)	1.43(1.00)	.06(.24)	.45(.75)	54.2	<.001
I feared that I would be "thrown" by some trivial but unfamiliar task	.06(.24)	1.21(.92)	.06(.35)	.30(.68)	57.2	<.001
I was unable to become enthusiastic about anything	.09(.52)	1.39(.96)	.18(.39)	.15(.36)	56.1	<.001
I found it difficult to tolerate interruptions to what I was doing	.61(1.82)	1.43(.92)	.18(.39)	.79(.82)	38.1	<.001
I was in a state of nervous tension	.00(.00)	1.75(1.08)	.03(.17)	.12(.55)	88.6	<.001
I felt I was pretty worthless	.06(.24)	1.29(.94)	.06(.24)	.33(.69)	58.9	<.001

I was intolerant of anything that kept me from getting on with what I was doing	.15(.36)	1.32(1.06)	.09(.29)	.64(.70)	42.1	<.001
I felt terrified	.30(.47)	1.25(1.01)	.06(.24)	.18(.58)	42.7	<.001
I could see nothing in the future to be hopeful about	.03(.17)	1.25(1.01)	.06(.24)	.24(.56)	56.6	<.001
I felt that life was meaningless	.30(.53)	1.29(1.12)	.00(.00)	.45(.75)	36.8	<.001
I found myself getting agitated	.36(.55)	1.54(1.04)	.06(.24)	.27(.57)	47.6	<.001
I was worried about situations in which I might panic and make a fool of myself	.06(.24)	2.11(.88)	.15(.36)	.27(.52)	81.0	<.001
I experienced trembling(eg in the hands)	.03(.17)	1.64(1.06)	.09(.29)	.33(.85)	64.1	<.001
I found it difficult to work up the initiative to do things	.00(.00)	1.39(.69)	.18(.47)	.24(.66)	79.3	<.001
PP dass depression score	2.03(2.54)	18.71(4.83)	1.33(2.8)	4.55(5.8)	*T*=4.6	<.001
PP dass anxiety score	1.76(2.02)	19.64(4.60)	1.52(3.06)	3.70(4.62)	*T*=8.2	<.001
PP dass stress score	2.97(3.52)	19.50(5.92)	2.09(3.2)	7.18(7.0)	*T*=5.2	<.001
PP dass total score(/126)	6.76(7.10)	57.86(13.56)	4.94(8.8)	15.42(15.3)	*T*=6.3	<.001

Independent T-Test (*T*) and Fisher Exact Chi-square Tests (X^2)

4.4.2.3 **Comparison of Pre-and Post-test DASS Scores of Groups**

Table 16 compared the pre and post –test DASS scores. Group I-PP (intervention group) score decreased by .49 (2.52 to 2.03). By contrast, significant pre-and post-test differences were found within Group C-PP (control group) and the depression score increased by 11.53 (7.24 to 18.71). Also, differences were found in the scores between Group I-Post (intervention group) and Group C-Post (control group) with a difference in score of 3.22(4.55 and 1.33). Group C-Post had a higher depression score than Group I-Post. Significant pre-and post-test differences were found in the DASS anxiety scores within Group I-PP and Group C-PP. Group I-PP (intervention group) scores decreased by 1.85 (3.61 to 1.76) while Group C-PP (control group) anxiety score increased by 13.61 (6.03 to 19.64). Also, differences were found in the scores between Group I-Post (intervention group) and Group C-Post (control group) with a difference in score of 2.18 (1.52 and 3.70). Group C-Post had a higher anxiety score than Group I-Post.The DASS stress scores within Group I-PP (intervention group) increased by .09 [2.88 to 2.97]. By contrast, within Group C-PP (control

group) the stress score increased by 12.53 (6.97 to 19.50). Also, differences were found in the scores between Group I-Post (intervention group) and Group C-Post (control group) with a difference in score of 5.09 (7.18 and 2.09). Group C-Post had a higher stress score than Group I-Post (Table 16).

Table 16: Mean pre and post-test DASS scores

DAS	Pre Test	Post Test	Difference(d) 95% CI	Test	p-value
DAS Depression					
Group I-PP (n=33)*	2.5 (sd 2.8)	2.0 (sd 2.5)	0.5 [-0.8 to 1.9]	*T=0.7*	p=.479
Group C-PP (n=28)	7.2(sd 9.9)	18.7 (sd 4.8)	-11.5 [-15.1 to -5.8]	*T=4.6*	P<.001
Group I-Post (n=33)*		1.3 (sd 2.8)			
Group C-Post (n=33)		4.5 (sd 5.8)			
DAS Anxiety					
Group I-PP (n=33)*	3.6 (sd 2.7)	1.8 (sd 2.0)	1.9 [0.8 to 2.9]	*T=3.5*	p=.002
Group C-PP (n=28)	6.0 (sd 7.6)	19.6 (sd 4.6)	-13.6 [-16.2 to -9.3]	*T=7.6*	P<.001
Group I-Post (n=33)*		1.5 (sd 3.1)			
Group C-Post (n=33)		3.7 (sd 4.6)			
DAS Stress					
Group I-PP (n=33)*	2.9 (sd 2.5)	3.0 (sd 3.5)	-0.09 [-1.6 to 1.4]	*T=0.12*	p=.904
Group C-PP (n=28)	7.0 (sd 9.0)	19.5 (sd 5.9)	-12.5 [-15.7 to -7.4]	*T=5.7*	P<.001
Group I-Post (n=33)*		2.1 (sd 3.2)			
Group C-Post (n=33)		7.2 (sd 6.9)			
DAS Total					
Group I-PP (n=33)*	9.0 (sd 5.1)	6.8 (sd 7.1)	2.2 [-0.9 to 5.3]	*T=1.5*	p=.151
Group C-PP (n=28)	20.2 (sd 26.1)	57.9 (sd 13.6)	-37. [-46.3 to -23.0]	*T=6.1*	P<.001
Group I-Post (n=33)*		4.9 (8.8)			
Group C-Post (n=33)		15.4 (sd 15.3)			

Paired Samples T-Tests. *Intervention

4.4.2.4 Comparison of Pre-and Post-test DASS Score Differences between Group C-PP and Group I-PP

An independent samples T-test was used to compare the pre and post-test score differences (d) between Group I-PP (intervention group) and Group C-PP (control group) (Table 17). For depression (M=3.6, SD=8.9) and Group C-PP (control group) (M=-4.9, SD=11.1), anxiety (M= -0.5, SD=3.9) and Group C-PP (control group) (M=10.4, SD=12.0) and stress (M= -1.85, SD=3.1) and Group C-PP (control group) (M=12.7, SD=8.9). There were significant DASS improvement in respondents following ACT intervention across all the subscale and total DASS (p<.001).

Table 17: Comparison DASS pre-and post-test difference between Group C-PP and Group I-PP

	Intervention	Control	Test	p-value
DASS depression	3.6 (sd 8.9)	-4.9 (sd 11.1)	*T*=4.6	P<.001
DASS anxiety	-0.5 (sd 3.9)	10.4 (sd 12.0)	*T*=8.2	P<.001
DASS stress	-1.85 (sd 3.1)	12.7 (sd 8.9)	*T*=5.2	P<.001
DASS total	-2.2 (sd 8.7)	34.7 (sd 30.1)	*T*=6.3	P<.001

Independent Samples T-Tests.

4.4.2.5 Assessing for pre-test sensitization

The Intervention Group DASS scores were lower than Control Groups (5.9 vs 36.7). To test for pre-test sensitization, a comparison of post-test DASS scores was done for groups with and without a pre-test. Groups without a pre-test had significantly lower DASS score (32.4 versus 10.2). This was largely due to the high DASS score of Group C-PP (57.8) (Table 28).

Table 18: Pre-test sensitization

	Intervention M (SD)	No Intervention M (SD)	Average score M (SD)
Pre-test	6.8 (sd 7.1)	57.9 (sd 13.6)	32.4 (27.8)
No Pre-test	4.9 (8.8)	15.4 (sd 15.3)	10.2(13.5)
Average Score	5.9(8.0)	36.7 (25.7)	

To test for pre-test sensitization a 2x2 ANOVA with intervention and pre-test as factors was conducted on the post-test scores(Table 19). The 2x2 ANOVA found a significant interaction between the intervention and pre-test factors (Intervention x Pre-test, F (1, 123) =96.9, p<.001). A simple main effects analysis showed that for women with the intervention, the pre-test had an effect (F (1, 123) = 222.7, p = <.001).The pre-test also had an effect on women with no intervention (F (1, 123) = 115.0, p <.001) (Table 19).

Table 19: Tests of Between-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	54086.650[a]	3	18028.883	134.077	.000	.766
Intercept	57029.918	1	57029.918	424.119	.000	.775
Intervention	29952.133	1	29952.133	222.747	.000	.644
Test	15464.429	1	15464.429	115.005	.000	.483
Intervention * Test	**13027.258**	**1**	**13027.258**	**96.881**	**.000**	**.441**
Error	16539.429	123	134.467			
Total	120431.000	127				
Corrected Total	70626.079	126				

Dependent Variable: PP_dass total score. R Squared = .766 (Adjusted R Squared = .760)

4.4.3 HIV Stigma Scale Assessment of respondents

4.4.3.1 Baseline HSS scale for Group C-PP and Group I-PP

Table 20 provides the baseline responses reflecting responses on the HSS scale. The total stigma score as measured by the HSS scale were significantly different between Group I-PP and Group C-PP at baseline (U=4.1, p= <.001). Significant differences in baseline items between the two groups were observed on all the items on the HSS stigma sub-scale.The difference between the HSS pre-test total scores for both Groups is 32.5(26.9) with Group I-PP having a higher score (p=<.001) denoting the prevalence of stigma among the two groups.

Table 20: Baseline Responses for Hss Total

Variables(Out of 4)	Group I-PP N=33 Mean(sd)	Group C-PP N=33 Mean(sd)	U	p-value
In many areas of my life ,no one knows that I have HIV	2.06(.42)	2.73(.11)	2.9	.003
I feel guilty because I have HIV	2.30(.73)	2.06(.11)	1.3	.187
People's attitudes about HIV make me feel worse about myself	2.94(.70)	2.03(.11)	3.5	.001
Telling someone I have HIV is risky	3.42(.56)	2.61(.12)	3.0	.003
People with HIV lose their jobs when their employers find out	2.45(.1.1)	2.39(.11)	.37	.706
I work hard to keep my HIV a secret	3.27(.52)	2.58(.12)	2.4	.016
I feel I am not as good a person as others because I have HIV	2.06(.35)	2.03(.98)	.71	.477
I never feel ashamed of having HIV	3.27(.45)	2.70(.12)	1.6	.119
People with HIV are treated like outcasts	3.30(.47)	2.30(.12)	3.5	.001
Most people believe that a person who has HIV is dirty	2.24(.44)	2.30(.13)	.61	.541
It is easier to avoid new friendships than worry about telling someone that I have HIV	1.91(.29)	2.39(.13)	1.1	. 262
Having HIV makes me feel unclean	2.06(.35)	1.79(.86)	2.1	.034
Since learning I have HIV I feel set apart and isolated than the rest of the world	1.73(.45)	1.97(.12)	.17	.866
Most people think that a person with HIV is disgusting	3.03(.31)	1.97(.12)	3.9	.001
Having HIV makes me feel that I'm a bad person	1.91(.46)	1.88(.12)	1.6	.117
Most people with HIV are rejected when others find out	3.30(.47)	1.88(.10)	5.3	<.001
I am very careful who I tell that I have HIV	3.73(.76)	2.27(.13)	4.7	<.001

Some people who know I have HIV have grown more distant	1.52(.62)	2.12(.11)	2.0	.049
Since learning I have HIV, I worry about people discriminating against me	3.33(.69)	2.18(.12)	3.8	<.001
Most people are uncomfortable around someone with HIV	3.52(.51)	2.18(.13)	4.0	<.001
I never feel the need to hide the fact that I have HIV	3.15(.36)	3.21(.11)	1.9	.058
I worry that people may judge me when they learn I have HIV	3.18(.68)	2.00(.12)	4.2	<.001
Having HIV in my body is disgusting to me	3.09(.29)	1.91(.11)	4.6	<.001
I have been hurt by how people reacted to learning I have HIV	3.18(.77)	2.00(.11)	4.5	<.001
I worry that people who know I have HIV will tell others	3.33(.82)	2.33(.11)	3.8	<.001
I regret having told someone that I have HIV	3.52(.80)	2.09(.11)	4.7	<.001
As a rule, telling others that I have HIV has been a mistake	3.76(.44)	2.03(.12)	5.5	<.001
Some people avoid touching me once they know I have HIV	3.24(.75)	1.91(.11)	4.6	<.001
People I care about stopped calling after learning I have HIV	2.97(.77)	1.94(.11)	3.8	<.001
People have told me that getting HIV is that I deserve for how I lived my life	2.76(.83)	1.97(.12)	3.1	.002
Some people close to me are afraid others will reject them if it becomes known that I have HIV	3.09(.72)	2.00(.12)	3.9	<.001
People don't want me around their children once they know I have HIV	3.58(.56)	1.79(.11)	5.4	<.001
People have physically backed away from me when they learn I have HIV	3.24(.50)	1.73(.11)	5.3	<.001
Some people act as though it's my fault I have HIV	3.33(.54)	1.88(.12)	4.7	<.001
I have stopped socializing with some people because of their reaction to my having HIV	2.36(.93)	1.91(.12)	2.0	.041
I have lost friends by telling them I have HIV	3.18(.39)	1.91(.12)	4.6	<.001
I have told people close to me to keep the fact that I have HIV a secret	3.03(.59)	2.15(.12)	3.4	.001
People who know I have HIV tend to ignore my good points	2.67(.65)	1.94(.12)	3.3	.001
People seem afraid of me once they learn I have HIV	3.18(.39)	1.97(.12)	4.2	<.001
When people learn you have HIV, they look for flaws in your character.	3.79(.42)	1.97(.12)	5.6	<.001
P_hss_stigma score(/72)	54.4(.5.6)	34.7(19.2)	4.1	<.001
P_hss_disclosure score(/40)	30.4(2.0)	24.1(7.9)	3.6	<.001
P_hss_public attitude score(/80)	61.0(4.7)	41.3(20.8)	4.0	<.001
P_hss_self image score(/52)	34.2(3.0)	27.4(10.6)	3.5	<.001
P_hss_total score(/160)	117 (8.6)	84.5 (35.5)	3.9	<.001

Mann-Whitney (U)

4.4.3.2 **Comparison of total post-test HSS scores of groups**

Table 21 provides the HSS total scores for the Solomon Four Group Design. Significant post-test differences were found in HSS scores within Group I-PP (intervention group) where the score decreased by .49(.21) [2.52 to 2.03]. By contrast, within Group C-PP (control group) the overall score increased by 12.53(5.57) [7.24 to 18.71]. Also, significant post-test differences were found in the scores between Group I-Post (intervention group) and Group C-Post (control group) with a difference in score of 32 .5(3.0) [4.55 to 1.33]. Group C-Post had a higher overall HSS score than Group I-Post.

Table 21: Post measures for HSS

Items(Out of 4)	**Group I-PP N=33 Mean (sd)**	**Group C-PP N=33 Mean (sd)**	**Group I-Post N=33 Mean (sd)**	**Group C-Post N=33 Mean (sd)**	X^2	P-Value
In many areas of my life ,no one knows that I have HIV	1.97(.47)	2.75(.70)	2.44(.62)	3.03(.1.0)	32.9	<.001
I feel guilty because I have HIV	2.30(.1.0)	2.75(.65)	1.97(59)	2.13(.91)	15.5	.001
People's attitudes about HIV make me feel worse about myself	3.21(.82)	2.86(.71)	2.21(.70)	2.27(.91)	26.8	<.001
Telling someone I've HIV is risky	3.52(.62)	2.86(.65)	2.27(.80)	3.39(.79)	42.1	<.001
People with HIV lose their jobs when their employers find out	3.15(.80)	2.18(.48)	1.67(.82)	2.85(.67)	51.9	<.001
I work hard to keep my HIV a secret	3.52(.57)	2.32(.91)	2.55(.79)	3.55(.79)	47.3	<.001
I feel I am not as good a person as others because I have HIV	1.97(.53)	2.46(.74)	1.79(.70)	1.76(.90)	17.6	.001
I never feel ashamed of having HIV	2.85(.67)	2.32(.72)	3.00(.75)	2.33(.99)	16.5	.001
People with HIV are treated like outcasts	3.42(.71)	2.75(.97)	1.82(.68)	2.66(.75)	47.2	<.001
Most people believe that a person who has HIV is dirty	2.03(.59)	2.79(.92)	1.82(.64)	2.09(.88)	19.5	<.001
It is easier to avoid new friendships than worry about telling someone that I have HIV	2.36(.70)	2.93(.72)	2.06(.75)	2.94(.70)	29.0	<.001
Having HIV makes me feel unclean	1.70(.47)	2.61(.69)	1.76(.66)	1.52(.62)	37.3	<.001

Since learning I have HIV I feel set apart and isolated than the rest of the world	1.70(.69)	2.50(.69)	1.78(.61)	1.67(.69)	24.3	<.001
Most people think that a person with HIV is disgusting	2.70(.64)	2.89(.88)	1.72(.58)	1.91(.91)	36.5	<.001
Having HIV makes me feel that I'm a bad person	1.61(.50)	3.00(.90)	1.68(.48)	1.67(.82)	41.5	<.001
Most people with HIV are rejected when others find out	3.45(.62)	2.71(.11)	1.72(.63)	2.94(.83)	52.3	<.001
I am very careful who I tell that I have HIV	3.58(.71)	2.82(.91)	2.41(.91)	3.42(.71)	34.4	<.001
Some people who know I have HIV have grown more distant	1.79(.55)	2.43(.96)	1.81(.69)	2.09(1.0)	9.3	<.001
Since learning I have HIV, I worry about people discriminating against me	2.79(.86)	2.54(.69)	1.87(.66)	2.88(1.1)	24.0	<.001
Most people are uncomfortable around someone with HIV	3.39(.75)	2.54(.79)	1.97(.82)	2.88(.86)	38.6	.001
I never feel the need to hide the fact that I have HIV	3.03(.85)	2.50(.88)	2.97(.82)	3.12(.86)	8.9	.031
I worry that people may judge me when they learn I have HIV	2.91(.91)	2.46(.79)	1.94(.67)	2.52(.91)	19.5	<.001
Having HIV in my body is disgusting to me	2.76(.87)	2.79(.74)	1.94(.72)	1.61(.70)	41.6	<.001
I have been hurt by how people reacted to learning I have HIV	2.85(1.0)	2.43(.57)	2.22(.79)	3.09(.98)	16.9	.001
I worry that people who know I have HIV will tell others	2.94(.93)	2.89(.74)	2.09(.73)	3.15(1.03)	24.0	<.001
I regret having told someone that I have HIV	2.79(.89)	2.68(.91)	2.09(.73)	3.03(1.1)	17.2	<.001
As a rule, telling others that I have HIV has been a mistake	3.27(.80)	2.89(.83)	2.22(.79)	3.18(.95)	25.0	<.001
Some people avoid touching me once they know I have HIV	2.55(.62)	2.61(.83)	1.91(.64)	3.00(.83)	30.1	<.001
People I care about stopped calling after learning I have HIV	2.15(.67)	2.32(.86)	1.62(.55)	2.97(.88)	38.8	. <.001
People have told me that getting HIV is that I deserve for how I lived my life	2.15(.51)	2.64(.73)	1.85(.57)	2.79(.93)	30.6	<.001
Some people close to me are afraid others will reject them if it becomes known that I have HIV	2.64(.70)	2.64(.87)	1.69(59)	2.76(.90)	32.1	<.001
People dont want me around their children once they know I have HIV	2.85(.80)	2.36(.87)	1.69(.64)	2.97(.88)	38.5	<.001

People have physically backed away from me when they learn I have HIV	2.45(.62)	2.18(.82)	1.69(.54)	2.88(.86)	37.8	<.001
Some people act as though it's my fault I have HIV	2.33(.54)	2.82(.86)	1.92(.64)	3.00(.1.0)	31.0	<.001
I have stopped socializing with some people because of their reaction to my having HIV	1.94(.70)	2.68(.72)	1.78(.61)	2.76(.1.0)	31.0	<.001
I have lost friends by telling them I have HIV	2.45(.57)	2.93(.72)	1.72(.52)	2.97(.88)	47.0	<.001
I have told people close to me to keep the fact that I have HIV a secret	2.73(.63)	2.82(.77)	1.81(.74)	3.30(.88)	43.2	<.001
People who know I have HIV tend to ignore my good points	2.18(.53)	2.68(.86)	1.78(.61)	2.85(.87)	34.9	<.001
People seem afraid of me once they learn I have HIV	2.64(.60)	2.54(.79)	1.84(.68)	2.94(.90)	30.7	<.001
When people learn you have HIV, they look for flaws in your character.	2.70(.81)	2.36(.73)	1.76(.83)	2.85(.91)	27.3	<.001
PP_hss_stigma score(/72)	44.9(5.5)	46.4(7.1)	31.9(10.5)	50.7(12.4)	*T*=5.8	<.001
PP_hss_disclosure score(/40)	29.3(3.1)	26.9(3.1)	21.9(5.4)	31.30(5.6)	*T*=2.8	.028
PP_hss_self image score(/52)	32.6(2.3)	34.6(4.8)	26.1(5.9)	30.3(6.1)	*T*=4.1	<.001
PP_hss_public attitude score(/80)	54.6(5.6)	52.2(6.9)	36.3(11.3)	55.1(10.2)	*T*=4.7	<.001
PP_hss_total score(/160)	105.3(8.8)	105.2(12.2)	76.9(20.1)	107.6(19.7)	*T*=4.3	<.001

Independent T-Test (*T*) and Fisher Exact Chi-square Tests (X^2)

4.4.3.3 **Comparison of mean pre-and post-test HSS Stigma scores**

There was a significant increase in the level of stigma with pre-and post-test psychological flexibility scores with Group I-PP (intervention group) significantly decreasing from 54.4 (5.6) to 44.9 (5.5), p=<.001(Table 22). By contrast, there was a significant increase in the pre- and post-test stigma scores within Group C-PP (control group) significantly increasing from 34.7 (19.2) to 46.4 (7.1), p=.002 (Table 22). Differences were found in post scores of Group I-Post (intervention group) and

Group C-Post (control group) 31.9 (10.5) versus 50.7 (12.4) with Group C-Post having a higher score than Group I-Post.

The pre-and post-test disclosure scores within Group I-PP (intervention group) decreased from 30.4(2.0) to 29.3 (3.1). However, the post-test disclosure scores within Group C-PP (control group) increased from 24.1 (7.9) to 26.9 (3.1) (Table 22). Differences were found in the post-test scores for Group I-Post (intervention group) and Group C-Post (control group) 21.9 (5.4) versus31.3 (6.1) with Group C-Post having a higher score than Group I-Post.

There was a significant difference in the pre-and post-test self–image scores with Group I-PP (intervention group) significantly decreasing from 34.2 (3.0) to 32.6 (2.3), p=.002. By contrast, there was a significant increase in the pre- and post-test self–image scores with Group C-PP (control group) significantly increasing from 27.4 (10.6) to 34.6 (4.8), p=.003 (Table 22). Differences were found in the post-test scores for Group I-Post (intervention group) and Group C-Post (control group) 26.1 (5.9) and 30.3 (6.1) with Group C-Post having a higher score than Group I-Post.

A significant difference was also observed in the pre-and post-test public attitude scores with Group I-PP (intervention group) significantly decreasing from 61.0 (4.7) to 54.6 (5.6), p=<.001. By contrast, there was a significant increase in the pre- and post-test scores with Group C-PP (control group) significantly increasing from 41.3 (20.8) to 52.2 (6.9), p=.007. Differences were found in post-test scores for Group I-Post (intervention group) and Group C-Post (control group) 36.3 (11.3) and 55.1 (10.2) with Group C-Post having a higher score than Group I-Post (Table 22).

Table 22: Mean pre and post-test HSS Stigma scale

HSS	Pre Test	Post Test	Difference(d) 95%CI	Test	p-value
Stigma					
Group I-PP (n=33)*	54.4 (sd 5.6)	44.9 (sd 5.5)	9.5 [6.6 to 12.4]	*T=6.7*	P<.001
Group C-PP (n=28)	34.7 (sd 19.2)	46.4 (sd 7.1)	-11.7 [-18.7 to -4.7]	*T=2.2*	p=.002
Group I-Post (n=33)*		31.9 (10.5)			
Group C-Post (n=33)		50.7 (sd 12.4)			
Disclosure					
Group I-PP (n=33)*	30.4 (sd 2.0)	29.3 (sd 3.1)	1.1 [-0.3 to 2.6]	*T=1.5*	p=.132
Group C-PP (n=28)	24.1 (sd 7.9)	26.9 (sd 3.1)	-2.8 [-5.8 to 0.4]	*T=1.8*	p=.084
Group I-Post (n=33)*		21.9 (sd 5.4)			
Group C-Post (n=33)		31.3 (sd 5.6)			
Self Image					
Group I-PP (n=33)*	34.2 (sd 3.0)	32.6 (sd 2.3)	2.1 [0.8 to 3.5]	*T=3.4*	p=.002
Group C-PP (n=28)	27.4 (sd 10.6)	34.6 (sd 4.8)	-7.3 [-11.8 to -2.3]	*T=3.3*	p=.003
Group I-Post (n=33)*		26.1 (sd 5.9)			
Group C-Post (n=33)		30.3 (sd 6.1)			
Public attitude					
Group I-PP (n=33)*	61.0 (sd 4.7)	54.6 (sd 5.6)	6.4 [3.8 to 9.1]	*T=4.9*	P<.001
Group C-PP (n=28)	41.3 (sd 20.8)	52.2 (sd 6.9)	-10.9 [-18.7 to -3.2]	*T=2.9*	p=.007
Group I-Post (n=33)*		36.3 (sd 11.3)			
Group C-Post (n=33)		55.1 (sd 10.2)			
TOTAL					
Group I-PP (n=33)*	117 (sd 8.6)	105.0 (sd 8.8)	11.7 [7.4 to 16.0]	*T=5.8*	P<.001
Group C-PP (n=28)	84.5 (sd 35.5)	105.2 (sd 12.2)	-20.7 [-34.2 to -7.3]	*T=3.2*	p=.004
Group I-Post (n=33)*		76.9 (sd 20.1)			
Group C-Post (n=33)		107.6 (sd 19.7)			

Paired Samples T-Tests. *Intervention

4.4.3.4 Comparison of pre and post-test HSS score differences between Group I-PP and Group C-PP

An independent sample t-test was used to compare the pre and post-test score differences (d) between Group I-PP (intervention group) and Group C-PP (control group)(Table 23). For stigma (M=-9.5, SD=8.2) and Group C-PP (control group) (M=-11.7, SD=17.9), disclosure (M= -1.1, SD=4.1) and Group C-PP (control group) (M=2.8, SD=8.1), self-image (M= -2.1, SD=3.5) and Group C-PP (control group) (M=7.3, SD=11.6), and public attitude (M= -6.4, SD=7.5) and Group C-PP (control

group) (M=10.9, SD=20.0). For the total HSS score (M= -11.7, SD=12.1) and Group C-PP (control group) (M=20.7, SD=34.7). There was significant HSS improvement in respondents following ACT intervention in all the sub-scale and total HSS scores.

Table 23: Comparison of HSS pre and post difference between the Group I-PP and Group C-PP (mean sd)

	Intervention Grp I-PP (n=33)	Control Group C-PP (n=28)	Test	p-value
Stigma	-9.5 (sd 8.2)	11.7 (sd 17.9)	*T*=5.8	P<.001
Disclosure	-1.1 (sd 4.1)	2.8 (sd 8.1)	*T*=2.8	P=.028
Self Image	-2.1 (sd 3.5)	7.3 (sd 11.6)	*T*=4.1	P<.001
Public Attitude	-6.4 (sd 7.5)	10.9 (sd 20.0)	*T*=4.7	P<.001
HSS total	-11.7 (sd 12.1)	20.7 (sd 34.7)	*T*=4.3	P<.001

Independent Samples T-Tests.

4.4.3.5 **Assessing for HSS pre-test sensitization**

The Intervention Group HSS scores were lower than the Control Group's (91.0 vs 106.6). To test for pre-test sensitization, a comparison of post-test HSS scores was done for groups with and without a pre-test. Groups without a pre-test had a significantly lower HSS score (105.3 vs 92.3). This was largely due to the high HSS score of Group C-Post (107.6) (Table 24).

Table 24: HSS pre-test sensitization

	Intervention M (SD)	**No Intervention M (SD)**	**Average score M (SD)**
Pre-test	105(sd 8.8)	105.5(sd 12.2)	105.3(10.4)
No Pre-test	76.9(sd 20.1)	107.6(sd 19.7)	92.3(25.1)
Average Score	91.0(21.0)	106.6(16.6)	

To further test for pre-test sensitization a 2x2 ANOVA with intervention and pre-test as factors was conducted on the post-test scores. The 2x2 ANOVA found a significant interaction between the intervention and pre-test factors (Intervention x Pre-test, F(1,123)=28.7, p<.001). A simple main effects analysis showed an interaction for both respondents with the intervention, (F(1,123) = 28.4, p <.001) and participants with no intervention (Table 25).Thus, the intervention is effective.

Table 25: Tests of Between-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	20830.003[a]	3	6943.334	26.803	<.001	.395
Intercept	1232210.940	1	1232210.940	4756.564	<.001	.975
Intervention	7354.934	1	7354.934	28.391	<.001	.188
Test	5352.008	1	5352.008	20.660	<.001	.144
intervention * Test	7440.736	1	7440.736	28.723	<.001	.189
Error	31863.745	123	259.055			
Total	1284781.000	127				
Corrected Total	52693.748	126				

R Squared = .395 (Adjusted R Squared = .381). Dependent Variable: PP_hss_total score

4.4.4 Prevention of Mother to Child Transmission of HIV Clinical Outcomes among pregnant women in South Western States of Nigeria

4.4.4.1 Comparison of pre-and post-test CD4 scores within groups

The CD_4 measurement within Group I-PP (intervention group) decreased by 13.2 [437.3 to 424.1]. Differences were found in the pre-and post-test counts of Group C-PP (control group) with a decrease of 31.8 [558.6 to 526.7]. Also, differences were found in the CD_4 counts of Group I-Post (intervention group) and Group C-Post (control group) with a difference of 49.6[578.4 and 528.4]. Though there were

decreases in both the intervention Group I-PP and the control Group C-PP from pre to post CD_4 counts I measurement, this was not significant (Table 26).

Table 26: Mean pre and post-test CD4 scores within group

Group	Pre-testCD_4 score(SD)	Post-test CD_4 score (SD)	Difference [95%CI]	T-test	p-value
Group I-PP (n=33)*	437.3 (sd 153.1)	424.1 (sd 197.4)	13.2 [-82.2-108.6]	*t=0.2*	p=0.780
Group C-PP (n=28)	558.6 (sd 231.1)	526.7 (sd 383.1)	31.8 [-119.1 to -182.7]	*t=0.4*	p=0.668
Group I-Post (n=33)*		578.4 (sd 230.9)			
Group C-Post (n=33)		528.8 (sd 218.2)			

Independent T-Test (*T*) *Intervention groups

4.4.4.2 **Comparison of CD4 scores differences between groups**

Comparing the pre- and post-test CD_4 score differences between Group I-PP (intervention group) 13.2(255.5) and Group C-PP (control group) 31.8(381.5), there was no significant improvement in CD_4 following ACT intervention (U=0.9, p=.385) (Table 27).

Table 27: CD4 pre and post difference between the Group I-PP and Group C-PP

	Intervention Grp I-PP (n=33)	Control Group C-PP (n=28)	Test	p-value
CD4 count	13.2 (sd 255.5)	31.8 (sd 381.5)	*U=0.9*	p=.385

Mann-Whitney (U)

On the average, the intervention group CD_4 counts were lower than control groups 501.3 (226.8) versus 527.6 (324.2), though not significant (T=0.3, p=.801) (Table 28). To test for pre-test sensitization, a comparison of post-test counts was done for groups with and without a pre-test. Groups without a pre-test had CD_4 counts of 559.8 (225.2) vs 472.8 (301.6), T=0.5, p=.604). No further testing was done (Table 28).

Table 28: Comparison of post-test scores

	Intervention	No Intervention	Average score
Pre-test	424.1 (sd197.4)	526.7 (sd 383.1)	472.8 (sd 301.6)
No Pre-test	578.4(sd 230.9)	528.8(sd 218.2)	559.8 (sd 225.2)
Average score	501.3 (sd 226.8)	527.6 (sd 324.2)	

4.4.5 Comparison of Post-service indicators

To assess the effect of ACT on service-related activities, the following variables were tested post intervention only: antiretroviral therapy, antenatal attendance visits, choice of delivery mode, attending PMTCT centres, infant feeding patterns and post-natal attendance among pregnant women attending PMTCT centres.

Table 29 shows the PMTCT outcomes among the respondents attending the four health centres studied in south western states of Nigeria. Significant differences were observed in some of the post-test service outcomes following ACT. Antiretroviral therapy visits were significant (K=57.4, p=<.001) with Group I-Post having the highest number of visits. The antenatal visits post service indicator was significant (K=35.2, p=<.001), the intervention groups had a higher number of antenatal visits than the control group. The highest proportion (87.9% in Group I-PP, 71.4% in Group C-PP, 87.9% in Group I-Post, and 66.7% in Group C-Post) of women delivered vaginally with 84.8%, 82.1%, 93.9% and 84.8% of the women in Groups I-PP, C-PP, I-Post, and C-Post respectively, reporting to have delivered at the hospital. Both the mode and place of delivery were not statistically significant.

The choice of infant feeding pattern was statistically significant (X^2 =31.7, p= <.001). Most (87.9%) of the respondents in Group I-PP gave infant formula to their baby compared to 21.4% in Group C-PP, 36.4% Group I-Post and 60.6% in Group C-Post.

A majority (99.1%) of the women's index child received immunization such as OPV $_{0,1,2}$, BCG and pentavalent vaccine in all the centres. One women in Group I-PP rejected immunization, though this was not statistically significant.No significant difference was observed in the paediatric HIV status even though two index children from a control centre tested positive.

Table 29: Prevention of Mother to Child Transmission of HIV outcomes among respondents in South Western states of Nigeria

	Group I-PP N=33 (%)	Group C-PP N=28 (%)	Group I-Post N=33 (%)	Group C-Post N=33 (%)	Total 127	Test	p-value
Antiretroviral visit							
Mean	2.03(.883)	2.57(.634)	3.97(1.262)	3.73(.801)	3.09(1.231)	57.4*	<.001
Antenatal visit							
Mean	4.09(.879)	3.05(.839)	4.52(.712)	3.04(1.098)	3.85(1.030)	35.2*	<.001
Mode of delivery							
Vaginal	29 (87.9)	20 (71.4)	29 (87.9)	22 (66.7)	100 (78.7)	7.1	.070
Caesarean section	4 (12.1)	8 (28.6)	4 (12.1)	11 (33.3)	27 (21.3)		
Place of delivery							
Hospital	28 (84.8)	23 (82.1)	31 (93.9)	28 (84.8)	110 (86.6)		
Mission house	4 (12.1)	1 (3.6)	2 (6.1)	2 (6.1)	9 (7.1)	7.9	.242
Home	1 (3.0)	4 (14.3)	0 (0.0)	3 (9.1)	8 (6.3)		
Choice of infant feeding pattern							
Exclusive breastfeeding	4 (12.1)	22 (78.9)	21 (63.6)	13 (39.4)	60 (47.2)	31.7	<.001
Formula	29 (87.9)	6 (21.4)	12 (36.4)	20 (60.6)	67 (52.8)		
Immunization status							
No immunization	1 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	2.7	.442
OPV0,1,2; BCG and Penta	32 (97.0)	28 (100.0)	33 (100.0)	33 (100.0)	126 (99.1)		
HIV STATUS							
Positive		2(7.7)					
Negative	27(100)	26(92.3)	33(100)	20(100)	106(100.0)	6.3	.099

*Kruskal wallis and chi-square

4.5 SUMMARY

This chapter presented the findings of the study on the outcome of Acceptance and Commitment therapy in the prevention of mother to child transmission of HIV among pregnant women living with HIV using mobile intervention. The study sought to answer two research questions: the effect of Acceptance and Commitment therapy on the mental health status, and service related activities among pregnant women attending PMTCT centres in South Western states of Nigeria. From the findings, these pregnant women living with HIV were predominantly young, married women, with a mean age of 31.6 years. Most were in monogamous marriages and most were employed.

It is worth noting that the psychological flexibility scores of the intervention groups were higher than control groups, though a pre-test sensitisation was observed. The intervention group's DASS and HSS scores were lower than the control groups also showing an improved effect of the intervention. Significant differences were observed in some of the post-test service outcomes following ACT at the PMTCT centres.

In chapter six, the key findings from the study in the context of the published literature in the field will be discussed.

CHAPTER 5: DISCUSSION

5.1 INTRODUCTION

The study sets out to strengthen the mental health status of pregnant women living with HIV and improve PMTCT outcomes in Nigeria through the introduction of Acceptance and Commitment therapy into the PMTCT program using mobile phones. To address this aim, the study set out to investigate two main objectives:

- to ascertain the effect of Acceptance and Commitment therapy (using mobile phones) on the mental health status of HIV in pregnant women attending PMTCT centres in the South-Western states of Nigeria and
- to evaluate the effect of Acceptance and Commitment therapy (using mobile phones) on depression, anxiety and stress in pregnant women attending PMTCT centres in the South Western states of Nigeria.

This chapter discusses the key findings from the investigation of these objectives in the context of the published literature in the field. This chapter specifically addresses the effect of the intervention on psychological flexibility, depression, stigma, selected service indicators and the possible confounders affecting the outcomes.

5.2 A PROFILE OF HIV POSITIVE WOMEN IN NIGERIA

Studies from sub-Saharan African countries provide some evidence on the sociodemographic characteristic profiles of pregnant women living with HIV. Though not the focus of this study, the sociodemographic profile of the pregnant women living with HIV in this study provides further information on these profiles in relation

to other similar studies ranging from 2003 to 2014 (Holtz et al., 2014; Owoaje, Omidokun and Ige, 2012; Myer et al., 2010; Homsy et al., 2009; Sagay et al., 2005; Kumar and Bent, 2003) and provides a context for the interpretation of the results.

Most of the respondents in all the facilities were in the age range of 30-34 years, with a mean of 31.6 years, which was slightly older than the ages from other studies of this group in Nigeria reported age ranges between 25-29 years (Owoaje, Omidokun and Ige, 2012; Kanki and Meloni,2008; Sagay, Kapiga, Imade, Sankale, Idoko, and Kanki, 2005). Almost all the respondents in this study were married with the majority engaging in a monogamous type of marriage like studies in sub-Saharan Africa which reported that pregnant HIV-positive women are predominantly married or cohabiting (Holtz, et al., 2014; Owoaje et al., 2012; Myer et al., 2010 and Homsy et al., 2009). This is contrary to Boerma, Gregson, Nyamukapa and Urassa (2003) hypothesis that young women tend to have sexual relationships with relatively older men who have been exposed to the risk of HIV for many years due to polygamy. However, it should be noted that significant differences were observed in the type of marriage in the separate groups in this study, with the pre-test groups having the lowest percentage in a monogamous relationship. The specific impact of this was not assessed due to the complex nature of causation.

Educational status revealed that most the respondents (69%) attained a secondary level of education. This is like the study by the Owoaje et al (2012) which also showed that nearly two thirds of the pregnant women (65.3%) in their study accessing antenatal clinic in a Primary Health Care centre in Nigeria had completed secondary education. The educational status of respondents was however in

contrast to the Mexican study by Holtz et al., (2014) where nearly two thirds (63%) of Mexican pregnant women living with HIV only attained a primary education.

Most the respondents in this study were self-employed. Significant differences were observed in the occupational status among the groups in line with Owoaje et al., (2012) study in Nigeria where almost all (98.7%) were employed with 56.2% engaging in skilled non-manual occupations. Nearly all the respondents belong to the Yoruba ethnic group as most of the pregnant women in south western Nigeria are Yoruba. Most the respondents preferred English language as a means of communication, this can be explained by high completion levels of secondary level of education. These findings might serve as important confounders that influenced some of the differences observed in the outcomes of the studies.

In considering respondent characteristics, the average number of years since diagnosis in our study was 3.3 years which was in line with that of the respondents in the Holtz et al. (2014) study where the mean length of time with HIV diagnosis was 3.4 years. There were significant differences between the groups as a significant difference was observed in the average number of years since diagnosis, with both Group I-PP and Group C-Post having a longer time of knowing their HIV status. Length of knowing a diagnosis may have had a confounding effect on psychological acceptance.

Though the average gravidity was 2.6 pregnancies in line with the mean parity of 2.6 pregnancies in the Holtz et al. (2014) Mexican study; contrary to the National Demographics and Health Survey (2013) report of 4.6 for the south-western Nigeria.

The mean gestational age of the current pregnancy was 23.2 weeks at enrolment in agreement with NDHS report of 2013 that documented ANC visit before their fourth month of pregnancy.

The mean CD_4 count in this sample at baseline of 499, reflected a clinically stable population, although HIV specific symptoms were not assessed. This is higher than the median CD_4 count of about 351 at delivery of women in Nigeria as reported by Kanki and Meloni (2008) in their APIN Plus/Harvard PEPFAR evaluation of PMTCT Program in Nigeria. Not enough information is available in terms of other studies to effectively compare this finding with other studies.

Most of the participants at pre-test indicated that they had disclosed their status to another person, with spouses being most commonly the person to whom they had disclosed, which is an indicator of acceptance. Client satisfaction with health status being linked to disclosure is supported by Jasseron et al., (2013) who hypothesized that non-disclosure of a pregnant woman's HIV status to her partner may predispose to suboptimal prevention of mother-to-child transmission. Client satisfaction differed among the groups with the satisfaction of health status for Group C-PP being significantly higher than for Group I-PP which was not hypothesized to be tested as part of the intervention. Lastly, a significant difference was reported between the two groups at pre-test on access to information on daily life needs, with Group I-PP having significantly less access than Group C-PP, which again could have influenced the outcomes of the study.

It is thus noted that though the demographics of the respondents were largely like other studies in Nigeria, the differences between the groups would have to be considered in the interpretation of the outcomes of the ACT intervention.

5.2.1 Demographic and clinical differences across intervention and control groups

There were some significant differences between the groups in the study which were a reflection of the different facilities. The facility differences can be explained by the nature of the uneven population distribution in Nigeria. There are thirty-six states and a Federal Capital Territory in Nigeria, out of which four states, largely urban, were used for this study.

A second factor that could have contributed to these differences among the groups was the specific nature of the randomly selected facilities and groups. Group C-PP and Group C-Post - both these facilities, though randomly selected, are incorporated under the AIDS Prevention Initiative in Nigeria (APIN Ltd) projects. APIN is a program funded by the Bill and Melinda Gates Foundation and implemented by the Harvard School of Public Health and the Fogarty AIDS International Training and Research Program (D43 TW001041-09). The APIN project provides research training and funding for study contributors and was established as a program of HSPH in 2000 with the Harvard PEPFAR (APIN Plus) Program 2004. APIN LLC was incorporated as a local NGO in 2007 to gradually assume HSPH's work in Nigeria. This was further compounded by site Group C-Post housing the Nigerian Institute of Medical Research (NIMR) which is based in Lagos, the capital of Nigeria and the economic focal point. Lagos has one of the highest standards of living in Nigeria and

has a vibrant social life. Similarly, Group C-PP is a tertiary health facility that houses two ART programs: one run by the Government of Nigeria and a second, operated by Harvard/APIN under PEPFAR. Although not a PEPFAR program, the Government of Nigeria ART clinic received PEPFAR funding. The facility attracts patients from some hospitals, non-governmental organizations and support groups throughout the country. Ibadan is the fourth largest state economy in Nigeria and the second largest non-oil state economy in Nigeria after Lagos state. Group C-PP is the oldest teaching and research centre in Nigeria and is a resource centre for primary and secondary health facilities throughout the country. It is a tertiary health facility affiliated to the University of Ibadan. The facility is one of the first 25 GON designated clinics and is receiving PEPFAR support through APIN/Harvard to treat HIV-patients. The hospital houses both GON and PEPFAR ART programs. Group I-PP is located in the capital city of Ondo State and the PMTCT program of Group I-PP is managed by the Equitable Health Access Initiative(EHAI), which is a sub-awardee to the Institute of Human Virology, Nigeria (IHVN) on the PEPFAR funded Centre for Disease Control and Prevention (CDC) 5 year (2012 – 2017) grant award GGH000925. Group I-Post is in one of the important cities in Ogun state and houses the state hospital. Group I-Post is composed of a mixed population who majorly speak the general Yoruba language, as opposed to the local dialect. The PMTCT program of the Group I- Post is also managed by the Equitable Health Access Initiative (EHAI). Though these four sites were randomly selected from the 11 possible facilities, these factors might affect the findings at the different sites. These socio-cultural differences have implications for HIV prevention service delivery and uptake in these different states.

5.3 EFFECTIVENESS OF ACCEPTANCE AND COMMITMENT THERAPY ON MENTAL HEALTH OUTCOMES

Mobile health interventions for health care consumers have been designed to increase healthy behaviour or improve disease outcome (Free et al., 2013). To measure the effectiveness of Acceptance and Commitment therapy (ACT) using mobile phones on mental health status. Three constructs of mental health status with different assessment tools were used, namely the AAQ-II for psychological flexibility, DASS for subjective mental health distress and HSS for perception of stigma. The effectiveness on each of these constructs is discussed separately.

5.3.1 The effect of ACT on psychological flexibility

A key finding from this study was a significant increase in psychological flexibility reported by the women following the ACT training and mobile messaging. The intervention groups' psychological flexibility scores were significantly higher than the control groups ($T = 3.4$, $p<.001$). Though further analysis revealed a significant interaction between the intervention and pre-test factors, this was linked to the psychological flexibility score of one of the control groups ($p<.001$) and the possible socio-cultural differences between the groups and the fact that the group is situated in a Medical Research institute might have influenced their exposure to other interventions.

This study is one of the first evaluations of the effectiveness of an intervention based on the theory of psychological flexibility to improve mental health outcomes of HIV-positive pregnant women as part of the PMTCT programs in Nigeria. Findings from the study showed that ACT was effective in increasing psychological flexibility.

5.3.2 The effect of ACT on depression, anxiety and stress in HIV positive women

As it was hypothesized that increased psychological flexibility might result in improved mental health, the study therefore also assessed the effect of ACT on psychological distress experiences such as depression, anxiety and stress.

Findings from this study revealed a link between ACT and depression thus we hypothesized that Acceptance and Commitment therapy (ACT) had beneficial effects on depressive symptoms, which corroborates the findings of earlier studies that showed that ACT is effective in reducing depression (Forman et al., 2007; Lappalainen et al., 2007). Findings from our study corroborate the theory on which ACT is built that low levels of psychological flexibility are a precursor for psychological distress and lead to high levels of psychological distress in reaction to various stressors (Carriochi et al., 2011; Biglan, Hayes and Pistorello, 2008) and that improvements in psychological flexibility are associated with reductions in psychological distress (Dalrymple and Herbert, 2007; Kocovski et al., 2009).

The DASS anxiety pre-test scores were not significantly different (p= .652), but a significant difference was observed in the DASS anxiety categories (p=.018). However, the study showed reduced levels of anxiety following ACT between all the groups. The Intervention groups DASS anxiety scores and categories were lower than control groups respectively (p=<.001). This finding is in line with the findings from Eifert and colleagues (2009) that showed positive pre- to post-treatment changes in ACT-relevant process measures (experiential avoidance, acceptance

and mindfulness skills), increases in quality of life, and significant reductions in anxiety and distress in individuals with differential anxiety disorder diagnoses. Forman and colleagues (2007) also documented that ACT yielded improved results in anxiety. Other studies have corroborated that there is a relationship between experiential avoidance and an observed increase in depression and anxiety (Hayes et al., 2006; Muris, Schmidt, Lambrichs and Meesters, 2001) and that ACT may be effective in managing HIV related anxiety symptoms.

The total stress scores were not significantly different between groups at baseline (p=.588) though a significant difference was observed in the DASS stress categories (X^2=12.0, p=.018). This study found significant pre- and post-test differences in DASS stress sub-scores following ACT between all the groups with the Intervention group DASS stress sub-scores being lower than control groups (p=<.001).

The DASS overall score was not significantly different between groups as a measure of psychosocial distress (depression, anxiety and stress), at baseline. Overall, this study found reduced levels of depressive symptoms (p=<.001), anxiety (p=<.001) and stress (p=<.001) following ACT between all the groups. These findings are in line with studies that showed that ACT is effective in substantially reducing depression, anxiety and other mood disturbances (Eifert et al., 2009; Forman et al., 2007; Lappalainen et al., 2007; Dalrymple and Herbert, 2007; Kocovski, Fleming and Rector, 2009). The DASS pre-test in testing has shown an effect on the intervention groups (p = <.001) and the groups with no intervention (p <.001) thus, concluding that it may have influence the overall finding that ACT is effective in reducing depression, anxiety and stress.

However, it should be noted that the overall DASS score differed significantly across the four groups (p=<.001) at post-test with the DASS scores being significantly lower among Intervention groups (5.9) in contrast to Control groups (36.6). It was noted that a significantly high DASS score was noted among Group C-PP participants at both pre (20.2) and post-test (57.8) compared to the other three groups. Generally in Nigeria there are lot of stigma associated with HIV infection and when complicated with mental health issues, it is regarded as a double tragedy. To avoid stigma and discrimination, people maintain a culture of silence (Nnamdi-Okagbue, 2009; Talam et al., 2008; Worku, 2007). There may be several reasons for the observed high DASS score among Group C-PP participants. One, the pregnant women accessing the Group C-PP site comes from an indigenous African community where HIV infection is regarded as a sign of promiscuity and there have been reported cases of marital disharmony, stigma, physical abuse and rejection from their spouse following HIV diagnosis (Nnamdi-Okagbue, 2009). Another possible explanation may be related to the therapeutic effect of having a mentored mother who is living with HIV to collect data at this site. Because the pregnant women were used to having her around, breaking ice at pre-test was easy and the pregnant women broke the culture of silence and verbalised their innate feelings. The pre-test had an effect on the DASS scores of both the intervention groups (p = <.001) and the groups with no intervention (p <.001), thus concluding that it may have influenced the overall findings, resulting in the recommendation that the findings on the DASS score must be interpreted with caution.

5.3.3 The effect of ACT on HSS stigma scores

Stigma in this study was measured using the constructs of personalised stigma, public attitude towards stigma and disclosure. In addition, the study provided data on the baseline experience of stigma and the effect of ACT on stigma.Holzemer et al. (2009) documented that perceived stigma is a significant psychological issue in HIV that often affects the severity of illness. Stigma and depression had been shown to have a negative influence on an individual's willingness to seek treatment for HIV and their adherence to therapy when receiving treatment (Aranda-Naranjo, 2004).

The pregnant women in this study experience personalised stigma, a significant difference was observed on the HSS stigma sub-scale at baseline between the groups (p<.001). This is in line with the different literature that had supported the link between HIV and stigma in several countries including Canada, Peru, and the United States (Ivanova et al., 2012; Zhou, 2007; Simbayi et al., 2007; Link and Phelan, 2006).Significant pre- and post-test differences were found in HSS stigma scores following ACT (p= <.001) with the Intervention group having lower post-test stigma scores than the control groups. This finding supports a Skinta, Lezama, Wells and Dilley (2014) study that evaluated an ACT-based group to address self-stigma related to HIV and hypothesized that ACT was effective in reducing HIV related stigma.

On the public attitude construct, the baseline ratings of the respondents revealed a high perceived public attitude related stigma in this population. This is in line with various literatures that documented HIV-related stigma as being severe in women and the fact that women experience higher rates of perceived public stigma

(Aggleton et al., 2005; Dos Santos et al., 2014; Swendeman et al., 2011). The perceptions of public attitudes related to stigma were not homogenous with the HSS public attitude pre-test scores between groups (p= <.001). Studies had identified perception of public attitude and stigma as barriers to utilization of PMTCT services and adherence to medication in HIV. Nnamdi-Okagbue (2009) findings revealed that 86% (n=88) of the HIV positive pregnant women indicated that they would not use the services if they were near their home. They cited that women were afraid of marital disharmony, stigma, physical abuse and rejection from their spouse for not accessing HIV testing and counselling services. According to Talam, Gatongi, Rotich and Kimaiyo (2008), they identified stigma (28.9%) as one of the factors affecting adherence to treatment with ARVs. Worku (2007) hypothesized that one of the barriers to utilisation of PMTCT services is stigma and observed that, “Of the 67 pregnant women who had expectation of having positive HIV test result, 23 (34.3%) were not willing to take the drug for PMTCT. The reason given was to avoid discrimination by the family.” Okonkwo et al., (2007) documented that 69.2% of their respondents answered that they would be discriminated against socially and/or culturally if they were known to be HIV positive.

This study observed a significant reduction in the HSS public attitude pre- and post-test scores in the intervention groups following ACT (p=<.001) with the control groups having a higher public attitude score than the intervention groups. Though there is a shortage of information on the effectiveness of ACT on public attitude perception, this study concluded that ACT is effective in influencing the Intervention groups’ perceptions of public attitude.

The respondents (pregnant HIV positive women) scored moderately in terms of the HSS disclosure score with differences between groups at baseline (p=< .001). This finding is similar to the disclosure scores in a study by Blessed and Ogbalu, (2013) among Nigerian men and women, where females were found to experience disclosure concerns with a mean score of 24.1.The post-test disclosure score as measured by the HSS scale were significantly different across all the groups (p= .028). The Intervention group HSS disclosure concern scores were lower than the control group leading to the conclusion that ACT may be effective in reducing disclosure concerns. This is one of the first studies that observe the effect of ACT in HIV disclosure. This finding is consistent with previous research among women with HIV who accepted their HIV status, and focused on living with their disease and caring for their families (Holtz and Sowell, 2012; Sowell et. al., 2013). Also, Delaney and O'Brien (2012) studied the role of acceptance in veterans living with HIV/AIDS. They found that acceptance was associated with an improved mental health functioning and hypothesized that social support can act as a buffer to negative psychological stressors (Bastardo and Kimberlin, 2000 and Vyavaharkar et al., 2011). Maman, Moodley, McNaughton-Reyes, Groves, Kagee and Moodley (2014) in their study among pregnant women receiving antenatal care HIV-positive women in Durban, South Africa found no significant differences in reported disclosure rates among women between intervention and control groups at 14 weeks postpartum though they did not use ACT.

The prevalence of stigma in HIV positive women in this study is moderate. The HSS overall score between the groups at baseline were significantly different between groups for all three constructs, namely: stigma (p=<.001), disclosure (p=<.001), self-image (p=<.001), public attitude (p=<.001), and the overall mean was (p= <.001).

These findings are in line with studies that documented stigma among HIV positive women. (Liu, Canada, Shi and Corrigan, 2012; Charles et al., 2012; Rao et al., 2012; Nattabi, et al., 2011; Palmer et al., 2011; Vlassoff and Ali, 2011; Zhou, 2007; Simbayi et al., 2007; Link and Phelan, 2006). This study found a reduced level of overall personal stigma (p=<.001), improved disclosure (p=.028), improved self-image (p=<.001) and perceived public attitude towards stiga (p=<.001) following ACT between all four groups. Findings from this study suggested that ACT may have an influence in reducing stigma.Lastly, it is important to note that there is limited research on how ACT has been applied in HIV and/or in stigma reduction (Ost, 2008; Pull, 2009). This study was one of the first evaluations to look at ACT in stigma among this population and findings from this study revealed that ACT is effective in reducing stigma. However,further researches can be done to substantiate this observed effectiveness.

5.4 TO EVALUATE THE EFFECT OF ACCEPTANCE AND COMMITMENT THERAPY HEALTH SERVICE OUTCOMES

The effect of ACT on health service outcomes were measured using six post intervention indicators namely, antiretroviral therapy visits, antenatal attendance, antiretroviral visit, infants feeding patterns, choice of delivery, and paediatric immunization among pregnant women attending PMTCT centres in South Western states of Nigeria.

5.4.1 ART visits

To measure the effect of ACT on antiretroviral therapy visits among pregnant women attending PMTCT centres in South Western states of Nigeria, the mean ART visits

among this population measured at post intervention was 3.1 which was higher than the mean ART medication visits of 2.2 at post intervention in a previous study by Holtz, et al. (2014). Though, gestation age at recruitment is an important determinant of the no of ANC visits and might have influenced this finding. One of the intervention groups had the highest number of antenatal visits compared to the control groups with significant differences observed in antiretroviral therapy visits between the group (p=<.001) following ACT.

Though no pre-measurement was done, the findings from this study contribute to the possible corroboration of evidence that support the effectiveness of mobile telephone text messages in contributing factors that may enhance adherence to ART as identified by Horvath et al. (2012). A study in Cape Town identified the key challenges to ART as denial of HIV diagnosis, fear of disclosure, and difficulties in accepting a lifelong commitment to treatment and suggested an increased level of acceptance of HIV status to improve adherence to ART (Stinson and Myer, 2012).

5.4.2 Antenatal visits

The impact of ACT on antenatal attendance among pregnant women attending PMTCT centres in South Western states of Nigeria was measured to be 3.9 after the intervention. This is more than the average number of visits of 2.6 post intervention as recorded by Deressa et al., (2014) in their study on utilization of PMTCT services and associated factors among pregnant women attending antenatal clinics in Addis Ababa, Ethiopia.

The antenatal visits post service indicator was significant where the intervention groups had a higher number of antenatal visits than the control group (p=<.001). This significance is in line with the 2013 National Demographics and Health Survey report that hypothesized that six in every ten women receive antenatal care (ANC) from a skilled provider and that most these women will make four or more ANC visits.

5.4.3 Other indicators

ACT effectiveness as an mHealth intervention

Documented evidence has established that mHealth can be used to rapidly assess and modify health-related behaviour and transform patients' decision-making about their health (Kumar, Nilsen, Pavel and Srivastava, 2013; World Health Organization, 2005). Examples of mHealth studies include mobile phone messages for adherence monitoring, reminders for clinic attendances and possible delivery of therapy or health education. Kunutsor, Walkey, Katabira, Muchino, Balidawa, Namagala and Ikoona (2010), in a cross- sectional prospective study conducted in Uganda, studied the use of mobile phones to improve clinic attendance in a rural setting. In the Uganda study, the results indicated that the total number of scheduled appointments recorded was 560, out of which 477 were on scheduled visits, while 62 (11% of appointments) were missed visits (Kunutsor, et al., 2010). Among the group that missed their visits, 49 (79%) of those who received reminders presented for treatment (Kunutsor, et al., 2010). The study reported the adherence levels to be significantly higher during the mobile phone intervention (Kunutsor, et al., 2010).

Chen and colleagues (2010), in their study, compared the efficacy of SMS and phone reminders in improving attendance at a health promotion centre in China. A total of 1,891 participants were randomly assigned into 3 groups (Chen, et al., 2010). The first group received SMS reminders and the second group received phone reminders, while the control group did not get any intervention (Chen, et al., 2010). The study participants were followed up for 2 months and results showed that SMS and phone reminders attendance rates were 87.5% and 88.3% respectively which were significantly higher than that of the controls 80.5% (Chen, et al., 2010).

However, there are several studies that have evaluated ACT delivered as an mHealth intervention, though not specifically for psychological flexibility in women with HIV. ACT had been delivered as a brief telephone intervention in a fidelity study for smoking cessation (Schimmel-Bristow, Bricker, and Comstock, 2012) and an Internet delivered therapy in Tinnitus distress (Hesser et al., 2012). A Finnish study compared individual CBT and ACT therapy among 28 participants living with depression/mood problems (Lappalainen et al., 2007). Results indicated positive results for both models in terms of improvement in psychopathological symptoms, depression, social functioning, mood and life satisfaction, and ACT clients showed better symptom improvement (Lappalainen et al., 2007). At post-treatment, ACT improved acceptance to a greater degree than CBT (Lappalainen et al., 2007). Dalryample and Herbert (2007) conducted a pilot study on the effectiveness of ACT for Generalised Social Anxiety Disorder with a sample of 19 individuals diagnosed with social anxiety. Analyses of the findings revealed no changes across a 4-week baseline control period, followed by significant improvements in symptoms and quality of life from pre-treatment to follow-up (Dalryample and Herbert, 2007).

Bohlmeijer et al. (2011) explored the efficacy of an early intervention based on ACT for adults with depressive symptomatology in an RCT (Bohlmeijer et al., 2011). The intervention resulted in a significant reduction in depressive symptomatology, anxiety and fatigue, and changes in depressive symptomatology were maintained at the three-month follow-up (Bohlmeijer et al., 2011). Importantly, the follow-up effects were mediated by an increase in participants' levels of acceptance (Bohlmeijer et al., 2011). Hayes, Boyd, and Sewell (2011) conducted a pilot study on ACT for the treatment of depression amongst adolescents clinically referred to a psychiatric outpatient setting. Study outcomes revealed that ACT participants showed significantly greater statistical improvement on depression measures (Hayes et al., 2011).

This study provides useful information for the use of ACT for psychological acceptance in pregnant women with HIV, though the study could have been improved by including a group that received ACT without messages being sent by mobile phone. This would have quantified the role of the mobile phone in the effectiveness of the intervention. This study has shown that ACT was effective for increased psychological flexibility which could lead to positive mental health promotion. The pregnant women demonstrated high psychological flexibility scores following ACT intervention which denotes acceptance. Acceptance involves an active willingness to acknowledge the cause of infection, experience unpleasant thoughts and emotions associated with the disease, and develop the disposition to incorporate health promoting behaviours into a daily routine. This corroborates the findings from previous studies that positive mental health is related to psychological flexibility (Baer, Smith, Hopkins, Krietemeyer, and Toney, 2006; Josefsson, Larsman,

Broberg, and Lundh, 2011), protects against the risk of mental illnesses (Keyes, Dhingra, and Simoes, 2010; Wood and Joseph, 2010), and emphasizes psychological flexibility to be a good predictor of emotional, physical and psychosocial functioning (McCracken, Vowles, and Zhao-O'Brien, 2010). One of the control groups also displayed elevated levels of experiential avoidance which affected their psychological flexibility scores. Studies had hypothesized that people with elevated levels of experiential avoidance (EA) tend to become easily overwhelmed by their problems, which can be an underlying predisposition for diverse psychopathology (Kashdan, Barrios, Forsyth and Steger, 2006).

5.5 SUMMARY OF THE CHAPTER

This chapter has reviewed the results of the present study in comparison with existing research evidence. Overall findings from this study concluded that ACT appears to have been effective in increasing psychological flexibility, decreasing psychosocial distress and decreasing the experience of stigma. However, the findings of this study should be considered in the light of the effect of the pre-test.

Key findings and recommendations will be set out in the next and concluding chapter of the study.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

The prevention of mother to child HIV transmission is an important key factor in the strategies to achieve the health-related Millennium goals. This study aimed to investigate the effect of ACT combined with mobile phone messaging on the prevention of mother to child HIV transmission though measuring the specific impact on ACT on mental health status and service related activities among pregnant women attending PMTCT centres in South Western states of Nigeria.

This chapter summarises the study's key findings and interpretations, the unique contributions of this study to knowledge of ACT, HIV and mHealth, and lastly conclusions from the findings on the use of ACT in the mental health and service indicators of pregnant women living with HIV. It also describes and discusses the recommendation implications of the key findings to knowledge, nursing clinical practice, education policy and program development, service provision and future research. The chapter concludes with limitations of the study and a conclusion to the study. This chapter is divided into three sections. The first section focuses on the key findings and contributions to knowledge. The second section outlines the recommendations based on the findings from the study. The last section outlines the limitations of the study and conclusion.

6.2 KEY FINDINGS

The study aimed to investigate the effect of Acceptance and Commitment therapy (using mobile phones) on the mental health status (psychological flexibility,

depression, anxiety, stress and stigma) and service related activities among pregnant women attending PMTCT centres in South Western states of Nigeria. The study had a number of key findings:

The first key finding from the study was the demonstrated effectiveness of ACT (using mobile phones) to improve the psychological flexibility of the pregnant women who were HIV positive. This increase in psychological flexibility remained once tested for the pretesting effect and after removing the effect of Group-CP. Increased psychological flexibility in this study denotes movement towards acceptance of HIV status among the pregnant women. Acceptance for pregnant women with HIV means the ability to accept the difficulty of living with HIV. Because of the learnt skill of cognitively defusing psychologically heightened experiences of HIV acceptance, these pregnant women may, over time, gain competence and autonomy in moving towards a committed action of managing HIV through the PMTCT services. This may bring about the acknowledgement that psychological flexibility nurtures a flexible approach to the HIV experiences of pregnant women and thus promotes good health and well-being.

The second key finding was the experience of stigma for the respondents. HIV stigma is still very prevalent in Nigeria and has been a longstanding problem in the history of HIV diagnosis and treatment (Nnamdi-Okagbue, 2009). Findings from this study confirm previous studies that people living with HIV/AIDS experience health-related stigma and discrimination which can lead to internalized guilt and blame for having HIV (Okonofua, 2012; NACA, 2012; Onyebuchi-Iwudibia and Brown, 2014). It was important to note that most of the women at pre-test indicated that they had disclosed their status to another person, with spouses being most commonly the

person they had disclosed to. By their disclosure of HIV status to spouse, the burden of living with HIV becomes shared among family. The high rate of HIV disclosure among these women even at pre-test can be linked to the fact that a majority are in a stable monogamous relationship which makes them feel secure enough to disclose the secret of their HIV diagnosis to their spouse. From the findings, we can conclude that there is a possible association between monogamous relationships and of women's disclosure of their HIV status.

The third finding from this study was that ACT (using mobile phones) can reduce the perception of various forms of stigma as experienced by pregnant women with HIV. Though this is one of the first evaluations on ACT and HIV disclosure, despite the fact that disclosure level of the pregnant women was high at pretest, an improvement in disclosure status following ACT was observed. Other studies had documented that disclosure of HIV status may lead to better physical and mental health outcomes and improved social support, as well as self-esteem (Zea et al, 2005; Stirratt, et al, 2006; Strachan et al. 2007; O'Cleirigh and Safren, 2008).

The fourth finding was the conclusion with some reservation that ACT (using mobile phones) may have had a beneficial effect on depression, anxiety and stress. Our study asserted that the incidence of mental health issues is common among pregnant women living with HIV irrespective of the time of diagnosis. This occurrence can be linked to the complex nature of HIV infection and the perceived stress related to the diagnosis (Dlamini et al., 2009; Delaney and O'Brien, 2012). These mental health issues are symptoms of ACT psychopathology shifting between experiential avoidance, cognitive fusion and dominance of conceptualised past and future of the ACT hexagon. The diagnosis of HIV initiates an anxiety response which

is a normal human emotion. A preoccupation with the thought of living with HIV comes with an accompanying struggle to avoid or get rid of the anxiety (Harris, 2008). The more importance that the pregnant woman places on avoiding anxiety, the greater her level of anxiety thus exacerbating the psychological suffering (Hayes, 2012; Harris, 2008). ACT teaches clients to learn to reduce the impact and influence of unwanted thoughts and feelings, through the effective use of mindfulness (Ciarrochi, Billich, and Godsell, 2010). Clients learn to stop fighting with their private experiences—to open up to them, develop an acceptance of unwanted private experiences which are out of one's personal control, and to make a commitment to, and actively live, a valued life despite their HIV, leading to better mental health outcomes (Delaney and O'Brien, 2012). From our findings, we have corroborate other studies to support consistent improvement on the DASS post ratings following ACT, though there are concerns about the validity of the DASS in these settings and the pre-testing effects.

The fifth key finding from this study was the significant differences between the intervention and control groups on the post-test service outcomes among the intervention groups following ACT (using mobile phones). Specifically, there were higher rates of antiretroviral therapy visits and antenatal visits among the intervention groups.

The choice of infant feeding patterns was also statistically significantly different between the intervention and control groups, though many of the pregnant women expressed their intention to practice complementary feeding using formula. Although infant formula feeding is the gold standard and promoted by PMTCT programs as the best and safest method to feed the infant, it is not easy to translate this into

practice under these circumstances. This maybe a reflection of acceptance of HIV status and improved psychological flexibility scores of the women. Acceptance promotes willingness by a process of contacting with the present HIV status. Despite the internal experience, acceptance may lead to guided committed actions.

6.3 UNIQUE CONTRIBUTIONS OF THIS STUDY

This study provided several unique contributions to the field of ACT (using mobile phone), mental health related to HIV and the use of rigorous techniques to evaluate outcomes in intervention research.

6.3.1 ACT delivery using mobile phones

This study adds unique information to the literature of the delivery of ACT using mobile phones thus contributing to the body of knowledge on mHealth. This study was driven by gaps in the existing empirical literature on mHealth to deliver psychological therapies and specifically to pregnant women living with HIV. As a contribution to knowledge, this study reviewed the literature related to Acceptance and Commitment therapy, telehealth, mental health and PMTCT and established what is currently known and what counts as knowledge in ACT and mental health discourse. This study added to the application of telehealth and PMTCT to ACT and mental health discourse and then set out to research the gap of information in the field. The subsequent findings from this study provide knowledge gained from the research which can be added to the existing information regarding the effect of using mobile phones to deliver psychological therapy such as ACT and the effect on the mental health of HIV-positive pregnant women.

This is one of the few studies that has looked at the application of telehealth and PMTCT to the ACT and mental health discourse. The ACT (using mobile phones) is a unique adaptation to the application of mhealth technology for the promotion of the mental health of these pregnant women not only to knowledge, but also to PMTCT practice of improving service uptake and achieving a high coverage of PMTCT services. This will further strengthen existing evidence that positive psychology can benefit from the use of mobile phone-based methodology.

6.3.2 ACT and the effect on mental health related to HIV

Secondly, the study provided a new perspective to the study of the use ACT (using mobile phones) in PMTCT and its implications for the mental health status and service related activities of these pregnant women. The study adds unique information to the literature of the effectiveness of ACT and thus contributes to the body of knowledge on ACT. This study was driven by gaps in the existing empirical literature on ACT and the effect on the mental health of pregnant women living with HIV.

Previous studies had focused on the use of ACT in reducing depression and anxiety, preventing stigma and improving the quality of life among persons with HIV/AIDs. As the aim of the study was to understand the effect of improved psychological flexibility through ACT on the mental health status and service related activities among pregnant women attending PMTCT centres in South Western states of Nigeria. A unique contribution of the finding is the scientific evidence that ACT successfully

improves psychological flexibility of pregnant women attending PCMTCT facilities. The psychological flexibility messages used were specifically designed to meet the mental health needs of patients living with HIV. Early identification and treatment of mental health related symptoms using ACT among this population will provide an opportunity for bridging the gap between science and practice.

This study also tried to shift focus to the issues related to psychopathology in HIV diagnosis and treatment regarding PMTCT services. The PMTCT service is the focal program for the treatment of HIV in pregnancy and the prevention of vertical transmission thus reducing the maternal and infant mortality rates in Nigeria. This is the first study in Nigeria to assess the application of ACT in PMTCT settings and is thus the first to provide the baseline information in this area of inquiry. Increased awareness to the potential vulnerabilities of this population in displaying depression and symptoms of anxiety and stress may prompt the screening of pregnant women for mental health related symptoms in PMTCT programs. Mental health screening will improve the assessment approach in PMTCT and may assist the integration of mental health services into PMTCT programs. The conceptual framework developed is a novel foundation for the development of mental health promotion theory in PMTCT services.

6.3.3 The use of rigorous techniques to evaluate outcomes in intervention research.

A final unique contribution to existing knowledge was the use of Solomon Four research design to evaluate this intervention. Empirical studies were reviewed and to the best of the researcher's knowledge this is an innovative approach to understanding the effect of Acceptance and Commitment therapy on the mental

health status and service related activities among pregnant women attending PMTCT centres. The use of Solomon Four experimental design also added a unique contribution to knowledge and evidence based practice. However, the lack of control of some site related factors might have affected the findings, so futher studies can be done to substantiate this report. To the best of the researcher's knowledge this is one of the few evaluations of DASS and HSS using this design.

6.4 RECOMMENDATIONS

Based on the findings of the study several recommendations are made on the implications for education, clinical practice, policy and management:

6.4.1 Clinical practice

- Based on the empirical data that Acceptance and Commitment therapy (using mobile phones) can improve the pregnant women's psychological flexibility, there is a need to explore the possibility of implementing ACT or a modified version of ACT into PMTCT programs as a routine support mechanism post diagnosis.

- The high rate of depression, anxiety and stress reported in the literature and confirmed in one of the control groups in the study suggests screening for psychosocial distress should be routine practice to identify people at risk of developing depression and to promote both physical and psychological well-being amongst HIV-positive pregnant women. Mental health screening will also improve the assessment approach in PMTCT programs.

- An active strategy to determine and manage perceptions of stigma in participants of the PMTCT program is recommended. This study documented the high rate of

stigma among this population and efforts to decrease the levels of stigma and discrimination are of key importance. The involvement of mental health nurses in pre- and post- HIV counselling and testing should be promoted for early identification and management of psychological disturbances, adding value to PMTCT services. Enlightenment campaigns should be promoted to create more awareness and understanding to reduce stigma and discrimination through partner, family and community education and awareness programs.

- It was noted that the most commonly preferred persons for disclosure of HIV status amongst this population are spouses. The inclusion of men in pre- and post-test counselling in PMTCT services will boost disclosure rate, as well as provide support for the women.

- Findings from this study substantiate existing evidences that PMTCT services can benefit from mobile health technologies use for a range of health-related activities in this setting.

6.4.2 Education

- There is the need for scaling up of care, support and treatment through capacity building and training of health workers in psychological intervention and mental health diagnosis and treatment to strengthen the PMTCT program systems.

- A second recommendation is the need to expose nursing students to psychological interventions which can be delivered by nurses. This could add value to existing Nursing curricula with a focus on strengthening interventions in the management of HIV in a range of health care settings.

6.4.3 Research

- There is a need for more studies to be conducted on the appropriate scales to measure psychiatric related symptoms and psychological digress in diverse cultures among this population. The inconsistent behaviour of the DASS in this population should be further examined.
- Further research needs to be conducted on measurement of psychological flexibility. Several studies have reported concerns about what the AAQ-II measures and this should be further examined.
- Research should be conducted to quantify the contribution of the use of a mobile phone to the intervention. Study designs should include enough power to measure complex interventions and thus require research arms with and without the mobile phone component.
- Studies which include both pre- and post-measurements of health service related outcomes should be done to quantify the effect of these interventions on these indicators.
- A further qualitative exploration of the experience of ACT and the use of mobile phones to deliver the ACT would be useful to provide a more contextually rich understanding of the experiences.

6.5 LIMITATIONS OF THE STUDY

There are several limitations in the study. Firstly, though all attempts were made to reduce bias, the study may have had suffered from unintended selection bias. Though the study included the random selection of the four major PMTCT centres in South Western states of Nigeria, the nature of these settings impacted on the findings and generalisations should be made with caution. It is believed that Group

C-Post could have significantly affected the findings due to additional interventions associated with a research service. A second selection bias may have occurred due to the focus only on the south western part of Nigeria where predominantly Yoruba speaking residents reside and therefore the results may not be generalized to other HIV-positive pregnant women from other areas in which cultures may differ.

Secondly, there may have been information bias as the assessment tools were designed for different population groups and needed further validation in this setting. The DASS was complex to complete for these pregnant women and most the women in this study answered NO to most of the questions under DASS except for one of the control groups where the data was collected by a mentored mother living with HIV. This coincides with a concern that the majority of the pregnant women were not able express their intense feelings and hidden pains to the research assistant at pre-test due to a culture of silence due to the fear of stigmatization and discrimination. The use of AAQ-II as a tool was to measure the six core processes of psychological flexibility as described by Bond et al., (2011) but it was noted that the measure does not include subscales, making it difficult to examine the six core processes in relation to other constructs. Also, some studies have questioned the appropriateness of the AAQ-II as a measure of psychological flexibility due to its strong association with measures of psychological well-being.

Thirdly, there may have been a comparison bias and the effects of confounding were not anticipated and were difficult to address. The research design of Solomon four used with two of the groups dealt with the effect of pretesting, but the study design did not include any premeasurement of some service outcomes like CD_4 count.

Similarly, the non-inclusion of an intervention group without mobile phone (ACT alone) left no room for comparison between the ACT alone group and mobile phone with ACT.

Lastly, the use of text messaging to deliver the complex ACT messages was not monitored and may not have been ideal. A text message is limited to only 160 characters. This presents a challenge in the level of detail that can be sent in a single message. Also, the use of simple phones by some of the participants made a communication link difficult. No monitoring of actual messages, whether participants received, opened or read the messages were conducted making it difficult to conclude with confidence which component contributed to the intervention outcomes.

6.6 CONCLUSION

In conclusion it can be stated that this study has generated some insight into the effect that ACT has on the mental health status and service related activities among pregnant women attending PMTCT centres in South Western states of Nigeria. The burden of HIV among pregnant women has many implications not only on the unborn child and the family, but also its impact on the health system, the community, and society at large. This study provides some research-based evidence that ACT can potentially improve maternal mental health outcomes and the prevention of mother to child transmission of HIV outcomes among the pregnant women in the south western part of Nigeria.

REFERENCES

Aaron, E., Bonacquisti, A., Geller, P.A and Polansky, M. Perinatal Depression and Anxiety in Women with and without Human Immunodeficiency Virus Infection *Women's Health Issues* 25-5 (2015) 579-585

Abaynew, Y., Deribew, A., and Deribe, K. Factors associated with late presentation to HIV/AIDS care in South Wollo Zone Ethiopia: A case control study. *AIDS Research and Therapy*, 2011:*8*(1), 8.

Abrams, E., Myer, L., Rosenfield, A. and El-Sadr, W. (2007) Prevention of mother-to-child transmission services as a gateway to family based HIV care and treatment in resource-limited settings: rationale and international experiences. *American Journal of Obstetrics and Gynaecology* 2007:197(3) (supplement 1), pp. 101–106.

Adewuya, A.O., Afolabi, M.O., Ola, B.A., Ogundele, O.A., Ajibare, A.O., Oladipo, B.F., and Fakande,I Relationship between depression and quality of life in persons with HIV infection in Nigeria. *International Journal of Psychiatry in Medicine,* 2008:*38,* 43-51.

Adeyi, S. and Ademo,J. (Eds.) 2006 'AIDS in Nigeria: A nation on the threshold*'. Chapter 2: The epidemiology of HIV/AIDS in Nigeria*. Massachusetts: Harvard Center for Population and Development Studies

Aggleton, P., Wood, K., Malcolm, A., and Parker, R. (2005).*HIV-related stigma discrimination and human rights violations: Case studies of successful programs*. USAID publications

Ahmed, M.A., Gagnon, M., Hamelin-Brabant, L., Mbemba, G.I, and Alami, H. A mixed methods systematic review of success factors of mhealth and telehealth for maternal health in Sub-Saharan Africa, *mHealth* 2017; 3:22

Anglewicz, P. and Chintsanya, J. (2011).Disclosure of HIV status between spouses in rural Malawi. *AIDS Care, March 9* 1–8.

Aranda-Naranjo, B. (2004). Quality of life in the HIV-positive patient: Implications and consequences. *Journal of the Association of Nurses in Aids Care*, 15(5 Suppl.), 20S-27S.

Arch, J. J., Eifert, G. H., Davies, C., Vilardaga, J. C. P., Rose, R. D., and Craske, M. G. Randomized clinical trial of cognitive behavioral therapy (CBT) versus acceptance and commitment therapy (ACT) for mixed anxiety disorders. *Journal of Consulting and Clinical Psychology,* 2012:80(5), 750-765.

Awofala, A.A. and Ogundele, O.E. HIV epidemiology in Nigeria. *Saudi Journal of Biological Sciences* (2016), http://dx.doi.org/10.1016/ j.sjbs.2016.03.006

Audet, C. M., McGowan, C. C., Wallston, K. A., and Kipp, A. M. Relationship between HIV stigma and self-isolation among people living with HIV in Tennessee.*PloS One,* 2013:8(8), e69564.

Babbie, E and Mouton, J. 2001.The practice of social research. Cape Town: Oxford University Press.

Bach, P., and Moran, D. (2008). *ACT in practice: Case conceptualization in Acceptance and Commitment Therapy*. Oakland, CA: New Harbinger.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., Toney, L. Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 2006:13, 27-45.

Baoliang Zhong, M.D (2009) How to Calculate Sample Size in Randomized Controlled Trial? (2nd Ed) Sydney: Psychology Foundation

Barnes, D., and Roche, B. Relational frame theory and the experimental analysis of human sexuality.*Applied and Preventive Psychology,* 1997:6, 117-135.

Bastardo,Y.M and Kimberlin, C.L Relationship between quality of life, social support and disease-related factors in HIV-infected persons in Venezuela. *AIDS Care.* 2000 Oct;12(5):673-84.

Berger, B. E., Carol E. Ferrans, and Felissa R. Lashley. "Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale," *Research in Nursing and Health* 2001:24, 518–529.

Bernatsky S. , Souza R., and De Jong, K. Mental health in HIV-positive pregnant women: results from Angola. *AIDS Care*. 2007 May;19(5):674-6.

Biglan, A., Hayes, S. C., and Pistorello, J. Acceptance and commitment: implications for prevention science. *Prevention Science,*2008: 9*,* 139-152.

Blessed, N.O and Ogbalu, A.I. Experience of HIV-related stigma by people living with HIV / AIDS (PLWHA), based on gender: A case of PLWHA attending clinic in the Federal Medical Center , Owerri ,. 2013;5(November):435–9.

Boerma, J.T, Gregson, S, Nyamukapa, C. and Urassa, M. Understanding the uneven spread of HIV within Africa: comparative study of biologic, behavioral, and contextual factors in rural populations in Tanzania and Zimbabwe. *Sex Transm Dis* 2003;30, 779–87

Bohlmeijer, E. T., Fledderus, M., Rokx, T. A. J. J., and Pieterse, M. E.Efficacy of an early intervention based on acceptance and commitment therapy for adults with depressive symptomatology: Evaluation in a randomized controlled trial. *Behaviour Research and Therapy,* 2011:49(1), 62-67

Bonacquisti A, Geller P.A and Aaron E. Rates and predictors of prenatal depression in women living with and without HIV. *AIDS Care*. 2014;26(1):100–6.

Brink, P.J., and Wood, M.J. (Eds.).(1989). Advanced Design in Nursing Research. Newbury Park, CA: Sage Publications.

Brown, L.K ,Lourie, K.J and Pao, M. Children and Adolescents Living with HIV and AIDS: A Review J. Child Psychol. *Psychiatry.* 2000:Vol. 41, No. 1, pp. 81-96, 2000 Cambridge University Press

Bryant, A. S., Leighty, R. M., Shen, X., Read, J. S., Brouwers, P., Turpin, D. B. and Tuomala, R. E. Predictors of repeat pregnancy among HIV-1-infected women.*Journal of Acquired Immune Deficiency Syndromes*,2007: *44*(1), 87-92.

Burns, N and Grove, S.K. (2005). The practice of nursing research: conduct, critique and utilization. 5th edition. St. Louis, Missouri: Elsevier Saunders.

Burns, S.N and Grove, S.K. (2003) Understanding nursing research.3rd edition. Philadelphia: Saunders pp195

Burtt, K. Nurses use telehealth to address rural health care needs, prevents hospitalizations. *American Nurse* 1997:29. 6: 21-25.

Bwirire L, Fitzgerald M, Zachariah R, Chikafa V, Massaquoi M, Moens M, Kamoto K, and Schouten E. Reasons for loss to follow-up among mothers registered in prevention-of mother-to-child transmission program in rural Malawi. *Trans R Soc Trop* Med 2008:102, 1195-1200.

Campbell, C., Scott, K., Madanhire, C., Nyamukapa, C., and Gregson, S. A 'good hospital': Nurse and patient perceptions of good clinical care for HIV-positive people on antiretroviral treatment in rural Zimbabwe — a mixed-methods qualitative study. *International Journal of Nursing Studies*, 2011:48(2), 175-183.

Charles, B., Jeyaseelan, L., Pandian, A.K., Sam, A.E., Thenmozhi, M. and Jeyaseelan, V. Association between stigma, depression and quality of life of people living with HIV/AIDS (PLHA) in South India A community based cross-sectional study, *BMC Public Health*, 2012:12, 463.

Chavance, B. (2004) *The uncertainties of the great enlargement. Central and Baltic Europe in European integration* , Paris, L'Harmattan, coll. "Eastern Europe" p 284

Chawla, N. and Ostafin, B. Experiential avoidance as a functional dimensional approach to psychopathology: an empirical review.*Journal of Clinical Psychology.* 2007: Sep. 63(9), 871-90.

Chen, Z., Fang, L., Chen, L and Dai, H. Comparison of an SMS text messaging and phone reminder to improve attendance at a health promotion center: A randomized controlled trial *Journal of Zhejiang Univ. Sci. B* 2008: 9*:* Number 1, Page 34

Ciambrone, D. Illness and other assaults on self: The relative impact of HIV/AIDS on women's lives. Sociology of Health and Illness,2001: 23(4), 517-540.

Ciarrochi, J., Billich, L., and Godsell, C. (2010).*Psychological flexibility as a mechanism of change in acceptance and commitment therapy.* In R. Baer (Ed.), Assessing mindfulness and acceptance processes in clients: Illuminating the theory and practice of change (pp. 51-75). Oakland, CA: Context Press/New Harbinger Publications.

Ciesla, J. A., and Roberts, J. E. Meta-analysis of the relationship between HIV infection and risk for depressive disorders. *American Journal of Psychiatry*, 2001:158(5), 725-730.

Clough, B.A and Casey, L.M. Technological adjuncts to increase adherence to therapy: a review. Clin *Psychol Rev.* 2011;31(5):697–710.

Cohen, D.A, and Scribner, R. An STD/HIV prevention intervention framework *AIDS Patient Care STD* 2000:14: 37-45.

Cohen, L. Manion, L. and Morrison, K. (2007).Research methods in education 6th edition. London: Routledge. pp9

Cole-Lewis H, Kershaw T. Text messaging as a tool for behavior change in disease prevention and management. *Epidemiologic Reviews 2010*; 32(1): 56-69.

Collins, P.Y., Holmand, A.R., Freemane, M.C and Patelf, V. What is the relevance of mental health to HIV/AIDS care and treatment programs in developing countries? A systematic review. *AIDS.* 2006 August 1; 20(12): 1571–1582

Commission on information and accountability for Women's and Children's Health (2004) keeping promises measuring objectives http://www.who.int/topics/millennium_development_goals/ accountability_commission/en/.

Commission on information and accountability for Women's and Children's Health (2011) Working Group on Accountability for Results final Paper http://www.who.int/topics/ millennium_ development_ goals/ accountability_commission/en/.

Crepaz, N., and Marks, G.Serostatus disclosure, sexual communication and safer sex in HIV-positive men.*AIDS Care,* 2003: 13 , 379–387.

Creswell, J. W. (2009). *Research design: qualitative, quantitative, and mixed methods approaches*. Los Angeles, Sage.

Dalrymple, K. L., and Herbert, J. D. Acceptance and commitment therapy for generalized social anxiety disorder: A pilot study. *Behavior Modification, 2007:31*(5), 543-568.

Davis S. Clinical sequelae affecting quality of life in the HIV infected patient. J Assoc Nurses AIDS Care. 2004; 15(5):S28–33.

De Vos, A.S., Strydom, H. Fouche, C.B and Delport, C.S.L(2011) Research at Grassroots for Social sciences and Human Sciences professions. (Fourth edition) Pretoria: Van SchaikPublishers,p152-153).

Delaney, E., and O'Brien, W. H. The association between Acceptance and Mental Health while Living with HIV. *Social Work in Mental Health*, 2012:10(3), 253-266.

Delost, M., & Nadder, T. Guidelines for Initiating a Research Agenda: Research Design and Dissemination of Results. Clinical Laboratory Science, (2014). 27(4), 237.

Deressa, W., Seme, A, Asefa, A, Teshome, G. and Enqusellassie F. Utilization of PMTCT services and associated factors among pregnant women attending antenatal clinics in Addis Ababa, Ethiopia. *BMC Pregnancy Childbirth.* 2014 Sep 19;14: 328.

Dlamini, P.S, Kohi, T.W., Uys, L.R, Phetlhu, R.D, Chirwa, M.L, Naidoo, J.R, Holzemer, W.L, Greeff, M.and Makoae, L.N. Verbal and physical abuse and neglect as manifestation of HIV/AIDS stigma in five African countries. *Public Health Nurs* 2007: 24(5),389–399.

Dole, N., Savitz, D.A, Hertz-Picciotto, I, Siega-Riz, A.M, McMahon, M.J, Buekens, P. Maternal stress and preterm birth.*Am J Epidemiology* 2003, 157:14-24.

Dos Santos,M.L. , Kruger, P., Mellors, S.E, Wolvaardt, G. and Ryst, E. Exploratory survey measuring stigma and discrimination experienced by people living with HIV/AIDS in South Africa: the People Living with HIV Stigma Index *BMC Public Health* 2014, 14:80 Pg 1-13

Dufau, S., Dunabeitia, J. A., Moret-Tatay, C., McGonigal, A., Peeters, D., et al. (2011). Smart phone, smart science: How the use of smartphones can revolutionize research in cognitive science. *PLoS ONE,* 2011:6, e24974.

Duff, P., Kipp,W.,Wild,T.C., Rubaale,T.,and Okech-Ojony, J. Barriers to accessing highly active antiretroviral therapy by HIV-positive women attending an antenatal clinic in a regional hospital in western Uganda. *Journal of the International AIDS Society*, 2010: 37.

Ehrenreich B, Righter B, Rocke DA, Dixon L and Himelhoch SAre mobile phones and handheld computers being used to enhance delivery of psychiatric treatment?: a systematic review. *J Nerv Ment Dis* .(2011) 199(11):886–891

Eifert, G. H., Forsyth, J. P., Arch, J. A., Espejo, E., Keller, M., and Langer, D. Acceptance and Commitment Therapy for Anxiety Disorders: Three Case Studies Exemplifying a Unified Treatment Protocol. *Cognitive and Behavioral Practice,* 2009:16, 368-385.

Falola, T., and Heaton, M. M. (2008). *A history of Nigeria*. Cambridge, UK ; New York: Cambridge University Press.

Federal Ministry of Health (2010) *National guidelines for prevention of Mother-To-Child Transmission of HIV (PMTCT)* Federal Ministry of Health. Abuja. Nigeria.

Federal Ministry of Health (2010).*Technical Report on the 2010 National HIV Sentinel Survey among pregnant Women attending Antenatal Clinics in Nigeria*. http://www.nigeriaaids.org/ documents/ 2010_National%20HIV%20Sero%20Prevalence %20Sentinel%20Survey.pdf

Feros,D.L Lane,L. Joseph Ciarrochi,J. and Blackledge, J.T Acceptance and Commitment Therapy (ACT) for improving the lives of cancer patients: a preliminary study *Psycho-Oncology* 2013; 22: 459–464 (2013)

Fletcher, L., and Hayes, S. C. (2005).Relational Frame Theory, Acceptance and Commitment Therapy, and a functional analytic definition of mindfulness. *Journal of Rational-Emotive and Cognitive-Behavioral Therapy, 23*(4), 315-336.

Folke, F., Parling, T., and Melin, L. Acceptance and commitment therapy for depression: A preliminary randomized clinical trial for unemployed on long-term sick leave. *Cognitive and Behavioral Practice,* 2012:19(4), 583-594.

Forman, E. M., Herbert, J. D., Moitra, E., Yeomans, P. D., and Geller, P. A.A randomized controlled effectiveness trial of acceptance and commitment therapy and cognitive therapy for anxiety and depression. *Behavior Modification,*2007: 31(6), 772-799.

Fowler, M.G. Further evidence that exclusive breastfeeding reduces mother to child HIV transmission compared with mixed feeding. *PLoS med* 2008:5,e63

Fox-Wasylyshyn, S.M and El-Masri, M.M. Handling missing data in self-report measures.*Res Nurs Health*. 2005 : Dec;28(6),488-95.

Free C, Phillips G, Galli L, Watson L, Felix L, Edwards P, Patel V, Haines A. The Effectiveness of Mobile-Health Technology-Based Health Behaviour Change or Disease Management Interventions for Health Care Consumers: A Systematic Review. *PLoS Med* 2013;10(1)

Futterman,D.,Shea,J.,Besser,M.,Stafford,S.,Desmond,K., Comulada, W. S. and Greco, E. (2010). Mamekhaya: A pilot study combining a cognitive-behavioral intervention and mentor mothers with PMTCT services in South Africa. *AIDS Care*, 22(9), 1093-1100.

Gaudiano B.A and Herbert J.D. Acute treatment of inpatients with psychotic symptoms using Acceptance and Commitment Therapy. B*ehav Res Ther* 2006; 44:415–4370.

Ghys,P.D., Bouey, P. ,Yekeye, R. , Erkkola,T. , Padayachy, J. and Low-Beer, D Monitoring the AIDS Response: How Can Lessons from the Pre2015 Era Inform Monitoring Progress Towards Ending the AIDS Epidemic by 2030? *AIDS Behav* (2017) 21:S1–S4

Global AIDS Response Progress Reporting. Geneva: Joint United Nations Program on HIV/AIDS; 2014

Harris, R. (2008). *The happiness trap*. New York: Shambala.

Hayes S. C., and Strosahl, K. D. (2004).*A practical guide to Acceptance and Commitment Therapy.* New York: Springer.

Hayes, L., Boyd, C. P., and Sewell, J. Acceptance and commitment therapy for the treatment of adolescent depression: A pilot study in a psychiatric outpatient setting. *Mindfulness,* 2011:2(2), 86-94.

Hayes, S .C. (1993).Analytic goals and the varieties of scientific contextualism. In S. C. Hayes, L. J. Hayes, H. W. Reese, and T. R. Sarbin (Eds.), *Varieties of scientific contextualism* (pp. 11-27). Reno: Context Press.

Hayes, S .C. and Hayes, L.J. (1989) The verbal action of the listener as a basis for rule –governance. In S. Hayes(ed), *Rule – governed behaviour: Cognition, Contingencies and instructional control* (pp 153-190) New York: Plenum Press.

Hayes, S. (2009) Acceptance and commitment therapy (ACT) www.contextual psychology .org/act.

Hayes, S. C. (1993) Analytic goals and the varieties of scientific contextualism. In S. C. Hayes, L. J. Hayes, H. W. Reese, and T. R. Sarbin (Eds.), *Varieties of scientific contextualism* (pp. 11-27). Reno, NV: Context Press.

Hayes, S. C. (2004). Acceptance and Commitment Therapy and the new behavior therapies: Mindfulness, acceptance and relationship. In S. C. Hayes, V. M. Follette, and M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive behavioral tradition* (pp. 1-29). New York: Guilford.

Hayes, S. C. Making sense of spirituality. *Behaviorism,* 1984:12, 99–110.

Hayes, S. C., and Smith, S. (2005). *Get out of your mind and into your life: The new Acceptance and Commitment Therapy.* Oakland, CA: New Harbinger.

Hayes, S. C., Barnes-Holmes, D., and Roche, B. (Eds.). (2001). *Relational Frame Theory: A post-Skinnerian account of human language and cognition.* New York: Kluwer Academic/Plenum.

Hayes, S. C., K. D. Strosahl, and K. G. Wilson. (2012) *Acceptance and Commitment Therapy: The Process and Practice of Mindful Change*. New York: Guilford Press

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., and Lillis, J. Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy*,2006: 44(1), 1-25.

Hayes, S. C., Strosahl, K. D., Wilson, K. G., Bissett, R. T., Pistorello, J., Toarmino, D., Polusny, M. A., et al. Measuring experiential avoidance: A preliminary test of a working model. *Psychological Record*, 2004:54, 553–578.

Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., and Strosahl, K. Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology, 1996:64,* 1152-1168.

Hayes, S.C, Strosahl, K.D and Wilson, K.G Acceptance and Commitment Therapy: An Experiential Approach to Behavior Change.in Dempsey, J. 2014 Self-editing and self-knowledge https://fictiontherapist.com/2014/04/14/self-editing-and-self-knowledge/

Henning, E, Van Rensburg, and Smit G. T 2004.*Finding Your Way in Qualitative Research.* Hatfield: Van Schaik

Heron, K. and Smyth, J. Ecological momentary interventions: incorporating mobile technology into psychosocial and health behaviour treatments. *Br J Health Psychol* 2010 15:1–39

Hernández-López, M., Luciano, C. M., Bricker, J B, Roales-Nieto, J. G., andMontesinos, F. Acceptance and commitment therapy for smoking cessation: a preliminary study of its effectiveness in comparison with cognitive behavioral therapy. *Psychology of addictive behaviours*, 2009:*23*(4), 723-30.

Hesser, H., Gustafsson, T., Lundén, Henrikson, O., Fattahi, K., Johnsson, E., Westin, V. Z., Carlbring, P., Mäki-Torkko, E., and Andersson, G.A randomized controlled trial of internet-delivered cognitive behavior therapy and acceptance and commitment therapy in the treatment of tinnitus.*Journal of Consulting and Clinical Psychology,* 80, 649-661

Holtz, C., and Sowell, R. L. (2012).Oaxacan women with HIV/ AIDS: Resiliency in the face of poverty, stigma, and social isolation. *Women and Health,* 2012:52(6), 517-535.

Holtz, C., Sowell, R. L.VanBrackle, L.Velasquez,G. and Hernandez-Alonso,V. A Quantitative Study of Factors Influencing Quality of Life in Rural Mexican Women *Journal of the Association of Nurses in AIDS Care,* 2014:25(6), 517-535

Holzemer, W.L and Uys, L..Managing AIDS stigma. *Journal of Social Aspects of HIV/AIDS*.2004;1(3):165–175

Holzemer,W.L., Human,S., Arudo,J., Rosa,M.E., Hamilton, M. J., Corles, I., and Maryland, M. Exploring HIV stigma and quality of life for persons living with HIV infection. *Journal of the Association of Nurses in AIDS Care*, 2009:20(3), 161-168

Homsy, J et al. intentions and outcomes among women on antiretroviral therapy in rural Uganda: A prospective cohort study. *Plos One*.2009: 4(1),41-49.

Horvath, T., Azman, H, Kennedy, G.E, and Rutherford, G.W. Mobile phone text messaging for promoting adherence to antiretroviral therapy in patients with HIV infection. *Cochrane Database Syst Rev.* 2012;3

Hubert, K.W, Hubert, E.H and Obyerodhyambo, O. Comparing HIV-related symbolic stigma in six African countries: social representations in young people's narratives. *SocSci Med* 2011, 73(8):1257–1265.

Huck, S. W., and Sandler, H. M. A note on the Solomon 4-Group Design: Appropriate statistical analyses. *Journal of Experimental Education*, 1973:42(2), 54-55.

Iheanacho,T., Obiefune,M., Ezeanolue, C.O., Ogedegbe,G., Nwanyanwu,O.C., Ehiri,J.E. Ohaeri,J. , Echezona E. and Ezeanolue,E.E. Integrating mental health screening into routine community maternal and child health activity: experience from Prevention of Mother-to-child HIV transmission (PMTCT) trial in Nigeria. *Soc Psychiatry Psychiatr Epidemiol* (2015) 50:489–495

Istepanian, R., and Lacal, J. (2003). Emerging Mobile Communication Technologies for Health: Some Imperative notes on m-Health. In IEEE (Ed.) The 25th Silver Anniversary International Conference of the IEEE Engineering in Medicine and Biology Society. Cancun Mexico: IEEE.

Ivanova, E.L ,Hart, T.A. ,Wagner,A.N. ,Aljassem, K. and Loutfy, M.A Correlates of Anxiety in Women Living with HIV of Reproductive Age *AIDS Behav* (2012) 16:2181–2191.

Jasseron, C., Mandelbrot, L., Dollfus, C., Trocmé, N., Tubiana, R., Teglas, J. P. Trocme, N. Non-disclosure of a pregnant woman's HIV status to her partner is associated with non-optimal prevention of mother-to-child transmission .*AIDS and Behavior*, (2013).*17*(2), 488–497.

Josefsson, T., Larsman, P., Broberg, A. G., and Lundh, L.G. Self-reported mindfulness mediates the relation between meditation experience and psychological wellbeing. *Mindfulness*, (2011). 2, 49-58.

Joseph, S. and Wood, A. Assessment of positive functioning in clinical psychology: theoretical and practical issues. *Clin Psychol Rev.* 2010 Nov;30(7):830-8.

Joubert, G and Ehrlich, R.(2007) *Epidemiology – A research manual for South Africa* (2nd edition). Cape Town:Oxford. University Press.

Kagee, A. and Martin, L., 2010. Symptoms of depression and anxiety among a sample of South African patients living with HIV. *AIDS Care,* 22(2), pp.159–165

Kahn, J. G., Yang, J. S., & Kahn, J. S. (2010). 'Mobile' health needs and opportunities in developing countries. *Health Affairs*, 29(2), 252-258.

Kanki ,P and Meloni ,S (2008) APIN Plus/Harvard PEPFAR: Evaluation of PMTCT Program

Kapetanovic,S ., Dass-Brailsford,P. , Nora,D & Talisman, N. Mental Health of HIV-Seropositive Women during Pregnancy and Postpartum Period: A Comprehensive Literature Review *AIDS Behav* (2014) 18:1152–1173

Kaplan S, and Garrett K. The use of logic models by community based initiatives. Evaluation and Program Planning. 2005;28:167–172.

Kashdan, T. B., Barrios, V., Forsyth, J. P., and Steger, M. F. Experiential avoidance as a generalized psychological vulnerability: Comparisons with coping and emotion regulation strategies. *Behaviour Research and Therapy*, (2006). *9*, 1301– 1320.

Kellogg W.K. Foundation. Using logic models to bring together planning, evaluation and action: logic model development guide. 2004.

Keyes, C. L. M., Dhingra, S. S., and Simoes, E. J. Change in level of positive mental health as a predictor of future risk of mental illness. *American Journal of Public Health*, (2010). 100, 2366-2371.

Kinyanda, E . Weiss, H.A , Levin, A. , Nakasujja, N. , Birabwa, H. Nakku,J., Mpango, R., Grosskurth,H. , Seedat,S. ,Araya, R. and Patel, V. Incidence and Persistence of Major Depressive Disorder among People Living with HIV in Uganda. *AIDS and Behavior*, June 2017, Volume 21, Issue 6, pp 1641–1654

Kocovski, N. L., Fleming, J., and Rector, N.A. Mindfulness and acceptance-based group therapy for social anxiety disorder: An open trial. *Cognitive and Behavioral Practice,* (2009). *16,* 276-289.

Kuhn, L., Aldrovardi, G., Sinkala, M., et al. High uptake of exclusive breastfeeding and reduced early postnatal HIV transmission: prospective results from the Zambia study. PLoS ONE; (2007). 2: 1361-1371.

Kumar, A and Bent, V, Characteristics of HIV-infected childbearing women in Barbados.*Rev PanamSaludPublica/Pan Am J Public Health*. (2003). 13(1),1-9.

Kumar, S., Nilsen, W., Pavel, M, and Srivastava, M. Mobile health: revolutionizing healthcare through trans-disciplinary research.Computer. 2013;46(1):28–35.

Kunutsor, S., Walkey, J., Katabira, E., Muchino, S., Balidawa, H., Namagala, E. and Ikoona, E. Clinic Adherence for Medication Refills and Medication Adherence among an Antiretroviral Treatment Cohort in Uganda: A prospective Study. *AIDS Research and Treatment.* (2010).

Kwalombota, M. The effect of pregnancy in HIV-infected women. *AIDS Care, (2002).14,* 431-433.

Lappalainen, R., Lehtonen, T., Skarp, E., Taubert, E., Ojanen, M., and Hayes, S. C. The impact of CBT and ACT models using psychology trainee therapists: A preliminary controlled effectiveness trial. *Behavior Modification,* (2007). *31*(4), 488-511.

Letteney, S., and LaPorte, H. H. Deconstructing stigma: Perceptions of HIV-seropositive mothers and their disclosure to children. *Social Work in Health Care,* (2002): *38* , 105–123.

Levine, A.B, Aaron, E.Z. and Criniti, S.M. Screening for depression in pregnant women with HIV infection. *J Reprod Med*.2008; 53(5):352–6.

Liamputtong, P., and Kitisriworapan, S. Deviance, difference and stigma as social determinants of health. In P. Liamputtong, R. Fanany, and G. Verrinder (Eds.), *Health, illness and well- being: Perspectives and social determinants* (2012):(pp. 242–256). Melbourne: Oxford University Press.

Link, B. G., and Phelan, J. C. Stigma and its public health implications. *Lancet,* (2006) *36* , 528–529.

Liu, Y., Canada, K., Shi, K., and Corrigan, P. HIV-related stigma acting as predictors of unemployment of people living with HIV/AIDS.*AIDS Care*, (2012). 24, 129-135.

Lovibond, S. H., and Lovibond, P. F. (1995).*Manual for the depression anxiety stress scales (2nd ed.).* Sydney: Psychology Foundation.

Luoma, J. B., Hayes, S. C., and Walser, R. (2007).*Learning ACT.*Oakland, CA: New Harbinger.

Ly, K.H., Dahl, J, Carlbring, P and Andersson, G: *Development and initial evaluation of a smartphone application based on acceptance and commitment therapy.*Springerplus.2012, 1: 11-10.

Maartens, G., Celum, C and Lewin, S. HIV infection: epidemiology, pathogenesis, treatment, and prevention *The Lancet*, Volume 384, Issue 9948, 20–26 September 2014, Pages 1098

Maman S, Moodley D, McNaughton-Reyes H.L, Groves A.K, Kagee A, Moodley P. Efficacy of enhanced HIV counseling for risk reduction during pregnancy and in the postpartum period: a randomized controlled trial. *PLoS One*. 2014;9(5):e97092

Manikkam L and Burns J.K. Antenatal depression and its risk factors: an urban prevalence study in KwaZulu-Natal. *S Afr Med J*.2012;102(12):940–4.

Markanday, S., Data-Franco, J., Dyson, L., Murrant, S., Arbuckle, C., McGillvray, J., and Berk, M. (2012). Acceptance and commitment therapy for treatment-resistant depression. *Australian and New Zealand Journal of Psychiatry, 46*(12), 1198-1199.

Mfusi SK and Mahabeer, M. Psychosocial adjustment of pregnant women infected with HIV/AIDS in South Africa. *J Psychol Afr.* 2000;10(2):122–45.

Millar, A., Simeone, R.S., and Carnevale, J.T. Logic models: A systems tool for performance management. Evaluation and Program Planning, 2001). 24, 73-81

Miller, G.The smartphone psychology manifesto. *Perspectives on Psychological Science,* (2012). *7*(3), 221–237.

Mokoae, L.N, Greeff M, Phethu R.D, Uys L.R, Naidoo, Kohi, T.W, Dlamini, P.S Chirwa M.L and Holzemer, W.L . Coping with HIV/AIDS stigma in five African countries. *J Assoc Nurses AIDS Care* 2008, 19(2):137–146.

Morrison, M.F., Petitto, J.M., Ten Have, T., Gettes, D.R., Chiappini, M.S., Weber, A.L. … Evans, D. L. Depressive and anxiety disorders in women with HIV infection. *American Journal of Psychiatry,* (2002). 159, 789-796.

Muris, P., Schmidt, H., Lambrichs, R. and Meesters, C. Protective and vulnerability factors of depression in normal adolescents. *Behav Res Ther. 2001*;39:555–565.

Myer ,L., Carter, R.J, Katyal, M, Toro P, El-Sadr, W.M, and Abrams, E. J Impact of Antiretroviral Therapy on Incidence of Pregnancy among HIV-Infected Women in Sub-Saharan Africa: A Cohort Study. PLoS Med (2010) 7(2): 229.

NACA (2015) 'End of Term Desk Review Report of the 2010-2015 National HIV/AIDS Strategic Plan' http://naca.gov.ng

NACA (2015) 'Nigeria GARPR 2015' http://naca.gov.ng

NARHS (2012) Nigeria National HIV and AIDS and Reproductive Health Survey (NARHS Plus II) 2012.

National Agency for the Control of AIDS (2011) Factsheet 2011: Women, Girls and HIV in Nigeria. http://naca.gov.ng

National Agency for the Control of AIDS (2012) Global AIDS response: Nigeria GARPR report http://naca.gov.ng

National Population Commission [Nigeria] and ICF International. 2014. *Nigeria Demographic and Health Survey* 2013. Rockville, Maryland, USA: National Population Commission and ICF International.

National Population Commission 2006 Census. Federal Republic of Nigeria Official Gazette. (2007).94(24):175-198.

Nattabi, B., Li, J., Thompson, S.C., Orach, C.G., and Earnest, J. Factors associated with perceived stigma among people living with HIV/AIDS in post-conflict northern Uganda. *AIDS Education and Prevention*. (2011). 23(3):193-205.

Nigeria National Agency for the Control of AIDS (2015) 'Country Progress Report 2015'

Nnamdi-Okagbue, U. R. An investigation into the factors affecting the utilization of mother to child tramission services by human immuno-deficiency virus positive women in Onitsha, Anambra State Nigeria. Master of Public Health, University of South Africa, 2009.

Okonofua, F. Prioritizing the prevention of HIV/AIDS in African women: A call for action: *African Journal of Reproductive Health* 2012 Sep; 16(3):9-13.

Olsen M.E, Lodwick D.G, Dunlop R.E (1992) Viewing the world ecologically. San Francisco: Westview Press.

Onyebuchi-Iwudibia, O. and Brown, A. HIV and depression in Eastern Nigeria: the role of HIV-related stigma. *AIDS Care.* 2014;26(5):653-7.

Owoaje, E.T, Omidokun, A.D and Ige, O.K. Knowledge and perception of Prevention of Mother to Child services amongst pregnant women accessing antenatal clinic in a Primary Health Care Centre in Nigeria. *Afr J Prm Health Care Fam Med.* 2012; 4(1), 432-439.

Palmer, A.K, Duncan, K.C, Ayalew,B., Zhang, W, Tzemis, D, Lima, V.D and Hogg,R.S. "The way I see it": the effect of stigma and depression on self-perceived body image among HIV-positive individuals on treatment in British Columbia. Canada *AIDS Care.* 2011 Nov;23(11):1456-66.

Parks, A., Della Porta, M., Pierce, R. S., Zilca, R., and Lyubomirsky, S. Pursuing happiness in everyday life: The characteristics and behaviors of online happiness seekers. *Emotion,* (2012). *12*(6), 1222–1234.

Pence, B. W. The impact of mental health and traumatic life experiences on antiretroviral treatment outcomes for people living with HIV/AIDS. *Journal of Antimicrobial Chemotherapy*, (2009) *63*(4), 636–640.

Polit, D. F., and Beck, C. (2011). Nursing Research: Generating and Assessing Evidence for Nursing Practice (9th ed.). Philadelphia: Lippincott.

Polit, D. F., and Beck, C. T. (2008). *Nursing research: Generating and assessing evidence for nursing practice* (8th ed.). Philadelphia: Wolters Kluwer Health/lippincott Williams and Wilkins.

Pull, C. Current empirical status of acceptance and commitment therapy. *Current Opinion in Psychiatry*, (2009). 22, 55-60.

Rao, D., Angell, B., Lam, C., and Corrigan, P. Stigma in the workplace: employer attitudes about people with HIV in Beijing, Hong Kong, and Chicago. *SocSci Med,* (2008). 67(10), 1541-1549.

Rao, D., Chen, W.-T., Pearson, C. R., Simoni, J. M., Fredriksen-Goldsen, K., Nelson, K.,Zhao, H. and Zhang, F. Social Support Mediates the Relationship between HIV Stigma and Depression/Quality of Life among People Living with HIV in Beijing, China. *International Journal of STD and AIDS*, (2012). *23*(7), 481–484.

Reynolds,N.A, Satyanarayana,V. , Duggal, M. , Varghese,M., Liberti,L. , Singh, P., Ranganathan,M. , Jeon, S. and Chandra, P.S. MAHILA: a protocol for evaluating a nurse delivered mHealth intervention for women with HIV and psychosocial risk factors in India. *BMC Health Services Research* (2016) 16:352

Roemer L. and Orsillo SM. An open trial of an acceptance-based behavior therapy for generalized anxiety disorder. Behavior Therapy. 2007;38:72–85.

Ross, R., Sawatphanit, W., and Zeller, R. Depressive Symptoms Among HIV-Positive Pregnant Women in Thailand *Journal of Nursing Scholarship;* Fourth Quarter 2009 ; 41(4) ProQuest Central pg. 344- 350

Ross, L. E., & McLean, L. M. (2006). Anxiety disorders during pregnancy and the postpartum period: A systematic review. *Journal of Clinical Psychiatry*, 67(8), 1285–1298.

Ruiz, F. J. A Review of Acceptance and Commitment Therapy (ACT) Empirical Evidence: Correlational, Experimental Psychopathology, Component and Outcome Studies. *International Journal of Psychology and Psychological Therapy*, (2010). *10*(1), 125-162.

Sagay, A.S. Kapiga, S.H. Imade, G.E Sankale, J.L.Idoko, J. and Kanki, P. HIV infection among pregnant women in Jos, Plateau State, Nigeria. *International Journal of Gynaecology and Obstetrics* (2005) 90, 61—67

Schimmel-Bristow, A., Bricker, J. B., and Comstock, B. Can acceptance and commitment therapy be delivered with fidelity as a brief intervention? *Addictive Behaviours*, (2012). 37.517-520.

Shamu S, Zarowsky C, Shefer T, Temmerman M, Abrahams N. Intimate partner violence after disclosure of HIV test results among pregnant women in Harare, Zimbabwe. *PLoS One*. 2014;9(10).

Sherman, P. (2007). *Stigma ,mental illness , and culture*. http://www.scribd.com/doc/11731670/ The-Stigma-of-Mental-Illness

Sherr, L. Vertical transmission of HIV: Pregnancy and infant issues. In: Rohleder P., Swartz L., Kalichman S. C., Simbayi L. C., editors. *HIV/AIDS in South Africa 25 years on*. New York: Springer; 2009. pp. 193–199.

Shittu, R.O, Issa, B.A, Olanrewaju, G.T, Mahmoud, A.O, Odeigah, L.O, Salami, A.K and Aderibigbe, S.A. Prevalence and Correlates of Depressive Disorders among People Living with HIV/AIDS, in North Central Nigeria.*J AIDS Clin Res* (2013) 4(11) : 251.

Simbayi, L. C., Kalichman, S., Strebel, A., Cloete, A., Henda, N., and Mqeketo, A. (2007). Internalized stigma, discrimination, and depression among men and women living with HIV/ AIDS in Cape Town, South Africa.

Simoni, J. M., Huang, B., Goodry, E. J., and Montoya, H. D. Social support and depressive symptomatology among HIV-positive women: The mediating role of self-esteem and mastery. *Women and Health,* (2007). *4* , 1–15.

Sin, N.L and Lyubomirsky, S. Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: a practice-friendly meta-analysis*. J Clin Psychol.* 2009; 65:467–487.

Skinta, M. D., Lezama, M., Wells, G. and Dilley, J. W. Acceptance and compassion-based group therapy to reduce HIV stigma. *Cognitive and Behavioral Practice,* (2015).*22*, 481-490.

Smith Fawzi, M.C., Kaaya, S.F., Mbwambo, J., Msamanga, G.L, Antelman, G., Wei, R., et al. Multivitamin supplementation in HIV-positive pregnant women: Impact on depression and quality of life in a resource-poor setting. *HIV Medicine,* (2015). *8,* 203-212.

Sousa, L., Ribeiro, C., and Rodrigues, S. Intervention with Multi-Problem Poor Clients: Toward A Strengths-Focused Perspective. *Journal of Social Work Practice*, (2006). 20(2), 189-204.

Sowell, R. L., and Phillips, K. D.(2010). Understanding and responding to HIV/AIDS stigma and disclosure: An international challenge for mental health nurses. *Issues in Mental Health Nursing,* (2006). *31* , 394–402.

Sowell, R. L., Holtz, C., VanBrackle, L., Velasquez, G., and Hernandez-Alonso, V. Depression in HIV-infected women: Implications for mental health services. *Online Journal of Medicine and Medical Science Research*, (2013). 2(1), 6-12.

Steward, W. T., Herek, G. M., Ramakrishna, J., Bharat, S., Chandy, S., Wrubel, J., et al. HIV-related stigma: Adapting a theoretical framework for use in India. *Social Science and Medicine,* (2008). *67* (8), 1225–1235.

Stewart,R.C, Umar,E. ,Gleadow-Ware, S. ,Creed,F. and Bristow, K. Perinatal distress and depression in Malawi: an exploratory qualitative study of stressors, supports and symptoms *Arch Womens Ment Health* (2015) 18:177–185

Stinson, K. and Myer, L African Barriers to initiating antiretroviral therapy during pregnancy: a qualitative study of women attending services in Cape Town, South Africa. *Journal of AIDS Research* 2012, 11(1): 65–73

Stirratt, M. J., Remien, R. H., Smith, A., Copelan, Q. O., Dolezal, C., and Krieger, D. The role of HIV serostatus disclosure in antiretroviral medication adherence. *AIDS and Behaviour,* (2006). *10* , 483–493.

Stoneburner, R.L. and Low-Beer, D. Sexual partner reductions explain human immunodeficiency virus declines in Uganda: comparative analyses of HIV and behavioural data in Uganda, Kenya,Malawi, and Zambia. *Int J Epidemiol*. 2004: 33, 624.

Strachan, E. D., Bennett, W. R. M., Russo, J., and Roy-Byrne, P. P. (2007). Disclosure of HIV status and sexual orientation independently predicts increased absolute CD4 cell counts over time for psychiatric patients. *Psychosomatic Medicine, 69*, 74–80.

Stuart, G. W., and Laraia, M. T. (2005).Principles and practice of psychiatric nursing. (8th ed.). St. Louis: Mosby.

Sumari-de Boer, I. M., Sprangers, M. A., Prins, J. M., and Nieuwkerk, P. T. HIV stigma and depressive symptoms are related to adherence and virological response to antiretroviral treatment among immigrant and indigenous HIV infected patients. *AIDS and Behavior,* (2012). *16*(6), 1681-1689.

Swendeman, D., Rotheram-Borus, M. J., Comulada, S., Weiss, R., and Ramos, M. E. Predictors of HIV-related stigma among young people living with HIV. *Health Psychology*, (2006). *25*(4), 501-509.

Talam, N. C., Gatongi, P., Rotich, J., and Kimaiyo, S. Factors affecting antiretroviral drug adherence among HIV/AIDS adult patients attending HIV/AIDS clinic at Moi Teaching and Referral Hospital, Eldoret, Kenya.*East Afr J Public Health*, (2008). 5(2), 74-78.

Terre Blanche, M, Durrheim, K and Painter, D (eds) (2006) Research in practice: Applied methods for the social sciences, 2nd edition. Cape Town: UCT Press.

Terre Blanche, M.J and Durrheim, K 1999: Research in practice: applied methods for the social sciences. Cape Town: University of Cape Town Press.

Thomas, F. (2006). Stigma, fatigue and social breakdown: Exploring the impacts of HIV/AIDS on patient and carer well-being in the Caprivi Region, Namibia. *Social Science and Medicine, 63* , 3174–3187.

Tountas, Y. The historical origins of the basic concepts of health promotion and education: the role of ancient Greek philosophy and medicine *Health Promotion International*, 2009 Vol. 24 No. 2 pp185 -192

Twohig, M. P. (2009). Acceptance and Commitment Therapy for Treatment-Resistant Posttraumatic Stress Disorder: A Case Study. *Cognitive and Behavioral Practice, 16*(3), 243-252.

Twohig, M. P. (2012). Special issue: The basics of acceptance and commitment therapy – introduction. *Cognitive and Behavioral Practice*, 19, 499-507.

UNAIDS (2016) 'Prevention Gap Report' Geneva, Switzerland: UNAIDS.

UNICEF (2010). Nigeria: Prevention of Mother-to-Child Transmission http://www.unicef.org/aids/files/ Nigeria_PMTCTFactsheet_2010.pdf.

United Nations Program on HIV and AIDS (2003).Women's Experiences with HIV Sero disclosure in Africa. Author

United Nations Program on HIV and AIDS (2010) UNAIDS report on the global AIDS epidemic' Geneva, Switzerland: UNAIDS.

United Nations Program on HIV and AIDS (2011) The Joint United Nations Program on HIV/AIDS.HIV Vaccine Research in West Africa*.http://www.gaiavaccine.org/* 2011

United Nations Program on HIV and AIDS (2011). 2011 United Nations General Assembly *Political Declaration on HIV/AIDS: Targets and elimination commitments.* Geneva.

United Nations Program on HIV and AIDS (UNAIDS). 2014 Global fact sheet. Geneva: Author.

United Nations Program on HIV and AIDS (UNAIDS). (2002*). Keeping the promise: Summary of the Declaration of commitment on HIV/AIDS*. Geneva: Author.

United Nations Program on HIV and AIDS (UNAIDS). (2014), The Gap Report. Geneva: Author.

United Nations Program on HIV and AIDS UNAIDS/WHO/UNICEF (2008).*Children and AIDS*: Second stocktaking report. Author

United Nations Program on HIV and AIDS. *General Assembly on Political Declaration on HIV and AIDS. 2011: Intensifying our efforts to eliminate HIV and AIDS* (extract from resolution adopted) (2011). www.unaids.org/unitednationsdeclarationsandgoals/2011

United Nations Program on HIV and AIDS. Global report: UNAIDS report on the global AIDS epidemic 2013 (2013).

United Nations Program on HIV and AIDS.Global plan towards the elimination of new HIV infections among children by, and keeping their mothers alive. Geneva: UNAIDS; 2015. p. 2011.http://www.zero-hiv.org/

Varga, C. and Brookes, H. Factors influencing teen mothers' enrollment and participation in prevention of mother-to-child HIV transmission services in Limpopo Province, South Africa. Qual Health Res. 2008;18:786–802 .

Veehof, M. M., Oskam, M.-J., Schreurs, K. M. G., and Bohlmeijer, E. T. Acceptance-based interventions for the treatment of chronic pain: A systematic review and meta-analysis (2011). *Pain*, *152*(3), 533-542.

Vlassoff, C and Ali, F. HIV-related stigma among South Asians in Toronto, *Ethnicity and Health*, PMID (2011): 21259140

Villar-Loubet, O. M., Illa, L., Echenique, M., Cook, R., Messick, B., Duthely, L. M., . Potter, J. (2014). Prenatal and mental health care among trauma-exposed, HIV-infected, pregnant women in the United States. *Journal of the Association of Nurses in AIDS Care*, 25(1 Suppl), S50–S61.

Weaver, K. and Olson, J.K. Understanding paradigms used for nursing research. Journal of Advanced Nursing (2006), 53 (4), 459-469.

Wetherell, J. L., Afari, N., Ayers, C. R., Stoddard, J. A., Ruberg, J., Sorrell, J. T., . . . Patterson, T. L. Acceptance and Commitment Therapy for generalized anxiety disorder in older adults: A preliminary report. *Behaviour Therapy* (2011)*, 42*(1), 127-134.

WHO, UNICEF, UNAIDS. Children and AIDS: Second stocking report, Washington D.C. www. Unaids/pub/Report/2008/childaidsstockingreport_en_pdf (2008).

WHO. WHO/UNICEF/UNFPA/UNAIDS: HIV and infant feeding: Guidelines for decision makers. Geneva, Switzerland, World Health Organization (2003).

Wilson KG, Sandoz EK, Kitchens J, Roberts ME. The Valued Living Questionnaire: Defining and measuring valued action within a behavioral framework. *The Psychological Record.*2010;60:249–272.

Wilson, K. G., andDuFrene, T. *Mindfulness for two: An acceptance and commitment therapy approach to mindfulness in psychotherapy* (2009)*.* Oakland, CA: New Harbinger

Worku, G and Enquselassie, F. Factors determining acceptance of voluntary HIV counseling and testing among pregnant women attending antenatal clinic at army hospitals in Addis Ababa. *Ethiop Med J.* 2007 Jan;45(1):1–8.

World Health Organization (WHO), UNAIDS and UNICEF *Towards Universal Access: Scaling-up Priority HIV/AIDS Interventions in the Health Sector* (2010)*.* Progress Report ; 2009. p. 2009.

World Health Organization European Ministerial Conference on Mental Health.Facing the Challenges, Building Solutions. Helsinki, Finland, 12–15 January 2005

World Health Organization *PMTCT strategic vision 2010–2015: preventing mother-to-child transmission of HIV to reach the UNGASS and Millennium Development Goals* (2010). World Health Organization, http://www.who.int

World Health Organization World Health Organization /UNAIDS/UNICEF .Scaling up priority HIV/AIDS interventions in the health (2009) sector: Author.

World Health Organization. HIV/AIDS and mental health: Report by the secretariat. 2008. 124: 4.3 Available from: http://apps.who.int/gb/ebwha/pdf_files/EB124/B124_6-en.pdf.

Yelland,J., Sutherlan,G. ,and Brown, S.J., Postpartum anxiety, depression and social health: findings from a population-based survey of Australian women *BMC Public Health* 2010, 10:771

Zea, M. C., Reisen, C. A., Poppen, P. J., Bianchi, F. T., and Echeverry, J. J. Disclosure of HIV status and psychological well-being among Latino gay and bisexual men.*AIDS and Behaviour* (2005)*, 9* , 15–26.

Zettle, R D. *ACT for Depression.A clinician's guide to using acceptance and commitment therapy in treating depression*. Oakland: New Harbinger Publications, Inc (2007).

Zhou, Y. R.. "If you get AIDS… You have to endure it alone": Understanding the social constructions of HIV/AIDS in China. *Social Science and Medicine* (2007)*, 65*, 284–295.

APPENDICES

CONSENT FORM (APPENDIX I)

TITLE OF RESEARCH PROJECT: ACCEPTANCE AND COMMITMENT THERAPY IN THE PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV PROGRAM AMONG PREGNANT WOMEN LIVING WITH HIV IN SOUTH WEST STATES OF NIGERIA

This study is being conducted by Adeyinka Ishola, a PhD student in the School of Nursing, University of Western Cape. This research is aimed at introducing Acceptance and Commitment therapy (ACT) into PMTCT program with the aim of promoting the mental health status of pregnant women and ultimately improving PMTCT outcome in Nigeria. This research is strictly for academic purpose; your participation is entirely voluntary, after making an informed decision. The information given will be treated with utmost confidentiality, hence you need not write your name or address. There is no risk associated with your participation or non-participation in this study. You have a choice to choose whether to participate or not to participate and you may withdraw from the study without giving a reason at any time and there will be no adverse consequence. This study has been described to me in a language that I understands and I freely and voluntarily agree to participate.

Participant's Name ……

Participant's Signature ……

Date ……

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Researcher
Adeyinka Ganiyat Ishola
School of Nursing,
Faculty of Community and Health Sciences:
University of the Western Cape
Private Bag X17,Bellville 7535, South Africa
Email:adeyinkaishola2004@yahoo.com

Research Supervisor
Professor Oluyinka Adejumo
School of Nursing,
Faculty of Community and Health Sciences:
University of the Western Cape
Private Bag X17,Bellville 7535,South Africa.

APPENDIX II
QUESTIONAIRE

SECTION A: DEMOGRAPHIC DATA OF RESPONDENTS

1.Unique Identifier No----------

2. Age in Years: ----------

3. Parity----------

4. Gestational Age in weeks ---------- (ii) Expected date of delivery ----------

6. Education: No formal education [ ] Primary education [ ] Secondary [ ] Tertiary [ ] Others: _____

7. Marital Status: Married [ ] Never Married [ ] Widowed [ ] Separated/divorced [ ]

8. Type of Marriage: Monogamous [ ] Polygamous[ ]

9. Occupation: Civil servant [ ] Self employed [ ] Unemployed [ ] Pls specify specific occupation……..

10. Religion: Christianity [ ] Islam [ ] Traditional [ ] Others (Specify) _____

11. Present CD $_4$ Count: _____

12. Year of diagnosis…….

13. No of deliveries after diagnosis……..

14. Is anyone close to you positive to HIV virus? Yes [ ] No [ ] If yes (specify) ……

15. Have you disclosed your HIV status to anyone? Yes [ ] No [ ]

a.) If yes, Specify relationship with you and Phone no…….

b.) If No, Why ……

16. Personal Phone number ----------

17. Preferred time of the day for health messages ----------

18. Preferred language for communication of health information. English [ ] Yoruba [ ]

19. Do you have access to information that you need in your day-to-day life? Yes [ ] No [ ]

20. Are you satisfied with your health status? Yes [ ] No [ ]

SECTION B MENTAL HEALTH STATUS AND PSYCHOLOGICAL FLEXIBILITY
Acceptance and Action Questionnaire II (AAQ-II). Please answer the question below

No	Items	Never true (1)	Rarely true (2)	Sometimes butinfrequently true (3)	Neutral (4)	Sometimes true (5)	Usually true (6)	Always true (7)
1	It's OK if I remember something unpleasant.							
2	My painful experiences and memories make it difficult for me to live a life that I would value.							
3	I'm afraid of my feelings.							
4	I worry about not being able to control my worries and feelings.							
5	My painful memories prevent me from having a fulfilling life.							
6	I am in control of my life.							
7	Emotions cause problems in my life							
8	It seems like most people are handling their lives better than I am.							
9	Worries get in the way of my success							
10	My thoughts and feelings do not get in the way of how I want to live my life.							

Depression anxiety Stress Scales (DASS)

Lovibond, S.H. and Lovibond, P.F. (1995). Manual for the Depression anxiety Stress Scales (2nd Ed) Sydney: Psychology Foundation.

0 Did not apply to me at all, 1 Applied to me to some degree, or some of the time, 2 Applied to me to a considerable degree, or a good part of time, 3 Applied to me very much, or most of the time

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*.	0	1	2	3
1. I found myself getting upset by quite trivial things				
2. I was aware of dryness of my mouth				
3. I couldn't seem to experience any positive feeling at all				
4. I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)				
5. I just couldn't seem to get going				
6. I tended to over-react to situations				
7. I had a feeling of shakiness (eg, legs going to give way)				
8. I found it difficult to relax				
9. I found myself in situations that made me so anxious I was most relieved when they ended				
10. I felt that I had nothing to look forward to				
11. I found myself getting upset rather easily				
12. I felt that I was using a lot of nervous energy				
13. I felt sad and depressed				
14. I found myself getting impatient when I was delayed in any way (eg, lifts, traffic lights, being kept waiting)				
15. I had a feeling of faintness				
16. I felt that I had lost interest in just about everything				
17. I felt I wasn't worth much as a person				
18. I felt that I was rather touchy				
19. I perspired noticeably in the absence of high temperatures or physical exertion				
20. I felt scared without any good reason				
21. I felt that life wasn't worthwhile				
22. I found it hard to wind down				
23. I had difficulty in swallowing				
24. I couldn't seem to get any enjoyment out of the things I did				
25. I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)				
26. I felt down-hearted and blue				
27. I found that I was very irritable				
28. I felt I was close to panic				
29. I found it hard to calm down after something upset me				
30. I feared that I would be "thrown" by some trivial but unfamiliar task				
31. I was unable to become enthusiastic about anything				
32. I found it difficult to tolerate interruptions to what I was doing				
33. I was in a state of nervous tension				
34. I felt I was pretty worthless				
35. I was intolerant of anything that kept me from getting on with what I was doing				
36. I felt terrified				
37. I could see nothing in the future to be hopeful about				
38. I felt that life was meaningless				
39. I found myself getting agitated				
40. I was worried about situations in which I might panic and make a fool of myself				
41. I experienced trembling (eg, in the hands)				
42. I found it difficult to work up the initiative to do things				

HIV Stigma Scale: This study asks about some of the social and emotional aspects of having HIV. For each item, circle your answer:Strongly disagree(SD),disagree(D),agree(A),or strongly agree (SA).

		SD	D	A	SA
1	In many areas of my life, no one knows that I have HIV				
2	I feel guilty because I have HIV				
3	People's attitudes about HIV make me feel worse about myself				
4	Telling someone I have HIV is risky				
5	People with HIV lose their jobs when their employers find out				
6	I work hard to keep my HIV a secret				
7	I feel I am not as good a person as others because I have HIV				
8	I never feel ashamed of having HIV				
9	People with HIV are treated like outcasts				
10	Most people believe that a person who has HIV is dirty				
11	It is easier to avoid new friendships than worry about telling someone that I have HIV				
12	Having HIV makes me feel unclean				
13	Since learning I have HIV, I feel set apart and isolated from the rest of the world				
14	Most people think that a person with HIV is disgusting				
15	Having HIV makes me feel that I'm a bad person				
16	Most people with HIV are rejected when others find out				
17	I am very careful who I tell that I have HIV				
18	Some people who know I have HIV have grown more distant				
19	Since learning I have HIV, I worry about people discriminating against me				
20	Most people are uncomfortable around someone with HIV				
21	I never feel the need to hide the fact that I have HIV				
22	I worry that people may judge me when they learn I have HIV				
23	Having HIV in my body is disgusting to me				
Many of the items in this next section assume that you have told					

other people that you have HIV, or that others know. This may not be true for you. If the item refers to something that has not actually happened to you, please imagine yourself in that situation.					
24	I have been hurt by how people reacted to learning I have HIV				
25	I worry that people who know I have HIV will tell others				
26	I regret having told some people that I have HIV				
27	As a rule, telling others that I have HIV has been a mistake				
28	Some people avoid touching me once they know I have HIV				
29	People I care about stopped calling after learning I have HIV				
30	People have told me that getting HIV is what I deserve for how I lived my life				
31	Some people close to me are afraid others will reject them if it becomes known that I have HIV				
32	People don't want me around their children once they know I have HIV				
33	People have physically backed away from me when they learn I have HIV				
34	Some people act as though it's my fault I have HIV				
35	I have stopped socializing with some people because of their reactions to my having HIV				
36	I have lost friends by telling them I have HIV				
37	I have told people close to me to keep the fact that I have HIV a secret				
38	People who know I have HIV tend to ignore my good points				
39	People seem afraid of me once they learn I have HIV				
40	When people learn you have HIV, they look for flaws in your character				
Berger, Barbara E., Carol E. Ferrans, and Felissa R. Lashley. 2001. "Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale," *Research in Nursing and Health* 24: 518–529.					

SECTION C: PMTCT OUTCOMES

1. Antiretroviral therapy Appointments Visits / drug refill with dates

---

---

2. Antenatal Appointments Visits with dates

---

3. Mode of Delivery choice ----------
4. Place of delivery----------
5. Choice of Infant feeding pattern ----------
6. Post natal attendance Visits with date ----------

---

7. Infant's HIV test outcome (with date)----------
   If positive, answer question 8
8. Peadiatric Initiation of antiretroviral(with date)----------
   -

APPENDIX III ETHICS APPROVAL

UNIVERSITY of the WESTERN CAPE

OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH DEVELOPMENT

30 July 2013

To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape approved the methodology and ethics of the following research project by: Ms A Ishola (School of Nursing)

Research Project:	Acceptance and commitment therapy in the prevention of Mother to Child transmission of HIV Program among pregnant women living with HIV in South Western States of Nigeria.
Registration no:	13/6/15

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias
Research Ethics Committee Officer

TELEGRAMS.....
PRIVATE MAIL BAG NO. 781

Ondo STATE
ISẸ LOOGUN ISẸ

TELEPHONE.....

HOSPITALS' MANAGEMENT BOARD

AKURE, ONDO STATE, NIGERIA.

Your Ref. No.....
All Communications should be addressed
to the Permanent Secretary quoting

Our Ref No.....G.8061/36.....

Date.....30th Dec., 2013.....

The Principal Investigator,

Acceptance & commitment therapy in the prevention of mother to child transmission of HIV program among pregnant women living in South West states of Nigeria.

Department of Nursing, College of Medicine, University of Ibadan.

Attention: Adeyinka Ganiyat Ishola.

Ethical Approval

The Ethical Review Committee of the Hospitals' Management Board, Akure had critically evaluated your request to conduct a research in some of our health facilities.

I am pleased to inform you that the Committee is satisfied with your study proposal and its instrument. In view of this, you have been granted permission to carry out the study at the health facilities of your choice.

However, you are to adhere strictly to the instrument presented to this Committee without breaching any of the ethical issues discussed with you during the last ethical approval interview held with you on 18th December, 2013. The committee will also monitor the progress and conduct of this research. In addition, you are to forward to this office the important findings and recommendations of this study.

Best regards.

Permanent Secretary
Hospitals Management Board
P. M. B. 781. Akure.

Dr. F.A. Akanbiemu. MBBS (Benin), MPH (Ib.), FWACP (Comm. H)
(Consultant Community Physician) DPR&S, HMB.
For: Permanent Secretary & Chairman, HMB Ethical Review Committee

CC: *Chief Medical Director, State Specialist Hospital, Akure.*
Chief Medical Director, Mother & Child Hospital, Akure,
Chief Medical Director, Mother & Child Hospital, Ondo

Permanent Secretary
Hospitals Management Board

ETHICS APPROVAL II

TELEGRAMS................. TELEPHONE.................

OYO STATE, THE PACESETTER

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. ....
All communications should be addressed to the Honorable Commissioner quoting
Our Ref. No. AD 13/ 479/558

20th January, 2014

The Principal Investigator,
School of Nursing,
Faculty of Community & Health Sciences:,
University of Western Cape,
South Africa.

Attention: Adeyinka.G.Ishola

Ethical Approval for the Implementation of your Research Proposal in Oyo State

This acknowledges the receipt of the corrected version of your Research Proposal titled: "Acceptance and Commitment Therapy in the Prevention of Mother to Child Transmission of HIV Program among Pregnant Women Living with HIV in South West State of Nigeria."

2. The committee has noted your compliance with all the ethical concerns raised in the initial review of the proposal. In the light of this, I am pleased to convey to you the approval of committee for the implementation of the Research Proposal in Oyo State, Nigeria.

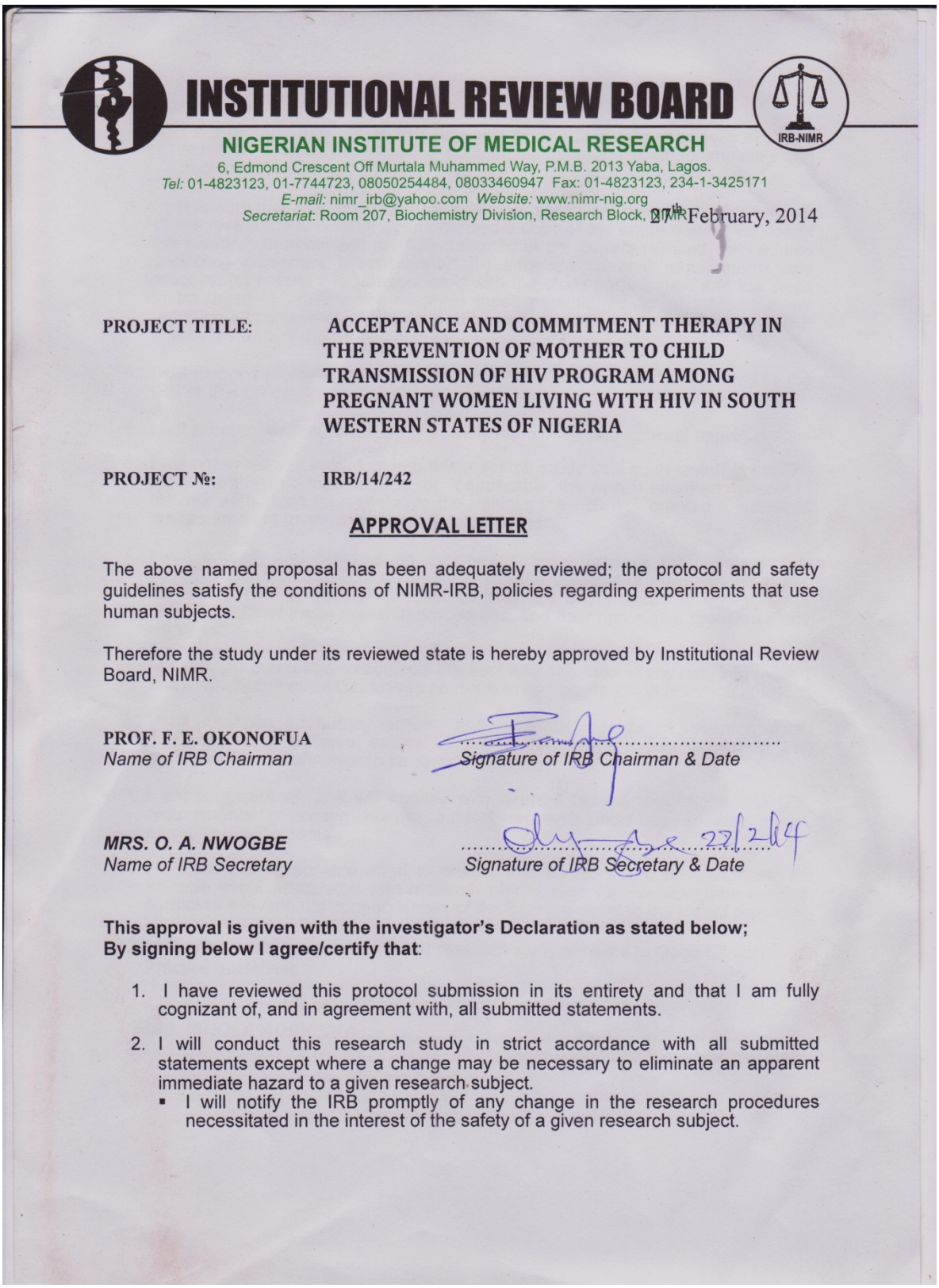
3. Please note that the committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of the findings as this will help in policy making in the health sector.

4. Wishing you all the best.

OYO STATE RESEARCH ETHICAL REVIEW COMMITTEE
Signature & Date

Sola Akinrinde (Dr)
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethical Review Committee

ETHICS APPROVAL III



INSTITUTIONAL REVIEW BOARD

NIGERIAN INSTITUTE OF MEDICAL RESEARCH

6, Edmond Crescent Off Murtala Muhammed Way, P.M.B. 2013 Yaba, Lagos.
Tel: 01-4823123, 01-7744723, 08050254484, 08033460947 Fax: 01-4823123, 234-1-3425171
E-mail: nimr_irb@yahoo.com *Website:* www.nimr-nig.org
Secretariat: Room 207, Biochemistry Division, Research Block, NIMR

27th February, 2014

PROJECT TITLE: **ACCEPTANCE AND COMMITMENT THERAPY IN THE PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV PROGRAM AMONG PREGNANT WOMEN LIVING WITH HIV IN SOUTH WESTERN STATES OF NIGERIA**

PROJECT №: **IRB/14/242**

APPROVAL LETTER

The above named proposal has been adequately reviewed; the protocol and safety guidelines satisfy the conditions of NIMR-IRB, policies regarding experiments that use human subjects.

Therefore the study under its reviewed state is hereby approved by Institutional Review Board, NIMR.

PROF. F. E. OKONOFUA
Name of IRB Chairman

.....
Signature of IRB Chairman & Date

MRS. O. A. NWOGBE
Name of IRB Secretary

..... 27/2/14
Signature of IRB Secretary & Date

This approval is given with the investigator's Declaration as stated below;
By signing below I agree/certify that:

1. I have reviewed this protocol submission in its entirety and that I am fully cognizant of, and in agreement with, all submitted statements.
2. I will conduct this research study in strict accordance with all submitted statements except where a change may be necessary to eliminate an apparent immediate hazard to a given research subject.
   - I will notify the IRB promptly of any change in the research procedures necessitated in the interest of the safety of a given research subject.

- I will request and obtain IRB approval of any proposed modification to the research protocol or informed consent document(s) prior to implementing such modifications.

3. I will ensure that all co-investigators and other personnel assisting in the conduct of this research study have been provided a copy of the entire current version of the research protocol and are fully informed of the current (a) study procedures (including procedure modifications); (b) informed consent requirements and process; (c) potential risks associated with the study participation and the steps to be taken to prevent or minimize these potential risks; (d) adverse event reporting requirements; (e) data and record-keeping; and (f) the current IRB approval status of the research study.

4. I will respond promptly to all requests for information or materials solicited by the IRB or IRB Office.

5. I will submit the research study in a timely manner for IRB renewal approval.

6. I will not enroll any individual into this research study until such time that I obtain his/her written informed consent, or, if applicable, the written informed consent of his /her authorized representative (i.e., unless the IRB has granted a waiver of the requirement to obtain written informed consent).

7. I will employ and oversee an informed consent process that ensures that potential research subjects understand fully the purpose of the research study, the nature of the research procedures they are being asked to undergo, the potential risks of these research procedures, and their rights as a research study volunteer.

8. I will ensure that research subjects are kept fully informed of any new information that may affect their willingness to continue to participate in the research study.

9. I will maintain adequate, current, and accurate records of research data, outcomes, and adverse events to permit an ongoing assessment of the risks/benefit ratio of research study participation.

10. I am cognizant of, and will comply with, current federal regulations and IRB requirements governing human subject research including adverse event reporting requirements.

11. I will make a reasonable effort to ensure that subjects who have suffered an adverse event associated with research participation receive adequate care to correct or alleviate the consequences of the adverse event to the extent possible.

12. I will ensure that the conduct of this research study adheres to Good Clinical Practice guidelines

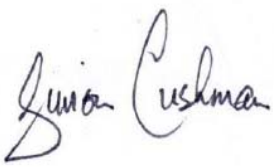
MRS. ISHOLA ADEYINKA
Principal Investigator's Name

.....
Principal Investigator's Signature and Date

APPENDIX IV
Certificate of Editing

Certificate of Editing

This is to certify that the thesis entitled ***Acceptance And Commitment Therapy In The Prevention Of Mother To Child Transmission Of HIV Program Among Pregnant Women Living With HIV In South Western States Of Nigeria*** to be submitted by Adeyinka Ganiyat Ishola has been edited for language by me. Neither the content nor the author's meaning were altered or affected in any way during the process.



Simon Cushman 8 April 2017

Editor

APPENDIX 1V

VALUE-BASED MESSAGE YORUBA

Tí kò bá sí òwò ìdùnú tí í fa ijó, wá ìdí láti korin másè so ìrètí nù rárá.Yálà ifé rè gbófo tàbí kún, ohun tí ó bá fi se ni ó se pàtàkì.Kò sí àkókò tí ó tó láyé yìí láti se ohun gbogbo, sùgbón síbè, àkókò sì wa láti lè mú kí ewu àti gbà omo eni là gbòòrò tàbí gbilè... Enìkan ní láti wòyáìjà, enìkan ní láti yáafî, enìkan ní láti mi sí ni, enìkan sì ní láti jé akíkanjú. Ojúse rè ní omo rè, jé akíkanjú rè.

Kò sì ìdùnnú nínú wa, sùgbón nínú àwa fúnra wa, kìí se ohun tí a rí bí òsùnmàrè tàbí tí a ní ìmòlára rè bí oru iná. Ayò ni ibi tí a wà. Àbùdá Olórun ni ifé, o sì pàse fún wa pé, "*féràn omonìkejì re bí ara rè*". Kò se é se láti nífèé elòmíì láìnífèé ara re. Bí ènìyàn bá se ń se àsàrò nípa èrò rere tó, béèni ìgbé ayé rè àti àgbáláayé lápapò yóò tí dára tó. Ìrètí wà nínú àlá, èrò àti ìyànjú àwon ènìyàn tí ó ti pinnu láti so àla won di òtító.

Máse fí èsùn kan ara re. Ìfèsùnkanra-eni máa ń yí èrò wa sí òdi, pátápátá. Èrò búburú máa ń dérùba okàn wa, pinnu láti dá, máse fí èsùn kan ara rè mó láti òní lo. Tí ó bá tí ni ìpòruru okàn rí ni ayé fún ìdí kan, tí kò sì ònà àbáyo, bèrè sí yí èrò búburú rè padà sí rere, gbé ìgbésè lórí àfojúsùn rè.

Bí èrò rè bá tí dára tó, béè ni inú rè yóò se dùn tí ayé rè yóò sì dára tó, ó di dandan kí èsì rere sì yojú bó pé bóyá."Báwò ní máa se gbé ìgbé ayé mi lónìí láti fàyè gba ojó òla tí mo fí ara mi jin fún?" Fí ara rèji láti jé olótító sí ohun tí kò sí ni ibikíbi àyàfi nínú rè.

Olórun gbà wá níyànjú lát kún okàn wa pèlú èrò tó lola, tó kún fún òdodo, tó mo, tí ó kún fún ifé àti oore-òfé, kí á sì kún okan wa pèlú èrò tó peregedé pèlú ìfé. Féràn ara rè tó láti máse dérubà ara rè.

Máse so ìdojúko kékeré di ńlá. Rí ohun gbogbo gégé bí àwòrán ìfé dáradára, kí ó sì máse gbàgbé won. Nígbà tí èrò búburú yìí bá wa, rántí àwòrán dáradára yen.

Jé aláánú sí okan rè, máse kórira ara rè nítorí àsìse, ó yé fún ìfé. Èrò rè ni láti je ànfàní ìfé níwòn ìgbà tí wà láyé. Ronú jìnlè nípa ara rè, ìgbésè àánú ni.

Ìbáwí máa ń mú ìdálébi wa. Ìdálébi máa ń sokùnfà ìjeníyà tí ó sí máa ń yorísí ìrora, fí ìfé gbé ara rè ró, ìfé a máa mú èrù kúró.

Ìsimi se pàtàkì fún ìwòsàn. Di ojú rè pèlú ìmíkanlè méjì sí métà, mí síta, kí ó sì fojú fòó, mú gbogbo èrù kúrò, so kélékélé pé: "*Mo nífèé re, yóò sì dára*".

Àsàrò - Dáké jé, di ojú rè, mí kanlè, so òrò rere sí ara re bíi, mo gbà ìwòsàn, mo dáríjì ara mi àti béè béè lo. Àsàrò máa ń fí àyè sílè ni okàn wa, wà á sì ni ìfarakínra pèlú ara re, ìfarakínra wà láàárín ara àti okàn.

Rérín fún ìwòsàn, túraká, mú inú ara rèdùn, máa rérín-ín músé, ní ojó kan wà á ní ìfokànbalè láyé.

Mo ìyìn ara rè, ayò kò sí fún enikéni tí kò bá iyì ohun tí wón ní..., gbé oríyìn fún ara re bí ó bá tí lè se é.

Ìpòruru kò mú ìsorò ojó iwájú kúrò, ó máa ń mú àlàáfíà òní kúrò ni. Fún ara rè láyé láti dáríjì. Gbàgbé èsè pèlú ìfé. Tí eyin bá fó láti ìta, kò sí iye, sùgbón tí ó bá fó láti inú, ayé sèse bèrè ni. Ìta ní àwon ohun ńlá tí ń bèrè,ohun gbogbo tí ó nílò wà nínú rè. Ó ní ipá láti wòsàn kí ó sì gbà ìlera. Àbùdá àmútòrunwá ni.

Nínú ìpòruru, wá ìròrùn, nínú èdèàìyedè, wá ìsòkan, láàárín gbungun ìsorò ni ànfàànì wa. Ó máa ni bí o bá tí fí ayè gbà ara rè nítorí ìwo ni ó máa fún ara re ní gbèdéke. Ní àfojúsùn ńlá, máse kábamò nípa ìsèlè tí ó ti kojá, ìfàkókòsòfò lásán ni, ohun gbogbo ló ní ìdí. Gbogbo àsìse, gbogbo àkókò àìlera, ohun búburú yówú tí ó tí se séyìn, dáríjì ara rè kí ó sì tèsíwájú.

Se àsàrò, rántí àwon ìrírí ayò tí ó tí ní ni ayé, òpòlopò sì kù yanturu, ènìyàn kò lè sàwárí ànfàànì ńlá láìní pinnu láti gbàgbé ànfàànì kékeré, nítorí náà tèsíwájú kí ó sì ní ayò.

Wá àyè ní inú níbi tí ayò wà, ìdùnnú yìí yóò sì fí òpín sí ìrora, ìpòruru kò dára, ó dábí kí ènìyàn máa rín pèlú agbòjò (Àbùradà) ní ìrètí òjò.

Ní ìfé sí àwon àsìsè rè. Àsìsè/kùdíè kudíè kò ní ìtumò. Máse fí àyè gbà èrò òdì. Dojú ìjà ko ìgbàgbó oní gbèdéke, ìdájó àti àwon èrò tí kò wúlò fún omó báyìí tàbí ní ojó iwájú. Mo fún ara mi láyé láti gbagbé àtijó pátápátá.

Máse díbón, akítiyàn láti se ìgbàgbóojú kò wúlò mó ní àkókò ìgbé ayé èdá kan. Tí wón bá fé ìwà rere rè tàbí won kò fé e, wàhálà tíwón níyen. Máse díbón, ìtìjú ńlá kan ni láti ni ìtìjú, múra gírí láti dáàbòbò ohun tí ó gbàgbó.

Láti inú ni ìgbékèlé ara eni tí bèrè nípa gbígbàgbó nínú eni tí ó jé, kò sí ohunkóhun níta tí ó lè dá e dúró. Nínú rè ní ohun gbogbo wa. Máse wá ohunkóhun tí kò sí ni inú rè, ìwò ní ara rè. Ò lè má fé ságbáterù ayò elòmìí, nítorí náà máse fí èsùn kan enikéni fún tìre.

Bíntín layé. Àkókò ń lo, kò lè padà, kò sì se é yìí séyìn. Nítorí náà gbà gbogbo àkókò bí wón se rí, wá ònà láti ran ara re lówó, bèèrè fún ìrànlówó nígbà tí ó lérò pé ó pòn dandan. Kò sí ànfààní kejì ní ayé.

Tójú ara rè. Ara rè ni ilé tí ó ń gbé. Tójú rè. Se é loge, mo rírí rè, tójú rè kí ó sì nífèé rè. Ní àárò kùtùkùtù, ohun àkókò ni kí ó wo àwòjíjì, kí ó sì so fún ara rè pé, “*Mo nífèé re*”.

Kí ni ètè ìwàláàye rè? Tí ó kò bá lè ronú nípa ètè/ìdí fún ìwàláàyè rè, ronú nípa re, ewù rè. Nítorí ewù re yóò yorísí ètè fún o, lépa re kí ó sì máse àfarawé. Wà ní ayé pèlú àlá re.

Téwógbà ara rè. Ìtéwógbà ní gbígbà ìfaraenijì ànfààní àkànse, ìdúró aláìnídájó tí ó rorùn tí ó níí se pèlú ìrírí ìgbàdégbà. Ìfé láti ní ìrírí àkókò ìdàámú ara eni, ipò àti ìsèlè tí ó lè sokùnfà won ni a fí ń se ìgbòwó fún un. Káràmáàsìkí ipò rè. Mo nílò ìfarabalè àti àláàfíà láti gbà kámú pèlú àwon nnkan tí ń kò lè yípadà, ìyànjú láti yí àwon nnkan tí mo lè yí padà àti lákótán, ogbón láti lè mó ìyàtò.

APPENDIX V
YORUBA QUESTIONNAIRE

ÌWÉ ATỌ́NISỌ́NÀ

ÈTÒ IṢÈGÙN ÌTẸ́WỌ́GBÀ ÀTI ÌFARẸNIJÌ NÍPA ÌDÈNÀ GBÍGBA ÀRÙN ÉÈDÌ LÁTI ARA ÌYÁ SÍ ỌMỌ LÁÀRÍN ÀWỌN ALÁBOYÚN TÍ Ó NÍ ÀRÙN ÉÈDÌ NÍ ÌPÍNLẸ̀ ÌWỌ̀ OÒRÙN ÀRÍWÁ ORÍLẸ̀ ÈDÈ NÀÌJÍRÍÀ

Kí ni iṣẹ́ yìí dálé lórí?

Iṣẹ́ ìwádìí yìí jẹ́ iṣẹ́ tí Adéyínká Ganiyat Ishola ọ̀mọ̀wé láti ilé ìkọ̀ṣẹ́ nọ́ọ̀sì, ẹka ìmọ̀ sáyẹ́nsì ibilẹ̀ [illegible] ilé ìwé gíga ti ìlà oòrùn Cape. À ń pè yín láti kópa nínú iṣẹ́ ìwádìí yìí gẹ́gẹ́ bí ọ̀kan lára àwọn abiyamọ tí ó lè ní àrùn ÉÈDÌ. Àwọn àbá àti ìrànlọ́wọ́ yín yóò ràn wá lọ́wọ́ láti ṣe ìwádìí àwọn ọ̀nà tí a lè gbà [illegible] àwọn aláboyún tí ó ń gbé pẹ̀lú àrùn ÉÈDÌ àti bí a ṣe lè dẹ́kun kòkòrò àrùn yìí láàrin àwọn ọmọdé. [illegible] iṣẹ́ ìwádìí yìí ni láti fi ìdí rẹ̀ múlẹ̀ pé bóyá tí a bá mú àwọn ènìyàn mọ̀ nípa Ètò Ìṣègùn Ìtẹ́wọ́gbà àti Ìfarẹniji (ACT) lè mú èsì ìdàgbàsókè bá ètò ìtọ́jú ipò tí èrò-ọpọlọ aláboyún wà àti ní pàtó àbájáde PMTCT ní orílẹ̀èdè Nàìjíríà.

Kí ni ìbéèrè tí wọ́n lè bi mí bí mo bá gbà láti kópa?

Bí o bá gbà láti kópa nínú iṣẹ́ ìwádìí yìí, a máa fún ẹ ní ìwé ìbéèrè láti dáhùn àwọn ìbéèrè inú rẹ̀. Àwọn ìbéèrè yìí yóò rànwá lọ́wọ́ láti mọ ṣiṣe àyẹ̀wò bí àrùn ÉÈDÌ ti nípa lórí rẹ tó. À sì tún máa jẹ́ kí o kópa nínú ìjíròrò olóṣooṣù pẹ̀lú aṣewádìí, wà á sì tún máa gba ìwé àtẹ̀ránṣẹ́ lọ́ṣọ̀ọ̀sẹ̀ lórí ago ìpè rẹ láti [illegible] ọ bí o ṣe lè gbé pẹ̀lú àrùn ÉÈDÌ. Iṣẹ́ ìwádìí yìí yóò wáyé ní ibi mẹ́rin tí àwọn abiyamọ yóò ti máa gba [illegible] fún ìtọ́jú ÉÈDÌ. Ìjíròrò olóṣooṣù náà àti ìwé àtẹ̀ránṣẹ́ yóò máa tẹ̀síwájú títí di ìgbà tí ọmọ rẹ yóò fi pé [illegible] mẹ́fà. Ìjíròrò olóṣooṣù yìí yóò wà fún ọgbọ̀n ìṣẹ́jú. Ní àkọ́kọ́ ìwáwdìí yii wa yóò lè ṣe àyẹ̀wò káàdì [illegible] ilé ìwòsàn àti ní yàrá ìgbẹ̀bí.

Ǹjẹ́ ìkópa mi nínú ìṣẹ́ yìí yóò jẹ́ mọ̀sínú?

A máa sa ipá wa láti ṣe ìtọ́jú àwọn nǹkan tí o bá kọ sílẹ̀ fún wa. Láti ṣe ìtọ́jú àwọn ohun tí a mọ̀ nípa rẹ a kò nílò orúkọ rẹ nínú ìwé ìbéèrè wa. Ọ̀kọ̀ọ̀kan àwọn ìwé ìbéèrè wa ló máa ní kóòdù ìdánimọ̀ láti lè fi ṣe àkójọpọ̀ détà rẹ. Bí a bá tilẹ̀ kọ àtẹ̀jáde kan nípa iṣẹ́ ìwádìí yìí, a ó gbìyànjú láti dáàbò bo ìdánimọ̀ rẹ.

Kí ni àwọn ewu inú iṣẹ́ ìwádìí yìí?

Kò mú ewu kankan dání fún ìkopa rẹ nínú iṣẹ́ ìwádìí yìí, àmọ́ bí a bá rí ohun tí kò tẹ́ ẹ lọ́rùn nípa àwọn ìdáhùn sí ìbéèrè wa nígbà kankan yálà ní àkókò tí iṣẹ́ ìwádìí yìí ń lọ tàbí lẹ́yìn rẹ̀, ó yẹ kí ó lè rọrùn fún ẹ láti sọ bẹ́ẹ̀. Bí ó bá sì ṣe pàtàkì, a lè darí rẹ̀ sí àwọn tí yóò ṣe àyẹ̀wò èrò rẹ yìí sí ọ̀kan lára àwọn òṣìṣẹ́ ìlera yìí fún ìrànlọ́wọ́ àti ìtọ́jú tó péye.

Kí ni àwọn èrè iṣẹ́ ìwádìí yìí?

A ṣe àgbékalẹ̀ iṣẹ́ ìwádìí yìí láti jẹ́ kí ẹ kọ́ nípa bí a ṣe lè gbé pẹ̀lú alárùn ÉÈDÌ, èsì yìí náà lè ran olùwádìí lọ́wọ́ láti kọ́ nípa bí àyẹ̀wò ÉÈDÌ ṣe ń nípá lórí àwọn aláboyún àti ìlera ajẹmoye wọn. A lè rò pé ní ọjọ́ iwájú, àwọn ènìyàn mìíràn lè rí èrè láti ara iṣẹ́ ìwádìí yìí láti ara òye tí ó wà nínú ìtẹ́wọ́gbà àti ìfarẹnijì fún ìtọjú àrùn ÉÈDÌ.

Ǹjẹ́ mo gbọ́dọ̀ kópa nínú iṣẹ́ ìwádìí yìí àti pé ṣé mo lè sọ pé mi ò kópa mọ́ nígbà tó bá wùnmí?

Kíkópa nínú iṣẹ́ ìwádìí jẹ́ àtinúwá o lè yàn láti má kópa rárá.Tí o bá sì pinnu láti kópa nínú iṣẹ́ ìwádìí yìí o lè kọ̀ láti kópa nígbàkúùgbà.Tí o bá pinnu láti máa kópa nínú iṣẹ́ ìwádìí yìí tàbí tí o bá ṣíwọ́ kíkópa nígbàkúùgbà, kò sí ìjìyà tàbí àyọrísí ibi kankan fún ẹ tàbí ìtọ́jú rẹ.

Tó bá jẹ́ pé mo ní ìbéèrè ńkọ́?

Tí o bá ní ìbéèrè nípa iṣẹ́ ìwádìí yìí, jọ̀wọ́ kàn sí:

Adeyinka Ganiyat Ishola

Ilé ìwé fún Ìkọ́ṣẹ́mọṣẹ́ nọ́ọ̀sì

Ẹ̀ka ti ìmọ̀ sáyẹ́nsì ìbìlẹ̀ àti ilera

Ilé ìwé gíga ti ìlà oòrùn Cape

Alábójútó Iṣẹ́ Ìwádìí

Ọ̀jọ̀gbọ́n Oluyinka Adejumo

Ilé ìwé fún Ìkọ́ṣẹ́mọṣẹ́ nọ́ọ̀sì

Ẹ̀ka ti ìmọ̀ sáyẹ́nsì ìbílẹ̀ àti ilera

Ilé ìwé gíga ti ìlà oòrùn Cape

Àpò ìkọ̀wéránṣẹ́ X17,

Bellville.

2

Alábójútó Iṣẹ́ Ìwádìí

Ọ̀jọ̀gbọ́n Oluyinka Adejumo

Ilé ìwé fún Ìkóṣẹ́mọṣẹ́ nóòsì

Ẹ̀ka ti ìmọ̀ sáyẹ́nsì ìbílẹ̀ àti ilera

Ilé ìwé gígá ti ìlà òòrùn Cape

Àpò ìkọ̀wéránṣẹ́ X17,

Bellville 7535.

ÌPÍN A: ÌMỌ̀ NÍPA IYE ÀWỌN OLÙDÁHÙN

1. Iye ọdún rẹ: .....
2. Iye ọ̀ṣẹ̀ tí ọmọ jẹ́ .....
3. Ètò Ẹ̀kọ́: N kò lọ ilẹ ìwé [ ]
   Ilé ìwé alákọ́bẹ̀ẹ̀rẹ̀ [ ]
   Ilé ìwé sẹ́kọ́ndírì [ ]
   Ilé ìwé gíga [ ]
   Àwọn òmíràn (jẹ́ kí á mọ̀) .....
4. Ipò ìgbéyàwó: O ti ní ọkọ [ ]
   O ò ní ọkọ rí [ ]
   Opó [ ]
   Pínyà/kòsílẹ̀ [ ]
5. Ẹ̀sìn: Onígbàgbọ́ [ ]
   Mùsùlùmí [ ]
   Àbáláyé [ ]
   Òmíràn (jẹ́ kí á mọ̀) .....
6. CD 4 Count: .....
7. Nọ́mbà ẹ̀rọ ìbánisọ̀rò.....
8. Àkókò tí o fẹ́ gba àwọn ìfìpè ìrànṣẹ́ nípa ìlera.....
9. Irú èdè tí o fẹ́ fi gba àwọn àlàyé nípa ìlera..... Gẹ̀ẹ́sì [ ]
   Yorùbá [ ]
10. Ǹjẹ́ o ti sọ nípa ìpò àrùn ÉÈDÌ rẹ fún ẹnìkan? Bẹ́ẹ̀ni [ ] Bẹ́ẹ̀kọ́ [ ]

    Tí ó bá jẹ́ bẹ́ẹ̀ ni, ta ni (jẹ́ kí a mọ̀).....
11. Ǹjẹ́ mo lè pe ẹni náà lórí ẹ̀rọ ìbánisọ̀rọ̀. Bẹ́ẹ̀ ni [ ] Bẹ́ẹ̀ kọ́ [ ]

    Bí ó bá jẹ́ bẹ́ẹ̀ ni, sọ nọ́mbà ẹ̀rọ ìbánisọ̀rọ̀ onítòún.....

ÌPÍN B: ÌPÒ ÌLERA IYE ÀTI ÀṢÈBÉÈRÈ ÌTẸ́WỌ́GBÀ ÀTI IṢẸ́ II (AAQ-II)

Jọ̀wọ́ dáhùn àwọn ìbéèrè wọ̀nyìí

Nọ́mbà	Ìlàrọ̀sílẹ̀	Kò rí bẹ́ẹ̀ (1)	Òtítọ́ rẹ̀ ṣọ̀wọ́n (2)	Nígbà mìíràn, ṣùgbọ́n kìí sábà jé òtítọ́ (3)	Da wà (4)	Ó lè jẹ́ òtítọ́ nígbà miíràn (5)	Òtítọ́ ni ní ọ̀pọ̀ ìgbà (6)	Ó jẹ́ òtítọ́ nígbà gbogbo (7)
1	Ó dára bí mo bá rántí ohun ti kò dùn mọ́ mi							
2	Àwọn ìrántí àti ìrírí tí ó dùn mi jẹ́ kí ó níra fún mi láti gbé ìgbé ayé tí mo máa buyì fún							
3	Ẹ̀rù àwọn ìmòlára mi máa ń bà mí							
4	Mo máa ń dàámú nígbà tí mi ò bá lè ṣe àkóso àwọn ìdàámú àti ìmọ̀lára mi							
5	Ìrántí gbogbo àwọn ohun tí ó dùn mi máa ń dí mi lọ́wọ́ láti gbé ìgbé ayé ìmúṣe							
6	Mò ń ṣe àkóso ayé mi							
7	Ìmí ẹ̀dùn máa ń fa wàhálà sínú ayé mi							
8	Ó dàbí ẹni pé ọ̀pọ̀ ènìyàn ń ṣe àkóso ayé dáadáa jù mí lọ							
9	Ìdàámú máa ń dí ọ̀nà àṣeyege mi lọ́wọ́							
10	Èrò àti ìmọ̀lára mi kìí							

20	Ọpọ̀lọpọ̀ ènìyàn ni ara wọn kì í balẹ̀ nígbà tí wọ́n bá wà ní ìtòsí alárùn éèdì				
21	Èmi kì í ri ìdí tí mo gbọ́dọ̀ fi sọ ọ̀rọ̀ pé mo jẹ́ alárùn éèdì dàṣírí				
22	Mo máa ń pòǹgbẹ́ pé bí àwọn ènìyà yóò ṣe dámi lẹ́jọ́ nígbà tí wọ́n mọ̀ pé alárùn éèdì ni mi.				
23	Níní àrùn éèdì nínú àgọ́ ara mi ń dójú tì mí.				

Ọpọ̀lọpọ̀ àwọn nǹkan tí ó wà ní ìsàlẹ̀ yìí ní ó gbà pé o ti sọ fún àwọn ẹlòmí-ìn pé o jẹ́ alárùn éèdì, tàbí pé àwọn ènìyàn mọ̀. Ó ṣée ṣe kí èyí má jẹ́ òótọ́ fún ọ. Tí ọ̀rọ̀ náà bá jẹ́ èyí tí kò tíì ṣẹlẹ̀ sí ọ rí, jọ̀wọ́ fi ara rẹ sípò náà.

24	Ó ti fún mi lẹ́dùn ọkàn lórí ìṣẹ́sí àwọn ènìyàn sí mi nígbà tí wọ́n mọ̀ pé mo ní àrùn éèdì				
25	Mo máa ni mí lára pé àwọn ènìyàn tó mọ̀ pé mo jẹ́ alárùn éèdì yóò sọ fún ẹlòmíràn				
26	Mo kábámọ̀ nítorí pé mo sọ fún àwọn kan pé mo lárùn éèdì.				
27	Gégé òfin, sísọ fún àwọn ẹlòmíràn pé mo jálárùn éèdì jẹ́ àṣìṣe.				
28	Àwọn-òn kàn kì í fẹ́ fọwọ́ kàn mí ní kété tí wọ́n bá ti mọ̀ pé mo jálárùn éèdì				
29	àwọn tí mo fẹ́ràn gan ti dẹ́kun pípè mí lẹ́yìn tí wọ́n ti mọ̀ pé mo lárùn éèdì				
30	Àwọn-òn kan ti sọ fún mi pé mo jèrè ni lórí níní àrùn éèdì nípá bí mo ṣe lo ìgbésí ayé mi.				
31	Àwọn èèyàn kan tí wọ́n sún mọ́mi ń bẹ̀rù pé àwọn náà lè dẹni ìkọ̀sílẹ̀ tí ó bá di mímọ̀ pé mo lárùn éèdì.				
32	Àwọn ènìyàn kì í fẹ́ rí mi pọ̀ pẹ̀lú àwọn ọmọ wọ́n nítorí tí mo jẹ́ alárùn éèdì.				
33	Àwọn èèyàn kan tíẹ́ ti fà sẹ́yìn fún mi ní gbangba nígbà tí wọ́n mọ̀ pé mo lárùn éèdì.				
34	Àwọn-òn kan máa ń wò ó pé èmi ni mo fà á ìdí tí mo fi ní éèdì.				
35	Mo ti dẹ́kun àti máa bá àwọn ènìyàn kẹ́gbẹ́pọ̀ nítorí ìṣesí wọn sí mi lórí pé mo lárùn éèdì.				
36	Mo ti pàdánù àwọn ọ̀rẹ́ mi nítorí pé mo sọ fún wọn pé mo lárùn éèdì				
37	Mo ti sọ fún àwọn tí wọ́n sún mọ́ mi kí wọ́n fi àṣírí éèdì tí mo ní pamọ́.				
38	Àwọn tí wọ́n mọ̀ pé mo ní àrùn éèdì kì í ka kókó ọ̀rọ̀ mi sí nǹkankan.				
39	Àwọn ènìyà máa ń bẹ̀rù mi nígbà tí wọ́n bá ti mọ̀ pé mo lárùn éèdì				
40	Nígbà tí àwọ́n ènìyàn bá ti mọ̀ pé o ní àrùn éèdì, àṣìṣe nínú ìwà rẹ̀ ní wọ́n á máa wá kíri.				

ÌPÍN C: ÀBÁJÁDE *PMTCT*

1. Ìpàdé gbígba òògùn amúnipadàbòsípò
   Ìbẹ̀wò àti ojọ́ ìbẹ̀wò .....
   .....
   .....

20	Ọpọ̀lọpọ̀ ènìyàn ni ara wọn kì í balẹ̀ nígbà tí wọ́n bá wà ní ìtòsí alárùn éèdì				
21	Èmi kì í ri ìdí tí mo gbọ́dọ̀ fi sọ ọ̀rọ̀ pé mo jẹ́ alárùn éèdì dàṣírí				
22	Mo máa ń pòǹgbẹ́ pé bí àwọn ènìyà yóò ṣe dámi lẹ́jọ́ nígbà tí wọ́n mọ̀ pé alárùn éèdì ni mi.				
23	Níní àrùn éèdì nínú àgọ́ ara mi ń dójú tì mí.				

Ọpọ̀lọpọ̀ àwọn nǹkan tí ó wà ní ìsàlẹ̀ yìí ní ó gbà pé o ti sọ fún àwọn ẹlòmí-ìn pé o jẹ́ alárùn éèdì, tàbí pé àwọn ènìyàn mọ̀. Ó ṣée ṣe kí èyí má jẹ́ òótọ́ fún ọ. Tí ọ̀rọ̀ náà bá jẹ́ èyí tí kò tíì ṣẹlẹ̀ sí ọ rí, jọ̀wọ́ fí ara rẹ sípò náà.

24	Ó ti fún mi lẹ́dùn ọkàn lórí ìṣésí àwọn ènìyàn sí mi nígbà tí wọ́n mọ̀ pé mo ní àrùn éèdì				
25	Mo máa ni mí lára pé àwọn ènìyàn tó mọ̀ pé mo jẹ́ alárùn éèdì yóò sọ fún ẹlòmíràn				
26	Mo kábámọ̀ nítorí pé mo sọ fún àwọn kan pé mo lárùn éèdì.				
27	Gégé òfin, sísọ fún àwọn ẹlòmíràn pé mo jálárùn éèdì jẹ́ àṣìṣe.				
28	Àwọn-òn kàn kì í fẹ́ fọwọ́ kàn mí ní kété tí wọ́n bá ti mọ̀ pé mo jálárùn éèdì				
29	àwọn tí mo fẹ́ràn gan ti dẹ́kun pípè mí lẹ́yìn tí wọ́n ti mọ̀ pé mo lárùn éèdì				
30	Àwọn-òn kan ti sọ fún mi pé mo jèrè ni lórí níní àrùn éèdì nípá bí mo ṣe lo ìgbésí ayé mi.				
31	Àwọn èèyàn kan tí wọ́n sún mọ́mi ń bẹ̀rù pé àwọn náà lè dẹni ìkọ̀sílẹ̀ tí ó bá di mímọ̀ pé mo lárùn éèdì.				
32	Àwọn ènìyàn kì í fẹ́ rí mi pọ̀ pẹ̀lú àwọn ọmọ wọ́n nítorí tí mo jẹ́ alárùn éèdì.				
33	Àwọn èèyàn kan tíẹ̀ ti fà sẹ́yìn fún mi ní gbangba nígbà tí wọ́n mọ̀ pé mo lárùn éèdì.				
34	Àwọn-òn kan máa ń wò ó pé èmi ni mo fà á ìdí tí mo fi ní éèdì.				
35	Mo ti dẹ́kun àti máa bá àwọn ènìyàn kẹ́gbẹ́pọ̀ nítorí ìṣesí wọn sí mi lórí pé mo lárùn éèdì.				
36	Mo ti pàdánù àwọn ọ̀rẹ́ mi nítorí pé mo sọ fún wọn pé mo lárùn éèdì				
37	Mo ti sọ fún àwọn tí wọ́n sún mọ́ mi kí wọ́n fi àṣírí éèdì tí mo ní pamọ́.				
38	Àwọn tí wọ́n mọ̀ pé mo ní àrùn éèdì kì í ka kókó ọ̀rọ̀ mi sí nǹkankan.				
39	Àwọn ènìyà máa ń bẹ̀rù mi nígbà tí wọ́n bá ti mọ̀ pé mo lárùn éèdì				
40	Nígbà tí àwọ́n ènìyàn bá ti mọ̀ pé o ní àrùn éèdì, àṣìṣe nínú ìwà rẹ̀ ní wọ́n á máa wá kíri.				

ÌPÍN C: ÀBÁJÁDE *PMTCT*

1. Ìpàdé gbígba òògùn amúnipadàbọ̀sípò
   Ìbẹ̀wò àti ojọ́ ìbẹ̀wò .....
   .....
   .....

2. Ìpàdé àwọn alábòyún
   Ìbẹ̀wò àti ọjọ́ ibẹ̀wò .....
   .....
   .....
3. Ọ̀nà à-ń-gbà bímọ tí o yàn láàyò .....
4. Ọ̀nà-à-ń-gbà fọ́mọ ìkókó lóúnjẹ .....
5. Ìpàdé àwọn ọlọ́mọ wẹ́wẹ́
   Ibẹ̀wò àti ọjọ́ ibẹ̀wò .....
   .....
   .....
6. Èsì àbájádé àrùn éèdì fún ọmọ ọwọ́ (pẹ̀lú ọjọ́) .....
   Bí ó bá jẹ́ bẹ́ẹ̀ ni, dáhùn ìbéérè (7)
7. Ojọ́ tí wọ́n bẹ̀rẹ̀ ìtọ́tú ọmọ náà pẹ̀lú òògùn amúnípadàbòsípò
   .....

University of the Western Cape
Faculty of Community and Health Sciences
School of Nursing

09 September 2013

P/Bag X17, Bellville 7535, South Africa Tel.: +27 21 9593482 Fax: +27 21 9592679 E-mail: njohannes@uwc.ac.za

The Officer in Charge

PEPFAR unit, State Hospital

Letter of introduction of the student Ms Adeyinka Ganiyat Ishola

This serves to confirm that Ms Adeyinka Ganiyat Ishola is currently registered for the PhD program in the School of Nursing, Faculty of Community and Health Sciences at the University of the Western Cape, South Africa. She holds a B.Sc and M.Sc degree in Nursing from the University of Ibadan in Nigeria.

Kindly accommodate Ms Ishola in her request to carry out her data collection

for her PhD. Thank you.

Sincerely

Nicolette Johannes
Postgraduate Administrator
School of Nursing
University of the Western Cape
South Africa
Tel: +27 21 959 3482
Email: njohannes@uwc.ac.za

University of the Western Cape
Faculty of Community and Health Sciences
School of Nursing

09 September 2013

P/Bag X17, Bellville 7535, South Africa Tel.: +27 21 9593482 Fax: +27 21 9592679 E-mail: njohannes@uwc.ac.za

The Principal Investigator

PEPFAR, University College Hospital, Ibadan

Letter of introduction of the student Ms Adeyinka Ganiyat Ishola

This serves to confirm that Ms Adeyinka Ganiyat Ishola is currently registered for the PhD program in the School of Nursing, Faculty of Community and Health Sciences at the University of the Western Cape, South Africa. She holds a B.Sc and M.Sc degree in Nursing from the University of Ibadan in Nigeria.

Kindly accommodate Ms Ishola in her request to carry out her data collection

for her PhD. Thank you.

Sincerely

Nicolette Johannes
Postgraduate Administrator
School of Nursing
University of the Western Cape
South Africa
Tel: +27 21 959 3482
Email: njohannes@uwc.ac.za

University of the Western Cape
Faculty of Community and Health Sciences
School of Nursing

09 September 2013

P/Bag X17, Bellville 7535, South Africa Tel.: +27 21 9593482 Fax: +27 21 9592679 E-mail: njohannes@uwc.ac.za

The Chairman, UI/UCH Ethical Review Committee

College of Medicine, University of Ibadan

Letter of introduction of the student Ms Adeyinka Ganiyat Ishola

This serves to confirm that Ms Adeyinka Ganiyat Ishola is currently registered for the PhD program in the School of Nursing, Faculty of Community and Health Sciences at the University of the Western Cape, South Africa. She holds a B.Sc and M.Sc degree in Nursing from the University of Ibadan in Nigeria.

Kindly accommodate Ms Ishola in her request to carry out her data collection for her PhD. Thank you.

Sincerely

Nicolette Johannes
Postgraduate Administrator
School of Nursing
University of the Western Cape
South Africa
Tel: +27 21 959 3482
Email: njohannes@uwc.ac.za

University of the Western Cape

Faculty of Community and Health Sciences

School of Nursing

P/Bag X17, Bellville 7535, South Africa Tel.: +27 21 9593482 Fax: +27 21 9592679 E-mail: njohannes@uwc.ac.za

09 September 2013

The Chief Medical Director

University College Hospital, Ibadan

Letter of introduction of the student Ms Adeyinka Ganiyat Ishola

This serves to confirm that Ms Adeyinka Ganiyat Ishola is currently registered for the PhD program in the School of Nursing, Faculty of Community and Health Sciences at the University of the Western Cape, South Africa. She holds a B.Sc and M.Sc degree in Nursing from the University of Ibadan in Nigeria.

Kindly accommodate Ms Ishola in her request to carry out her data collection

for her PhD. Thank you.

Sincerely

Nicolette Johannes

Postgraduate Administrator

School of Nursing

University of the Western Cape

South Africa

Tel: +27 21 959 3482

Email: njohannes@uwc.ac.za