ANALYSIS OF THE DETERMINANTS OF WILLINGNESS OF WOMEN TO ADHERE TO PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV (PMTCT) IN MALAWI: A CASE OF ZOMBA DISTRICT

MASTER OF ARTS (ECONOMICS) THESIS

By

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DECLARATION

I declare that this thesis is my original work and hence any errors made herein are mine alone. The opinion expressed in the study are those of the researcher and do not necessarily represent the views of the supervisor. Where other researchers' work has been used, due acknowledgements have been made accordingly. I further declare that this thesis has never been submitted in any university or any institution of higher learning for similar purposes.

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CERTIFICATE OF APPROVAL

I declare that this thesis is the student's own work and effort and where he has used other sources, acknowledgement has been duly made. Hence the thesis is submitted with my approval on behalf of the University of Malawi, Chancellor College, Zomba.

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DEDICATION

To my dearest mum and dad and entire members of my family.

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ABSTRACT

The overall objective of this study was to analyze the determinants of willingness of women to adhere to the prevention of mother to child transmission of HIV (PMTCT) in Malawi. The study used two sources of data, namely ART registers and primary data obtained from the in-depth interviews with randomly chosen respondents in 13 health centers in Zomba district. The study used the following as the independent variables: Income level of the woman/household, Sex of the head of the household, Education level of the woman, Age of the woman, Parity of the woman, membership of the woman to the PLHIV support group, Distance covered by the woman to go to the health centers to access health care, Location of the woman and Involvement of the woman in Mother-Infant- Pair as a PMTCT strategy in Malawi in a logistic regression model. Main findings of this Analysis show that Mother – Infant – Pair (MIP), Sex of the head of the household, Age of the woman, programmes that can enhance attainment of education by females, encouragement of the PLHIV women to be members of PLHIV support groups, reduction of the distances covered by women when accessing health services, parity of the woman thus mobilization of the members of the community especially women living with HIV to eschew from having desire of having many children and the discouragement of the act of giving birth by young women, have a significant probability of reducing the rate of defaulting on the adherence to utilization of recommended PMTCT services in Malawi.

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LIST OF ABBREVIATIONS AND ACRONYMS

ABM:	Anderson Behavioural Model
AIDS:	Acquired Immunodeficiency Syndrome
ANC:	Antenatal Clinic
ART:	Antiretroviral Therapy
ARV:	Antiretroviral
CHBC:	Community Health Based Care
CTC:	Close to Client Approach
DHO:	District Health Officer
DNA	Dioxy- Nucleolic- Acid
FHI:	Family Health International
GoM:	Government of Malawi
HBM:	Health Belief Model
HIV:	Human Immunodeficiency Virus
HSA:	Health surveillance Assistant
HTC:	HIV Testing and Counseling
LR:	Log-likelihood Ratio
MGDS:	Malawi Growth Development Strategy
MIP:	Mother-Infant-Pair
MoH	Ministry of Health
MOHCW	Ministry of Health and Child Welfare (in Zimbabwe)
MTCT:	Mother to Child Transmission
NAC:	National Aids Commission
NSO:	National Statistical Office

OVC: Orphans and other Vulnerable Children

PCR: Polymerase Chain Reaction

PLHIV: People Living with HIV

PLHIVSG: People Living with HIV- Support Group

PMTCT: Prevention of Mother to Child Transmission

TPB: Theory of Planned Behaviour

TRA: Theory of Reasoned Action

UN: United Nations

UNAIDS: Joint United Nations Programme on HIV&AIDS

UNFPA: United Nations Population Fund

UNICEF: United Nations International Children's Emergency Fund

WHO: World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background and Motivation

Since 1985 when the first case of Acquired Immunodeficiency Syndrome (AIDS) was diagnosed in Malawi, Human Immunodeficiency Virus (HIV) prevalence has been increasing among persons aged 15 – 49. The prevalence rate has been higher among women than men (GoM, 2004), due to the fact that women are the victims of gender based violence.

Malawi has developed a number of legislations, policies and strategic plans that guide HIV&AIDS interventions. Therefore, in 2006, the country developed the Malawi Growth and Development Strategy (MGDS) covering the period of 2006 -2011 (GoM, 2004) This was replaced by MGDS II covering the period of 2011 – 2016, in which HIV&AIDS is recognized as a cross cutting issue (ibid). According to Malawi government Global Aids response progress report (2012), the goal of the MDGS II as it relates to HIV is to prevent the spread of HIV infection and mitigate the health, socio–economic and psychosocial impacts of HIV&AIDS. The MGDS II identifies three medium – term expected outcomes namely: (i) reduced HIV infection and transmission rate, (ii) improved dietary practices of PLHIVs, OVC and affected individuals and households and (iii) improved quality of lives of PLHIV, OVC and affected individuals and households (GoM, 2012). However, the areas of emphasis for the MGDS II include: (i) promoting HIV testing and counseling (HTC), (ii) promoting prevention of mother to child transmission (PMTCT) of HIV, (iii) capacity building for HIV management; promoting advocacy and awareness campaigns, (iv) promoting access to quality community home based care (CHBC), (v) promoting support to PLHVs, OVC and affected individuals and households, and (vi) increasing access to ARVs and treatment of opportunistic infections, among other interventions (ibid).

1.2 Mother to Child Transmission (Vertical Transmission) of HIV

Mother to child transmission (MTCT) is when an infected woman passes the virus to her baby. It is also known as vertical transmission of the virus. Mother to child transmission of human immunodeficiency virus may occur during pregnancy, labour and delivery or after birth while breastfeeding (Stringer, 2006). According to Joint United Nations Programme on HIV&AIDS (2006), vertical transmission of the virus is the second most common mode of transmission of HIV in Malawi. The joint WHO and UN report shows that without any intervention[1], 27 – 30 % of babies born to HIV infected mothers would acquire the virus. In the same report, it is also indicated that among all babies who are infected with HIV, 21% got the virus from their mothers during pregnancy, 65% during labour and delivery while 14% got the virus through breastfeeding (WHO/UNAIDS/UNICEF/UNFPA, 2003).

1.2.1 Goal of the Prevention of Mother to Child Transmission in General

The PMTCT goal is to reduce the number of paediatric HIV infections and improve the quality of life for HIV exposed infants, infected children and parents living with HIV (UNAIDS, 2004).

1.2.2 Risk Factors for Vertical Transmission of the virus

Transmission of HIV-infection from a mother to her child is influenced by multiple factors. An important determinant may be the mother's viral load, CD4[2] cell count, and duration of labour. Several studies based on small numbers of mother-child pairs have demonstrated that a high viral load, as measured by polymerase chain reaction (PCR) is associated with increased transmission (UNAIDS, 2004). Apart from the viral load the low maternal CD4 cell counts, an advanced clinical HIV stage and increased levels of neopterin or beta-micro globulin are also detrimental in prevention of mother-to-child transmission of HIV (UNAIDS, 2004). Ray and Jackson (2000) argue that an infant born to a mother who has primary HIV-infection during pregnancy is at high risk of infection because of the mother's high viral load.

[1] Without PMTCT services, 27- 30% of babies born to HIV infected mothers can acquire the virus.

[2] CD4 is a receptor for HIV in humans.

1.2.3 Prevention of Mother to Child Transmission of HIV in Malawi

In recent years Malawi has increased efforts to prevent the vertical transmission of the virus. Since 2004, the country has rapidly expanded medical services for pregnant women. In 2010 for instance, around 66 percent of pregnant women were tested for HIV, compared to only 10 percent in 2005 (GoM, 2008).PMTCT services are fully integrated into maternal and child health services in Malawi and it is currently available in 544 sites as at June 2011. Of the 544 PMTCT sites, 200 sites are able to collect blood for DNA – PCR for early infant diagnosis (ibid).

In 2011, Malawi's Ministry of Health began to implement the 2010 WHO guidelines by rolling out a "universal test and treat" strategy for pregnant women. This innovative strategy, called Option B Plus, uses immediate lifelong ART for all pregnant women who test positive. It has the potential to make serious advances towards eliminating paediatric HIV (Shapiro *et al*, 2010). Not only the provision of the lifelong ART to all pregnant women but also intensification of HIV testing and counseling so that women should know their statuses before delivery. Despite the offer of HIV testing and counseling (HTC) in the antenatal care clinic (ANC) setting as the integral part of PMTCT, many HIV infected women give birth in health facilities without knowledge of their HIV statuses, thereby missing an opportunity to prevent vertical transmission of virus to their infants and care for their own health (WHO, 2010). This is evidenced by the Malawi's national quarterly HIV programme report (MoH, 2012) which is indicating the antenatal cohort analysis on HIV status ascertainment. Therefore, according to the report there were 47,762 representing 33% of women whose HIV statuses were not ascertained and 99,168 representing 67% women whose HIV statuses were ascertained (MoH, 2012).

According to the most recent recommendations of the World Health Organization, biomedical prevention of MTCT using antiretroviral therapy (ART) interventions can reduce the rate of MTCT to less than 5 percent in breastfeeding populations (WHO, 2009; Chasela *et al*., 2010; Shapiro *et al*., 2010). In program settings, however, less than 35 percent of all women complete the sequence of interventions involved in effective PMTCT (GoM, 2010).

Therefore, out of the aforementioned discussion, one can saliently see that there are hidden factors that tend to influence women to adhere (or not) to the PMTCT services in Malawi.

Many researchers have written on different factors influencing women's adherence to PMTCT services in Malawi. For instance research conducted by Nyasulu (2007), focused on some selected demographic factors such as knowledge of a woman about PMTCT, education level of the woman, marital status of the woman, age of the woman and stigma and discrimination without indicating the marginal effects of these factors to the dependent variable PMTCT. However, the range of demographic factors extends beyond what was included in that study, for instance in Malawi. Factors such as number of children of the woman (parity) would be important for investigation and this study seeks to include more of this kind of factor. This study would also go to account for programmatic factors such as, distance covered by the woman when going to attend antenatal clinic services, involvement of a woman in mother – infant – pair strategy, which are considered to be strategic features of the PMTCT approaches in Malawi. The conceptualization of these factors recognizes the importance of the role played by both the supply side and demand sides in the production and uptake of the health care commodity as stipulated by the co-production theories of health care.

1.2.4 Supply Side Factors Affecting the Proper Uptake of PMTCT Services

These factors include all initiatives and endeavors that the government through the ministry of health can do in a particular area with respect to PMTCT services in Malawi, such as provision of the PMTCT services within a distance of 10km, implementation of Option-B plus, that involves the provision of the lifelong ART chemoprophylaxis therapy, training many people in HTC services, promotion of follow ups services to the defaulters of the PMTCT services just to mention a few. Therefore, the absence of these important initiatives can suffocate the whole objectives of the PMTCT services.

1.2.5 Demand Side Factor Affecting the Proper Uptake of PMTCT Services

These are factors mostly perceived at the individual level. Of course these factors are governed by the variations in utility by the service users in a particular area. This implies that when a woman gets a higher utility out of the services provided to her, she will be able to adopt such a service without any problem and that if the utility is low, then the uptake of the PMTCT services will also be poor. However, there are deterministic factors that may influence the realization of the utility out of the services provided to the pregnant women such as age, education, income, sex, parity etc.

1.3 Targeted Area of the Study

This study was conducted in Zomba district which is one of the districts in southern region of Malawi whose population is 670,000 and 80% of inhabitants are rural (NSO, 2008). Antenatal surveillance data from sentinel health centers show that HIV prevalence is high, ranging from 12% to 34% (Malawi MoH, 2008). Public health services are provided at one central hospital, one mission hospital and 33 health centers, run by the Zomba District Health Office (DHO).

Since 2005, the Zomba DHO in partnership with Dignitas International[3], have implemented PMTCT services. By 2007, 22 ANC sites in Zomba District provided PMTCT services. Zomba District data indicate that 96% of all women attend at least one ANC visit and that 56% of deliveries are performed by skilled birth attendants in health institutions (Richard *et al*, 2011). In Zomba district, where uptake of PMTCT services by pregnant women appears to be increasing, monitoring data showed that few HIV infected mothers and HIV exposed infants are accessing HIV treatment, care and support services (ibid). Therefore, assessing the quality of PMTCT services and identifying ways in which delivery of those services could be improved, is essential to address maternal health needs and prevent vertical transmission[4] of the virus.

[3] Dignitas International is an NGO which is involved in researches in health related issues in Malawi.
[4] Vertical transmission of the virus is a transmission of the virus from the mother to a child.

1.4 Problem Statement

According to Richard *et al*, (2011) Zomba District data indicate that 96% of all women attend at least one ANC visit and that 56% of deliveries are performed by skilled birth attendants in health institutions. They also receive information about the process and the benefits of the PMTCT programme including antiretroviral drugs. However, despite the high levels of HIV&AIDS awareness and awareness of the benefits of the PMTCT programme, only 18% of HIV-infected mothers follow all current recommended PMTCT options. Therefore there are inconsistencies between what is happening on the ground and the ideals set by the policy framework for the Malawi PMTCT-programme. Hence this study finds it necessary to investigate supply and demand side barriers that tend to affect the willingness of the women (ages of 16- and 45-years and eligible on the PMTCT programme in Zomba Health Clinics, Malawi) in terms of adoption and staying on the course of the recommended PMTCT options.

1.5 Study Justification

Nevirapine[5] reduces the risk of Mother to child HIV transmission (Bulterys and Fowler, 2000). The Voluntary Counseling and Testing (VCT) and PMTCT role out plans for the government of Malawi is expected to reduce the HIV infection rates at all levels. According to World Health Organization (2010) the effectiveness of the PMTCT programmes depends upon the ability of the pregnant women to follow all the comprehensive and recommended interventions. The results from this study may help inform policy on what factors from both supply side and demand side are affecting pregnant women to uptake of PMTCT recommended services and how to address them.

1.6 Objectives of the study

1.6.1 Main Objective

To investigate on how demographic[6] factors, biographic[7] factors, economic factors, geographical factors and PMTCT programmatic factors affect pregnant women in the uptake of PMTCT recommended services in Malawi.

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[5] Nevirapine is non-nucleoside reverse transcriptase inhibitor (trade name Viramune) used to treat AIDS and HIV.

[6] Demographic variables are the variables characterizing human populations (or segments of human populations broken down by age, sex or income etc.).

[7] Biographic variables are variables relating to a person's life, or an account of a person's life.

In the nutshell, the study investigates on how predisposing factors, enabling factors and need factors influences women on uptake of PMTCT recommended services in Malawi.

1.6.2 Specific objectives

The specific objective of the study is to investigate on how the ages of women, education levels of women, income of women, membership of women to PLHIV support groups, location of the women, parity of women, the sex of head of household, mother – infant pair PMTC strategy and the distance covered by women to go to a health centre to access ART, influence health decision-making in Malawi. However, to accomplish the above objectives below are the corresponding null hypotheses that have been tested.

1.7 Hypotheses of the Study

- Age of a woman does not affect willingness of a woman to adhere to PMTCT services in Malawi.
- Education level of a woman does not affect willingness of a woman to adhere to PMTCT services in Malawi.
- Income of the woman/household does not affect willingness of a woman to adhere to PMTCT services in Malawi.
- Membership to PLHIVSG by a woman does not affect willingness of a woman to adhere to PMTCT services in Malawi.
- Location of a woman/house does not affect willingness of a woman to adhere to PMTCT in Malawi.
- Parity of a woman does not affect willingness of a woman to adhere to PMTCT services in Malawi.
- Sex of the head of the household does not affect willingness of a woman to adhere to PMTCT services in Malawi.
- Involvement in mother-infant-pair strategy in PMTCT does not affect willingness of a woman to adhere to PMTCT services in Malawi.
- Distance covered to go to the health clinic does not affect willingness of a woman to adhere to PMTCT services in Malawi.

1.7.1 Apriori Assumptions of the Study

The study assumed that demographic, biographic, geographic, economic and programmatic variables drive the women's decisions to make use of the facilities and services offered by the PMTCT programme in Zomba Health clinics. Therefore, by investigating the aforementioned demographic, biographical and programmatic factors would cause the objectives of this study to be fully realized.

1.8 Organization of the Study

The study is organized in 5 chapters. Chapter 1 presents a scope of the study. Chapter 2 presents a review of existing literature both theoretical and empirical. Chapter 3 looks at the methodology of the study. Chapter 4 presents estimation and data analysis. Finally, chapter 5 consists of conclusion and policy implications.

1.9 Conclusion

This chapter has made the following discussions; section 1.1 presents background and motivation, section 1.2, looks at mother to child transmission of HIV, section 1.3 presents goals of the prevention of mother to child transmission in general, section 1.4 discusses risk factors for vertical transmission of the virus, section 1.5 presents prevention of mother to child transmission of HIV in Malawi, section 1.6 talks about supply side factors affecting the proper uptake of PMTCT services, section 1.7 looks at demand side factors affecting the proper uptake of the PMTCT services, section 1.8 presents the targeted area of the study, section 1.9 discusses on problem statement, section 1.10 presents study justification, section 1.11 discusses on objectives of the study, section 1.12 outlines hypotheses of the study, section 1.13 talks about Apriori assumptions of the study and finally section 1.14 outlines the organization of the study. In conclusion, the study assumed that demographic, biographic and programmatic variables drive the women's decisions to make use of the facilities and services offered by the PMTCT programme in Zomba Health clinics. The variables include age of the woman, parity of the woman, education of the woman, location of the woman, distance covered by the woman when accessing PMTCT services, income of the woman/household, membership of a woman to a PLHIV support group, involvement of a woman in Mother - Infant – Pair and sex of the head of the household.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

According to Babbie and Mouton (2001), every research report should be placed in the context of the general body of scientific knowledge[8]. The general purpose of a literature review therefore, is to gain an understanding of the current state of knowledge about the research topic (Johnson and Christensen, 2004).

For this study, the literature was reviewed to gain more understanding on PMTCT programmes, and in particular to gain an understanding of factors that contribute to utilization of targeted health services and therefore, the effectiveness of the program strategies. The review also contributed to the following contextual factors of the research on the PMTCT issues in Malawi.

- Identification of the relevant concepts linked to studying PMTCT as supply and demand problem.
- Isolating the knowledge and research gaps on PMTCT especially on choice of variables.
- Refining of the research problem as it obtains from the background information and specific context of the study area, namely Zomba District.

2.2 Scope of the literature review

The literature review included both theoretical[9] and empirical[10] sources. The most consulted were secondary[11] sources.

[8] Scientific Knowledge: knowledge based on proven facts.
[9] Theoretical sources: Concerned primarily with theories or hypotheses rather than practical considerations.
[10] Empirical sources: Derived from experiment and observation rather than theories.
[11] Secondary sources: include journals and textbooks.

An internet search was also conducted and a considerable amount of information on PMTCT was found. This chapter reviews literature on the PMTCT of HIV- designed to promote and understand women's health seeking behaviour. However, relatively few have proved effective, which is, at least partially, due to the lack of developing the practical aspects of programming to proven theoretical notions (Case *et al* 2005). infections as researched by different authors.

2.3 Theoretical Framework

Numerous research findings have provided undeniable evidence of the central role played by behaviour in the world's health problems. Glanz *et al* (2002), note that programmes that are meant to influence health behaviour, including health promotion and interventions, are most likely to benefit the communities when the programme is guided by theories of health behaviour. The specific theories of health behaviour are discussed below one by one. These theories also inform the monitoring and evaluation of change by helping to identify the outcomes to be measured, as well as the timing and methods of study to be used. A woman's access to health care, in physical, social, and psychological contexts, depends on her health beliefs and her socioeconomic and demographic background. In this study, four theories of health behaviour have been reviewed in an attempt to understand the supply side and demand side factors that affect the willingness of pregnant women attending the PMTCT programme; namely the Theory of Reasoned Action, the Theory of Planned Behaviour, Health Belief Model and Andersen behavioural model.These different theories or models of health seeking behaviour can be studied to produce a broad framework to inform investigation and intervention, particularly in the context of looking at use and non-use of PMTCT services. A study of the various theories or models thus produced a framework of variables which includes the attitudes towards and knowledge of women of HIV&AIDS and PMTCT services; socio-demographic characteristics, psychological and psychosocial factors and socio-cultural and socio-environmental factors. It should be noted that this study was not a test of any one of these theories, but rather that the constellation of factors guiding health seeking behaviour as posited in each of these theories contributed to the generation of the important variables to include in the study.

2.3.1 The Theory of Reasoned Action (TRA)

Theory of Reasoned Action postulates that individual behaviour is driven by beliefs, attitudes, intentions, expectations, and social norms. It states that individuals hold attitudes and beliefs that shape their intentions to engage in behaviour. This in turn influences their actual behaviour (Valente 2002). The roots of the Theory of Reasoned Action also come from the field of Social Psychology (Chiroro *et al* 2002). The social psychologists attempts, among other things, to explain how and why attitudes impact behaviour. That is, how and why people's beliefs change the way that they act. In basic terms, TRA says that a person's behaviour is determined by his or her attitude towards the outcome of that behaviour and by the opinions of significant social others in the person's social environment.

Ajzen and Fishbein (cited by Chiroro *et al* 2002) proposed that a person's behaviour is determined by her or his intention to perform the behaviour and that this intention is, in turn, a function of her or his attitude toward the behaviour and her or his subjective norm. According to Petty and Cacioppo, (cited by Valente 2002), in order to change behaviour, health promotion programmes have to first change attitudes and beliefs about the behaviour. Increasingly, TRA has included perceptions of community norms as an influence on behaviour. It argues that attitudes and intentions are influenced by subjective interpretations of the norms, social influence, and social pressure regarding the behaviour (Valente 2002).

However, in summary the new model developed from the TRA by Chiroro, stipulates that women's attitudes towards the PMTCT programme are determined to a larger extent by knowledge, social position in the family and sex role stereotypes. In turn, sex role stereotypes, sexuality standards and attitudes towards HIV&AIDS are products of the individual's knowledge and beliefs about sexuality both of which are determined by socio-cultural factors as well as the individual's personality, habits and general attitudes towards life.

The model also highlights that the provision of information to people in order to increase their knowledge does not guarantee that such knowledge will necessarily be used. This implies that mode of presentation and the extent to which the incoming information is assimilated, believed and used by recipients also play a role in this regard.

The modified model further argues that women's attitudes towards health care services do not directly affect their behaviour in a specific situation. A number of intervening variables play a significant role in determining whether or not a person decides to engage in a particular behaviour. First, a person's attitudes predispose her to act in a particular way but that intention is significantly affected by the individual's assessment of the social context prevailing at a given time. The foregoing suggests that as the context changes, the same individual can arrive at different conclusions and engage in different types of health-seeking behaviours.

Secondly, the person's physical state or health condition (e.g. already showing signs of HIV-infection) could significantly influence that individual's intentions and decisions. It is therefore important to note that the behaviour itself is a product of multiple factors that interact in a complex way in any given situation. This set of interrelated factors must be considered together as important determinants of pregnant women's attitudes towards the PMTCT programme if future intervention programmes are to be more effective in order to result in positive behavioural change.

Finally, to sum it all, the model argues that the individual is capable of assessing the consequences of her behaviour, the results of which are used to reshape that individual's health-seeking attitudes.

2.3.2 Health Belief Model (HBM)

The Health Belief Model (HBM) was first developed in the early 1950s by a group of social psychologists to explain the widespread failure of people to participate in disease prevention programmes (Glanz *et al* 2002). Over the years the model has been modified and extended to peoples' responses to symptoms and to their behaviours in response to diagnosed illness, particularly adherence to specific medical regimens.

The HBM postulates that people will take action to prevent, to screen for, or to control illness if they regard themselves as susceptible to the condition. It also poses that people will take action to prevent or control ill-health condition; if they believe it would have potentially serious consequences, if they believe that a course of action available to them would be beneficial in reducing either their susceptibility to or the severity of the condition. Additionally, the model observes that, people will act if they believe that the anticipated barriers to (or cost of) taking the action are outweighed by its benefits.

Health Believe Model argues that in order for behaviour to succeed, people must feel threatened by their current behavioural patterns (perceived susceptibility and severity) and believe that change of a specific kind will result in a valued outcome at acceptable cost. They also must feel themselves competent (self-efficacious) to overcome perceived barriers to taking actions. For example, if the perception of HIV&AIDS threat is high, and the perceived benefits outweigh perceived barriers, the HBM predicts that a cue to action could prompt an individual to adopt HIV&AIDS preventive behaviours (Glanz *et al* 2002).

Therefore, women who perceive HIV&AIDS as a threat are likely to adopt the recommended PMTCT services. Below is the figure depicting the framework of Health Belief Model (HBM).

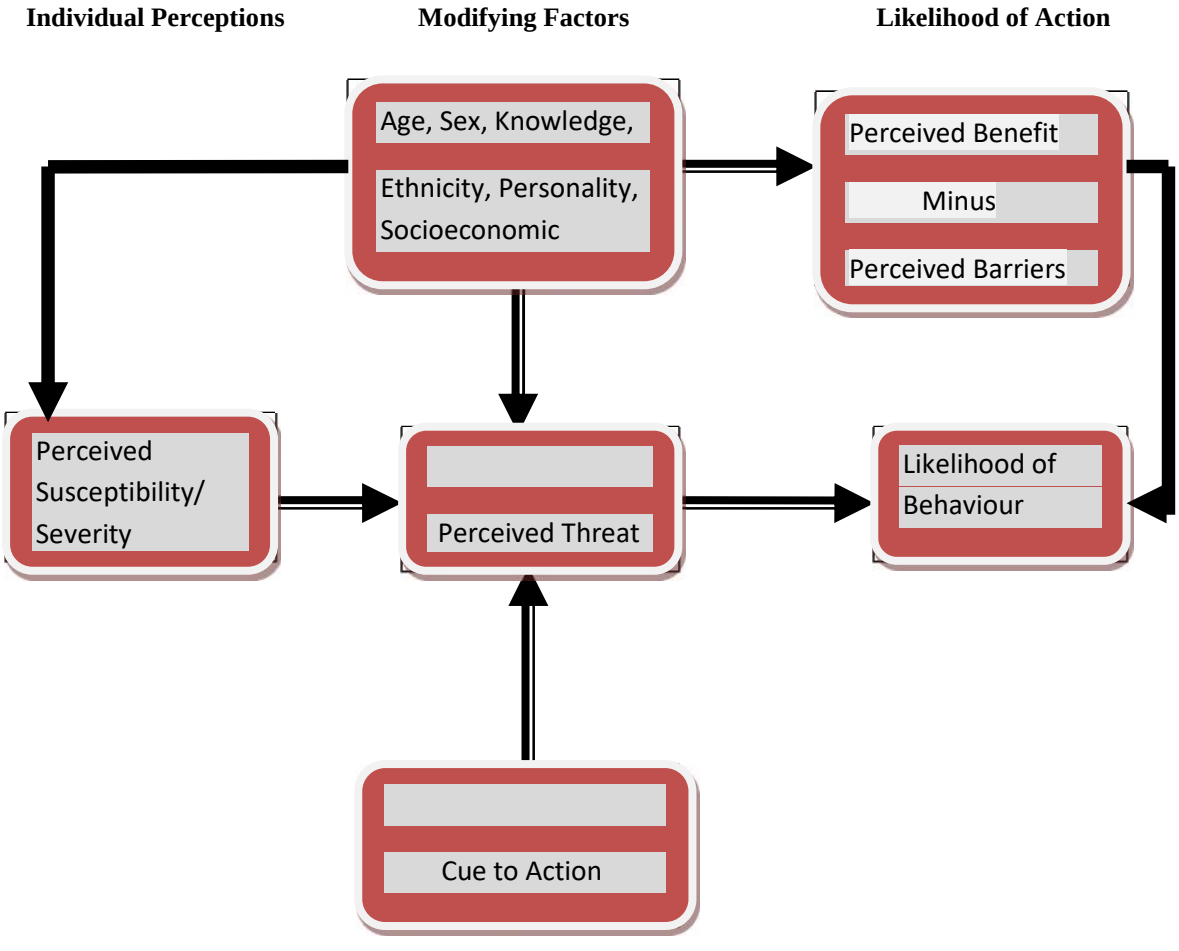

Figure 1: The Framework of Health Belief Model (HBM)

Adapted from: Stretcher, V., & Rosenstock I.M. (1997)

In addition to the four beliefs or perceptions and modifying variables, the HBM suggests that behaviour is also influenced by Cues to Action. Cues to Action are events, people or things that move people to change their behaviour. Examples include, illness of a family member, media reports (Graham, 2002), advice from others, reminder post cards from a health care provider or health warning labels on a product (Ali, 2002). Below is the billboard showing an example of Cues to Action.

Figure 2: Billboard Displaying SRH Promotion Message as an example of Cues to Action

2.3.3 The Theory of Planned Behaviour (TPB)

The theory of reasoned action and the theory of planned behaviour are concerned with individual motivational factors as determinants of the likelihood of performing a specific behaviour (Chiroro *et al* 2002). The TRA includes measures of attitudes and social normative perceptions that determine behavioural intention. Behavioural intentions in turn affect behaviour. We can saliently observe that, the Theory of Planned Behaviour (TPB) is an extension of the TRA rather than an independent theory. The TPB includes an additional construct concerned with perceived control over performance of the behaviour.

According to Ajzen (1991); Ajzen and Driver (1991), and Ajzen and Madden (1986) (cited by Glanz *et al* 2002), argue that, the TRA assumes that the most important direct determinant of behaviour is behavioural intentions. The success of the theory in explaining behaviour is dependent upon the degree to which the behaviour is under volitional control (i.e., situations in which individuals can exercise a large degree of control over the behaviour). It is further observed that, under conditions of high volitional control, motivation as measured by intentions and its attitudinal and normative determinants is expected to be the main determinant of behaviour. However, Ajzen and Driver (1991) note that, it is not clear that the TRA components are sufficient for predicting behaviour in which volitional control is reduced.

For example, it is argued that a person who has high motivation to perform a specific behaviour may not actually perform that behaviour due to environmental conditions that intervene.

Perceived behavioural control was added to the TRA in an effort to account for factors outside of the individual's control that may affect his/her intentions and behaviour. Glanz *et al* (2002) note that, the extension of the TRA was based in part on the idea that behavioural performance is determined jointly by motivation (intention) and ability (behavioural control). Ajzen and Driver (1991, (cited by Glanz *et al* 2002) argue that a person will expend more effort to perform behaviour when his/her perception of behavioural control is high. They observe that, a persons' perception of control over behavioural performance, together with intention is expected to have a direct effect on behaviour, particularly perceived control is an accurate assessment of actual control over the behaviour and when volitional control is not high. Therefore, the effect of perceive control declines and intention is a sufficient behavioural predictor in situations in which volitional control over the behaviour is high (Glanz *et al* 2002).

In summary, both TRA and TPB provide an excellent framework for conceptualizing, measuring, and identifying factors that determine behaviour. The TRA focuses on cognitive factors (beliefs and values) that determine motivation (behavioural intention), and the theory has been very useful in explaining behaviour, particularly behaviour under volitional control. The TRA provides a very precise rationale for identifying and measuring behavioural and normative beliefs and for testing their association with intentions and behaviours. The TPB extends the TRA by adding perceived behavioural control concerned with facilitating or constraining conditions that affect intention and behaviour. This is particularly important for behaviour over which a person has less volitional control. The theories of health behaviour (HBM, TRA, and TPB) remain major organizing frameworks for explaining and predicting acceptance of health and medical care recommendations. In this study, the researcher was guided by the variables pointed out in these frameworks as correlates of health seeking behaviours, but this study was not a test of these theories and neither did it set out to follow the methodological pathways traditionally followed in the strict application of these theories.

These different theories or models of health seeking behaviour can be studied to produce a broad framework to inform investigation and intervention, particularly in the context of looking at use and non-use of PMTCT services.

A study of the various theories or models thus produced a framework of variables which includes the attitudes towards and knowledge of women of HIV& AIDS and PMTCT services; socio-demographic characteristics, psychological and psychosocial factors and socio-cultural and socio-environmental factor. It should be reiterated that this study was not a test of any one of these theories, but rather that the constellation of factors guiding health seeking behaviour as posited in each of these theories.

2.3.4 The Andersen's Behavioural Model (ABM)

The other model that was reviewed is Andersen's (1968) behavioural model. The Andersen's (1968) behavioural model is a detailed model for comprehensive analysis of health seeking behaviour with a scope for applying econometric and other statistical tools. The model assumes that health seeking behaviour is the result of interaction between characteristics of individuals, population and the surrounding environment.

According to the model, an individual's decision to utilize medical services depends on a sequence of conditions which are grouped into three components namely: predisposing characteristics, enabling factors and need factors. The distal determinants act on the proximate determinants to influence the number of ANC visits hence have an indirect impact on the ANC visits. The proximate determinants have direct impact on ANC use.
Thus *Health care utilization = f (predisposing, enabling, need factors).*

Predisposing factors are those factors which are supposed to make an individual susceptible to a specific action or behaviour or experience and can be divided into demographic, social structure, and belief sub components. Demographic variables include: age, sex, household size, marital status and past illness. Social structure includes: education, race, occupation, ethnicity and religion. Belief variables are those that are likely to influence illness behaviour. These are values concerning health and illness, attitudes towards health services and knowledge about disease or illness.

Enabling factors are variables that allow an individual to have the means to seek care. Important factors in this category are: availability of health facilities, accessibility to health care, quality of care and costs. Therefore family resources such as income, wealth, health insurance may constitute the variables that create the means to seek care. Area of residence, region, distance, transport costs, waiting time costs, physician population ratio also constitute variables that are under enabling factors. Need factors are characteristics of the disorder.

Intensity of illness measured by self-reported health status or sick days and evaluated need estimated by clinical diagnosis constitute the need factors. In case of pregnancy, complications associated with pregnancy, number of previous pregnancies and gestation period at first antenatal check. Below is the diagrammatical conceptual framework based on the Anderson's behavioural model of health services, depicting distal[12] and proximate[13] determinants in investigating ANC use.

[12] Distal determinants encompasses predisposing factors such as education, employment statuses, family background and religion, and enabling factor such as income, wealth, rural/urban residence as well as religion.

[13] Proximate determinants encompasses need factors such as health status, pregnancy complications and gestation period 1st antenatal check plus all distal determinants.

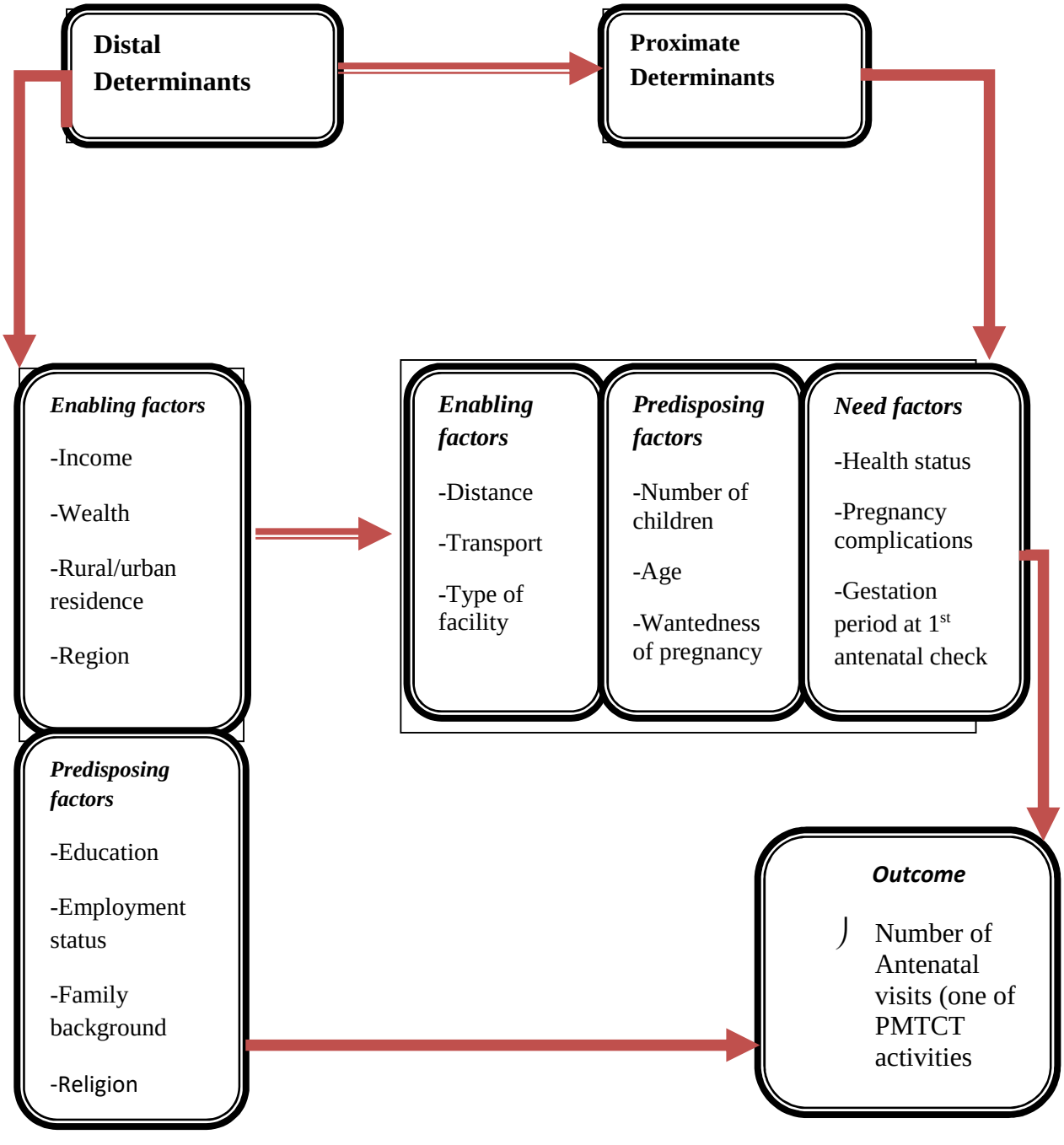

Figure 3: The Andersen's Behavioural Model

Adapted from: Andersen, 1968.

2.4 Economic Theories

2.4.1 The Human Capital Theory

The human capital framework is important because the theories of health care demand have evolved from it. One such theory is the human capital theory to demand for health developed by Grossman in 1972 where health capital is regarded as a component of human capital. The identification of health capital as a component of human capital stock meant that people demand good health in order to realize potential gains in productivity. By implication an increase in the stock of health would lead to increase in wage rates as a result of increase in human capital stock. Therefore the decision to invest in health is synonymous with the decision to invest in human capital.

Human capital refers to the stock of individual knowledge, capability, and skills that are economically usable thus all characteristics of an employee that may raise his or her salary including not only those skills that are acquired through education, but also talents and practical experience. Human capital differs from other forms of capital in that it cannot be sold or separated from its owner (Grossman, 1972).

Like other forms of capital, human capital is characterised by; investment where current expenditures are interchanged with future returns in terms of effect of an additional year of schooling on earnings and depreciation due to new knowledge or technical progress but also because people forget knowledge once it has been acquired. The human capital theory argues that, when there is an increase in an individual's stock of knowledge or human capital, his productivity in the market sector of the economy will increase where he produces money earnings, and in the non-market or household sector where he produces commodities that enter into his utility function (Grossman, 2000). Thus the human capital theory suggests that individuals and society derive economic benefits from investment in people.

Framework on which human capital theory is developed is that costs of investment in schooling and on the job training include direct outlays on market goods as well as the opportunity cost of the time that has to be withdrawn from competing needs.

Becker (1967) and Ben-Porath (1967) developed models that determine the optimal quantity of investment in human capital at any age. Assume perfect capital market and T periods, wage as a function of human capital is given by:

$$w_t = r_t^H H_t, \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where H_t, is the stock of human capital which is assumed to be homogeneous and r_t^H is the rate of return to capital. Inter- temporal utility function is therefore given by:

$$\int_{t=1}^{T} U\left(C_t, \bar{L} - L_t - I_t^z, H_t; t\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

With leisure defined as $F_t = \bar{L} - L_t - I_t^z$ ..... (3)

U denotes utility whereas C_t is consumption, I_t^z is the time attributed to the accumulation of human capital, $\bar{L}$ is total time available and L_t is the available time put into market work. H_t is the stock of human capital for the t-th period and is the subjective discount rate of the individual. Assume H_t generates direct utility hence it is accumulated by the following process:

$$H_t = f\left(I_{t-1}^Z, I_{t-1}^G, H_{t-1}; t\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

$$\Delta H_t = f\left(I_{t-1}^Z, I_{t-1}^G, H_{t-1}; t\right) - \delta H_{t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

Where $f(\cdot)$, denotes general human capital investment function, ΔH_t change in stock of human capital from period t-1 to t and δH_{t-1} is human capital that is lost (depreciation) at constant depreciation rate δ. I_t^Z is time investment needed for acquiring human capital and I_t^G is the investment in goods needed for the human capital investment.

Put in words: equation (5) implies that the change in human capital from last period to today is a linear combination of human capital acquired in the previous period (investment) and the stock of human capital once acquired that is lost (depreciated).

Without being much more detailed, the models developed by both Becker (1967) and Ben-Porah (1967) can be summarized basing on two main scenarios[14] as follows; first, *increase* in time investment needed for acquiring human capital and investment in goods needed for the human capital investment. Second scenario is that *decrease* in the aforementioned variables (time investment and good investment).

Therefore, on one hand, the increase in the aforementioned variables implies that efficiency of the investment is high. This also indicates that there is an increase in general human capital investment. An increase in the efficiency of investment means that there is a proper resource allocation and management hence boosting general human capital investment. On the other hand, a decrease in the aforementioned variables implies that a depreciation rate of the human capital is high. However, the main economic theory upon which this study rests is Grossman's demand for health model. As a main economic theory, a detailed discussion of the model will be made. Therefore, below is the detailed discussion of the Grossman's demand for health model[14].

2.4.2 The Grossman's Demand for Health Model

While the human capital theory emphasizes that an individual's stock of knowledge affects his productivity in the market sector of the economy where he produces money earnings and in the household sector where he produces commodities that enter into his utility function, the model by Grossman (1972) argues that health capital differs from other forms of human capital in the sense that an individual's stock of knowledge affects his non market productivity while his stock of health determines the total amount of time he can spend producing money earnings and commodities.

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[14] An increase in $Z(I_{tZ1}^{Z}, I_{tZ1}^{G})$ and a decrease in $Z(I_{tZ1}^{Z}, I_{tZ1}^{G})$ depends upon several factors as explained. On one hand, $Z(I_{tZ1}^{Z}, I_{tZ1}^{G})$ increases if there is an increase in $-f.$ implying that efficiency of investment is high. Furthermore an increase in T denoting longer time for amortization of human capital investment, an increase in $U(...,H_t,...)$ implying higher utility of human capital and high returns to human capital (r_t^H) entail an increase in $Z(I_{tZ1}^{Z}, I_{tZ1}^{G})$. On the other hand, $Z(I_{tZ1}^{Z}, I_{tZ1}^{G})$ decreases if the depreciation rate of human capital δ, is high and where the market rate of interest r, is high also meaning that the present is more important than the future.

The Grossman model (1982) emphasises the role played by patients' choice looking at health and wealth as two interrelated assets the values of which are optimally controlled over time by the individual. In the case of health, the marginal utility of holding a marginal unit of stock has consumption and an investment component, which together must always be equal to its marginal user cost.

Let $U = U(\phi_t, H_t, Z_t)$; $t = 0,1,...,n$, ... (8)

Where: U is the utility, H_t is the stock of health at age t or in time period t and ϕ_t is the service flow per unit stock. $h_t = \phi_t H_t$ is the total consumption of health services and Z_t is consumption of another commodity and n is the number of years. Stock of health at any other age is endogenous and death takes place when $H_t \geq H_{\min}$ hence length of life is determined by the quantities of health capital that maximize utility subject to production and resource constraints. As inherited health stock and rates of depreciation are given, the optimal quantity of gross investment determines the optimal quantity of health capital. By definition net investment in the stock of health equals gross investment minus depreciation:

$H_{t+1} - H_t = I_t - \delta_t H_t$ ..... (9)

Where I_t is gross investment and δ_t is the rate of depreciation in the t-th period $(0 \leq \delta \leq 1)$

A set of household production functions are given by:

$I_t = I_t(M_t, TH_t; E)$ ..... (10)

$Z_t = Z_t(X_t, T_t; E)$ ..... (11)

Where M_t, is a vector of inputs purchased in the market that contribute to gross investment in health, X_t is a vector of inputs that contribute to the production of Z_t, TH_t and T_t are time inputs while E is consumer's stock of knowledge exclusive of health and is exogenous.

The inputs budget constraint equates the present value of outlays on inputs to the present value of earnings over life cycle plus initial assets as follows:

$$\sum_{t=0}^{n} \frac{P_t M_t + Q_t X_t}{(1+r)^t} = \sum_{t=0}^{n} \frac{W_t TW_t}{(1+r)^t} + A_0 \quad \ldots \quad (12)$$

Where P_t and Q_t are prices of M_t and X_t, W_t is the hourly wage rate, TW_t is the total hours of work, A_0 is initial assets and r is the market rate of interest. Time constraint, Ω requires that total time available in any period is exhausted by all possible uses defined as:

$$TW_t + TH_t + T_t + TL_t = \Omega \quad \ldots \quad (13)$$

A full wealth constraint is given by:

$$\sum_{t=0}^{n} \frac{P_t M_t + Q_t X_t + W_t (TL_t + TH_t + T_t)}{(1+r)^t} = \sum_{t=0}^{n} \frac{W_t \Omega}{(1+r)^t} + A_0 \quad \ldots \quad (14)$$

Equilibrium quantities of H_t and Z_t are obtained by maximizing utility function in (8) subject to constraints in (9), (10) and (14).

Inherited stock of health and depreciation are given hence optimal quantities of gross investment determine optimal quantities of health capital. The first order optimality conditions for gross investment in period t-1 are:

$$\left.\begin{aligned} \frac{\pi_{t-1}}{(1+r)^{t-1}} = \frac{W_t G_t}{(1+r)^t} + \frac{(1-\delta_t) W_{t+1} G_{t+1}}{(1+r)^{t+1}} + \ldots + \frac{(1-\delta_t)\ldots(1-\delta_{n-1}) W_n G_n}{(1+r)^n} + \\ \frac{Uh_t G_t}{\lambda} + \ldots (1-\delta_t)\ldots(1-\delta_{n-1}) \frac{Uh_n G_n}{\lambda} \end{aligned}\right\} \quad (15)$$

$$\pi_{t-1} = \frac{P_{t-1}}{\partial I_{t-1}/\partial M_{t-1}} = \frac{W_{t-1}}{\partial I_{t-1}/\partial TH_{t-1}} \quad \ldots \quad (16)$$

Uh_t X$\frac{|U}{|h_t}$ the marginal utility of healthy time and ª the marginal utility of wealth

G_t :$\frac{|h_t}{|H_t}$ XZ $|TL_t \diagup |H_t$ the marginal product of the stock of health in production of health time and $®_{tZ1}$ is the marginal cost of gross investment in health in period t-1.

Equation (15) states that the present value of Marginal cost of gross investment in health in period t-1 is equal to present value of marginal benefit and it holds for any capital asset not only just for health capital. While equation (15) determines the optimal gross investment in period t-1, equation (16) shows the condition for minimizing the cost of producing a given quantity of gross investment. The optimal stock of health in period t is therefore given by:

$$G_t \; W_t \Gamma \; \frac{Uh_t}{\text{a}} \; \text{fi} \Gamma r \text{Å} \; \text{X}®_{tZ1} \text{fr Z}\overline{®}_{tZ1} \Gamma ¢_t \text{Å} \quad \text{..... (17)}$$

Expanding equation (17) we get:

$$\frac{G_t W_t}{®_{tZ1}} \Gamma \frac{G_t Uh_t \text{fi} \Gamma r \text{Å}}{\text{a}} \text{J} \frac{G_t}{®_{tZ1}} \text{X} r \text{Z}\overline{®_{tZ1}} \Gamma ¢_t \text{ ..... (18)}$$

Where: $\overline{®_{tZ1}}$ is percentage rate of change in Marginal cost between period t-1 and period t,$®_{tZ1} \text{fr Z}\overline{®}_{tZ1} \Gamma ¢_t \text{Å}$ is the user cost of health capital which comprises depreciation, interest rate and capital gains. Grossman assumes that the capital stock of health cannot be traded in a capital market. This implies that gross investment in health capital must be non-negative. However an individual is able to rent the health stock from himself over different time periods, giving rise to a user cost of health capital.

Equation (18) is the essential equation of the Grossman's demand for health model signifying that the marginal utility of holding a marginal unit of health stock has both consumption and investment benefits which together must always be equal to marginal user cost. Therefore demand for health services is derived demand because the services are meant to maintain or improve upon a certain health status and not consumed for their own sake.

Based on equation (18) an individual's demand for health services is given by:

$$M(t) = f(H(t), w(t), P_m(t), age(t), E(t), X(t)) \quad \text{.....} \quad (19)$$

The demand for health services at time *t, M(t),* is endogenously co-determined by the latent variable health status, *H(t),* and is affected by the wage rate *w(t),* a price vector for medical services, $P_m(t)$, individual age, *age(t),* the level of education, *E(t),* and a vector of environmental effects, *X(t).* A higher wage lowers the marginal incentive to hold health as an asset for consumption use, thus depressing the demand for medical care. In contrast it increases the opportunity cost of sick time, hence reinforcing the incentive to hold health as an asset. The impact of prices is negative like that of better education. Education should lower the demand for investment in health because it contributes to lower health stock depreciation. Demand for medical care should increase with ageing, because it is not optimal to let health stock decline in step with depreciation.

2.5 Empirical Framework

In studying the demographic and socioeconomic determinants of maternal health care utilisation, studies have focused on individual, household and community characteristics. Individual characteristics such as level of education, age, health status, autonomy, marital status, have been found to significantly influence maternal health care utilization. A study on determinants of prenatal care in Honduras revealed that education was significantly and positively related to prenatal care use while marital status, age and wantedness of pregnancy were significantly and negatively related to prenatal care use (Henze, 2004).

However, Chandiok *et al* (2006), found that there was statistically significant reduction in the proportion of women obtaining antenatal services with increasing age and number of living children in India while Abbas and Walker (1986) found that being married and duration of marriage were positively associated with prenatal care use in Jordan.

Several studies also found that maternal education and age were among the most important determinants of maternal health care utilization after controlling for other factors such as household size (Govindansamy and Ramesh, 1997; Celik, 2000: Celik and Hotchkiss 2000). The findings partly support the propositions by Grossman model (1972) that education and age influence demand for health services.

Resources at household and community level such as availability of health insurance cover, household income, household wealth, availability and accessibility to health care facilities between rural –urban areas, regions and states are important in influencing utilisation of maternal health care. Navaneetham and Dharmalingam, (2000) found that there were interstate differences in utilisation of maternal health care in South India. Additionally studies by Celik and Hotchkiss (2000); Erbaydar (2003), Fatmi and Avan (2002) seem to support the materialist school of thought that material advantage or disadvantage has impact on individual's health status and consequently health care use. These studies revealed that health insurance coverage, income, household wealth and housing characteristics such as presence of electricity in the house appear to be positively associated with prenatal care use. Studies by Materia *et al*, (1993) in Ethiopia: Griffiths and Stephenson (2001) in India; Jackson *et al* (2006) in South Africa revealed that distance to health facilities was negatively associated with utilisation of ANC services. A study by Hutton, (2002), also revealed that distance to facilities; cultural factors, disease type and user fees influence the utilisation of health services in Africa.

On the sex of the head of the household, many studies have revealed that when the head of the household is a male and that he is not involved i.e. taking part in PMTCT services, the proper uptake of these services is in limbo. Ekouevi *et al* (2004) in Ivory Coast, found that where the fear of male partners existed, had a negative effect on the uptake of the PMTCT interventions among HIV infected women, to the point that women who were in female headed household accepted the PMTCT package more frequently than those who had a male partner.

In general health care use, other studies have investigated on the determinants of doctor visits and impact of prices and income, in seeking health care from alternative sources. Gurmu, (1997) using the semi parametric estimation of hurdle regression model found that health status measures such as acute and chronic conditions are important in determining doctor visits other than socio economic variables.

A study by Fabbri and Monfardini, (2004) evaluated price and income elasticity in using alternative sources of health care using a semi-parametric trivariate negative binomial model in Italy. The study found that General Practitioner visits and private specialists' visits proved to be substitutes while consumption of public specialist visit was found to be slightly price sensitive but the value of this price elasticity not to decrease with income.

2.6 Conclusion

This chapter has presented a review of both theoretical and empirical literature. Theoretically, there are underlying economic, social and demographic foundations that determine health and consequently utilisation of health services. Empirically, determinants of health care utilisation vary widely from place to place however; age, education, distance and health status are some of the important determinants of health care utilisation.

On the other hand, the section has discussed the following general models: theory of reasoned action (TRA), health belief model (HBM), Andersen's behavioural model and theory of planned behaviour (TPB). Therefore, the study reviewed different models in order to establish relevant factors that determine health care utilization in Malawi. This study is mainly premised on the Andersen's behavioural model for that it is a detailed model for comprehensive analysis of health seeking behaviour with a scope for applying econometric and other statistical tools. The model assumes that health seeking behaviour is the result of interaction between *characteristics of individuals*, *population* and the *surrounding environment*. Therefore, variables of this study will emanate from the characteristics of individuals, population and the environment.

On economic theories, the section has discussed the human capital theory in general and Grossman's demand for health model. Therefore, the study is also premised heavily on the two aforementioned economic theories. The next chapter outlines the methodology employed in the study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The methodology employed to conduct the analysis of the willingness of pregnant women to adhere to PMTCT services in Malawi is outlined in this chapter. Therefore, the chapter covers the following: model specification, modeling determinants of willingness to adhere to PMTCT services, diagnostic test, sensitivity analysis, empirical model specification, research design and data sources, estimation technique and sample size.

3.2 Model Specification

One basic premise in new classic welfare (utility) economics is that individuals are best judges of their welfare and that inferences can be drawn about welfare (utility) for each individual by observing the individual's choice of bundles of goods and services (Gunatilake, 2003). Suppose a consumer (woman) who uses PMTCT services approaches the same services but in a safer form. A woman who moves from using a usual PMTCT services to the one which is assumed potentially safe, presumably does so because choice of the safe product (PMTCT services) increases (or at least does not decrease) the utility of the consumption set, all other things being equal. If utility does not change, then a woman will not rationally be willing to change with safe alternative, as an increased effort results in a lower utility level compared to the base level of utility. If utility does increase, then a woman may be willing to choose PMTCT services, provided the present choice does not lower utility beyond the base level (ibid)

Specifically, an individual's preference for safe alternative is a function of the change in utility:

$f(\Delta U)$. Where ΔU *is* the change in utility and $f' > 0$…….. ……..... (1)

An individual's consumption choice of safe alternative is a function of the change in utility in terms of improved health arising from the consumption of PMTCT services. Since the choice of one service over another is a discrete one, it is convenient to cast choice in a random utility setting.

In this setting, an individual's utility function, and hence utility arising from the choice of alternative, is consisted of a **deterministic component** and a **random component**.

The deterministic component reflects observable alternative specific factors (i.e., attributes) that influence the level of utility realized by choosing the *i-th* service (Gunatilake, 2003) The random component represents unobservable factors, such as unobservable variations in preferences, random individual behavior and measurement error. The *i-th* alternative is chosen if and only if the change in utility is positive.

In the random utility model, the utility function is expressed as $U_i = X_i \beta + \varepsilon_i$ where U_i is the utility arising from the choice of the i-th alternative, $X_i'ß$ is the deterministic component of the utility function, X_i is a vector of observable, alternative specific factors that influence utility, ß is a parameter vector and is the random component (ibid). Alternative ***i*** is chosen if and only if $U_i > U_j$ for all $j \neq i$ (*or that* $\Delta U = U_i - U_j > 0$**).** Willingness to adhere to PMTCT services can be re-written therefore, without loss of generality, as:

W (ADH-PMTCT) $= X\beta + \varepsilon$**.** *Where* $X = X_i - X_j$ *and* $\varepsilon = \varepsilon_i - \varepsilon_j$…… (2)

and X_j *is the random component representing unobservable factors.*

Based on the conceptual framework, a model is formulated to analyze the relationship between *W (ADH-PMTCT)* and Parity of the woman, Education level of the woman, Distance covered by a woman to access PMTCT services, Location of the woman, membership of a woman to PLHIV support group, Sex of the head of household, Age of the woman, Income level of a woman/household and Mother – infant – pair strategy. However, the premise from which the empirical model of *W (ADH-PMTCT)* will be built is the study which was carried out by Henze in Central America. By using model propounded by Anderson (1968), Henze (2004) carried out a study in Honduras on factors affecting adherence to medical care by patients in Central America by employing the model which is as follows:

WTadh = f(Y, K, C, Z, H)…… ……(3)

Where:

WTadh = willingness to adhere

Y = income level of household (Enabling factor).

K = vector of characteristics of head of household. It includes: age, gender, education, religion, occupation (Predisposing factors).

Z = vector of household characteristics. It includes: number of family members, participation in community activities/groups, and membership to credit unions/clubs (Predisposing factors)

C = Community characteristics which include: location (rural or urban), and distance covered to access health services (Enabling factors).

H = health status which includes: quality of health services such as quality of counseling given to a patient and prevailing concept of illness (Need factors)

Therefore, borrowing the above specified models, then willingness to adhere to PMTCT services can be specified as:

W (ADH-PMTCT) = F (AGE, PAR, EDUC, INCOME, LOC, PLHIVSG, DIST, SEX, MIP)

Where, "*W (ADH-PMTCT)*" is willingness to adhere to the PMTCT services and is the dependent variable. All the variables in the brackets are explanatory variables in this study. Therefore, below are the detailed definitions, descriptions and expected signs of the explanatory variables:

3.3 The Definitions of the Study Variables and their expected signs

AGE: is a continuous variable showing age of the woman on the PMTCT.

It is expected to have a positive sign based on the findings of the early studies such as Asgray (2004), that as people get old, their stock of health keeps on depreciating hence need better services to improve on their stock of health; therefore, as they get old they will be more willing to adhere to the PMTCT services.

PAR: Is a continuous variable which captures parity of the woman (number of the children that a woman has given birth to and is correlated with the size of the household). As what Jupiter (2009) puts it that the increase in the number of children in any family reduces the care and support for them. Therefore, it is expected to have a negative sign.

EDUC: Captures the education of the woman. It takes the number of years a woman has been in school. Therefore, if a woman did not go to school, it implies zero years in school, if standard two, it implies 2 years and if form three, it is eleven years in school. It is expected to increase the woman's ability to make informed decisions thereby making rational choices regarding willingness to adhere to the PMTCT services; as such it is expected to have a positive sign.

INCOME: is the continuous variable of the monthly income of the woman and/ or household which is a measure of the household poverty level. Demand theory postulates that demand for a commodity is mainly determined by income level of an individual or household has or expect to have. As such it is expected to have a positive sign especially with women/households with higher levels of income. This is for that their income levels can help them to cover the transport costs when going to access the PMTCT services.

LOC: is a dummy variable representing the location of the community to which the woman belongs. LOC = 1 if the community is situated in the urban or semi-urban area, and zero otherwise. It is expected to have a positive sign as people in the urban areas are within short distances to go to the health centers to access PMTCT services, than those in the rural areas.

PLHIVSG: Is a dummy variable standing for the membership of a woman to the People Living with HIV support group (PLHIV) in her community. It takes 1 if a woman is a member of the support group and 0 otherwise. In these support groups, people tend to be reminding each other the importance of the drug adherence and all other important pieces of advice obtained from the hospitals or health centers. As such it is expected to have a positive sign.

DIST: Is a dummy variable capturing the distance covered by woman when going to the health centers to access the PMTCT services. It takes 1 if the distance covered is said to be within or less than the recommended distance of 10 kilometers ($1 \leq 10$ km) and 0 otherwise.

SEX: Is the dummy variable capturing the sex of the head of the household. It takes the value of 1 if a head of the household is Male and 0 otherwise. Since in Malawi there is poor male involvement in PMTCT services (Nyasulu, 2007), it is expected to have a negative sign.

MIP: Is the Mother - Infant - Pair, a strategy that has been employed in the Ministry of Health in order to reduce the defaulting tendency by the women with respect to medical care. It is a dummy variable which captures 1 if a woman is on the MIP and 0 otherwise. It is expected to have a positive sign because MIP reduces medical care defaulting by the women.

The selection of the above mentioned variables was based on the Andersen's (1968) behaviour model and that of Henze (2004). The study used both continuous and dummy variables. However, one variable (PLHIV-SG) has been used as a proxy variable for disclosure of one's sero status to the members of the community. Disclosure of one's status is very significant in the battle against the spread of HIV, as what FHI (2003) puts it that people who have disclosed their statuses mostly do not find it hard to take up HIV&AIDS related chemoprophylaxis therapy. According to Chiroro (2002), disclosure of an HIV-test result to a partner can be an important step for an HIV-positive woman in accessing care and support.

3.4 Modeling Determinants of Willingness to Adhere to PMTCT services

The Dependent variable i.e. *W (ADH-PMTCT)* = 1 if a woman adopts PMTCT services and = 0 otherwise

Therefore, willingness to adopt/participate in PMTCT takes 1 if the woman adopts/participates in the recommended PMTCT services and 0 otherwise.

Since the dependent variable takes the form of binary response variable, hence binary response (Probit or logit) models are available. However, this study has used logit regression model. The logit model is used to estimate the possible determinants of women's decision on willingness to adhere to the recommended PMTCT services.

The decision takes two values, thus not willing to adhere [*W (ADH-PMTCT*] = 0) or willing to adhere to PMTCT services [*W (ADH-PMTCT)*] = 1).

Let P_i represent the probability that the woman is willing to adhere to the recommended PMTCT services. Then the probability of the woman not willing to adhere to is given as 1- P_i.

Since P_i is unobserved, what we observe is only binary variable indicating the sign of P_i^*

$P_i = 0$ if $P_i^* \leq 0$ and $P_i = 1$ if $P_i^* > 0$ …………………………………………… (4)

The above expression implies that since P_i is unobserved, but the outcome *W (ADH-PMTCT)* = 1, if the woman is willing to adopt PMTCT services and *W (ADH-PMTCT)* = 0, otherwise, then we have the following:

Pr [*W (ADH-PMTCT*)] = 1) = P_i and that Pr [*W (ADH-PMTCT*] = 0) = 1 - P_i

Therefore, the probability that a woman is willing to adhere to PMTCT services is given as:

P_i = E [*W (ADH-PMTCT*) = 1| X)] $= \dfrac{1}{1+e^{-(\beta_0 + \beta' X)}}$ ………………………… (5)

The probability that the woman is not willing to adhere to is now given as:

(1 - P_i) = E [*W (ADH-PMTCT*) = 0| X)] = $\dfrac{1}{1+e^{(\beta_0 + \beta' X)}}$……………………….. (6)

Formulating these equations in terms of odd ratio of probability that the woman is willing to adhere to and the probability that the woman is not willing to adhere to the medical care and taking the natural logarithm gives us the logit model where the log of odd ratio L_i is not only linear in X but also in parameters. The logit model is as follows:

$$\ln \frac{p_i}{1 - P_i} = L_i = \beta_0 + \beta' X \quad ....(7)$$

3.5 Estimation Technique and Interpretation

On account of the discussion in the preceding section, the logit model as specified above is adopted to conform to the binary nature of the functional relationship being investigated. The regressand can only assume values between 0 and 1. In this case making use of standard linear regression is felt inappropriate and hence ruled out.

The standard logit model therefore, employing maximum likelihood method was thus the obvious choice because the functional form of our model is non-linear. The study used STATA version 11 to estimate the model and this choice was made on the basis of its user friendliness and versatility.

3.6 Diagnostic Test

The marginal effect which gives of the marginal change in the explanatory variable involved on the probability of success was used for interpretation of results. Binary choice models are mostly faced with the problem of heteroskedasticity (Wooldridge: 2002), therefore, the study used robust regression to solve the problem of heteroskedasticity. However, the Z- statistics test and the F- test were used to test the statistical significance of individual coefficients and all coefficients in the model respectively.

3.7 Sensitivity Analysis

In most cases a question that arises in logit models with qualitative dependent variable is that of interpretation of results. The signs of the coefficients and their statistical significance are interpreted as they appear, but the magnitudes of the coefficients cannot be interpreted in a straightforward manner. This is in view of the fact that the dependent variable in a logit model is log odds ratio. We therefore carry out a transformation process of deriving or estimating marginal effects of the variable on the odds ratio.

In the analysis, we also undertake to report models with omitted variables. This is done to check the effect of omitting a variable on the magnitude, significance and direction of influence of the rest of the variables. In particular, the reason for using this variable omission technique is that most economic variables are related in one way or the other. Model estimation can thus be affected by such relationship, particularly when the correlation is very high. This problem is what is referred to as *multicollinearity***.**

3.8 The Empirical Model Specification

This study therefore estimates the following econometric model.

$$W\ (ADH\text{-}PMTCT) = \beta_0 + \beta_1 AGE + \beta_2 PAR + \beta_3 EDUC + \beta_4 INCOME + \beta_5 LOC + \beta_6 PLHIVSG + \beta_7 DIST + \beta_8 SEX + \beta_9 MIP + \varepsilon_i \quad \ldots\ldots (8)$$

3.9 Research Design and Data Sources

In this study, a research design refers to a logical framework that guides the researcher in the processes of collecting, analyzing and interpreting the data (Valente: 2002). The study uses data from the ART registers, and the data that has been primarily collected by the author. This implies that there were some missing data and this prompted the researcher to collect the primary data.

The study investigates on how the biographical, socio – economic, demographic and programmatic factors might influence their (women) health decision-making and descriptive surveys are ideal for investigating attitudes and experiences. The study used questionnaire to collect data. The data was collected from the 13 clinics in Zomba where respondents do come for their routine antenatal care namely, Matawale health centre, Zomba central hospital, Domasi rural hospital, Pirimiti community hospital, Mayaka health centre, Thondwe health centre, Namikango maternity, St Lukes hospital, Chingale health centre, Chipini health centre, Nkasala health centre, Makwapala health centre and Namasalima health centre. The aforementioned PMTCT facilities have been chosen for that they are said to have big antenatal cohorts.

3.9.1 Interviewer and Respondent Bias

Interviewer's conduct and interviews can influence responses of the respondent. Though this kind of bias can be minimized by using mail or telephone surveys, but it results in less information forthcoming and also giving rise to hypothetical bias: respondents may not give correct answers or give the questions proper consideration (Ninan, 2008). To minimize this problem professional interviewers or well trained interviewers should be used. Therefore, the expert clients were used to collect this data at each study site.

The expert clients are the peer educators who are themselves enrolled in care and have a good understanding of HIV & AIDS care and treatment services and have the skills to help other patients with their care and treatment (GoM, 2011). The interviewers (expert clients) will be reading each item from the structured questionnaire to the respondent and record their responses on the questionnaire.

3.9.2 Structure of the Questionnaire

The questionnaire is designed to gather the data that should complement to data in the ART registers such as monthly income level of a woman, sex of the head of the household, membership to a PLHIV support group, involvement in the Mother – infant – pair strategy, location and distance covered to access ART services (see appendix F).

3.9.3 Ethical Considerations

Since this study deals with human subjects, permission to carry out the research was sought from the Zomba District Health Officer (DHO) (see the appendix G). Additionally, the respondents were informed that participation in the study was voluntary. The purpose of the study was explained to all of the respondents so that they could make informed decisions about whether or not to agree to the interview.

The respondents were assured that even if they decided to stop at any time during the data collection process they would not be prejudiced in any way. The respondents were also assured that no relative, family members or friends would have access to the research findings unless where the respondent gives permission. They were also assured that the information given would remain confidential and there would be no detrimental consequences from the answers given. However, the respondents who had participated in the study were requested to sign a consent form. The consent forms clearly stated that the information given was to be treated in strict confidentiality and no names or any form of identification was to be used that would link them with information provided. Therefore, the consent form stated that participation was voluntary and that the interviewees could stop the interview at any moment, (see the appendix E).

3.9.4 Sample Size

To determine the required sample size, the study employed the standard formula which is:

$$\mathbf{N} = \frac{\boldsymbol{P}\,(\boldsymbol{100\%-P})}{(\boldsymbol{SE})^{\boldsymbol{2}}} \quad \text{..... (9)}$$

Where N = required sample size, P = estimated percentage and SE = standard error (Nick *et al* 2009). The SE is calculated as $\frac{\mathbf{5}}{\mathbf{1.96}}$ where **5** is the confidence interval and 1.96 is *Standard normal deviation or z-score (ibid).*

The calculation of sample size was based on z-score of 1.96 corresponding to 95% confidence interval and the acceptable error level of 5% (0.05). This was based on recommended standard deviation and error levels in social science research (ibid). However, in 2009, the Ministry of Health (MoH) set a target of at least 95% of women attending ANC with PMTCT services by the end of 2012 (NAC, 2009), hence, the value of P = 95%. Therefore, the sample size required would be **73** women on PMTCT programmes in Zomba district. This data was collected from May – July, 2013.

3.10 Conclusion

This chapter has discussed on research methodology, in which section 3.2 model specification, section 3.3 modeling the determinants of willingness to adhere to PMTCT services in Malawi, section 3.5 presents estimation techniques and interpretation, section 3.6 presents diagnostic test, section 3.7 presents sensitivity analysis, section 3.8 discusses the empirical model specification, section 3.9 presents design and data sources, section 3.9.1 discusses on interviewer and respondent bias, section 3.9.2 presents the structure of the questionnaire, section 3.9.3 discusses on ethical considerations and section 3.9.4 presents method employed in order to come up with the required sample size. The method used above is the one which is commonly used in the Social science research papers. Therefore, after employing the aforementioned formula, the required sample size to be used in this study was 73 women on PMTCT services (programmes) in Zomba district.

CHAPTER FOUR

ESTIMATION AND DATA ANALYSIS

4.1 Introduction

This chapter presents and interprets the results of the study. Section 4.2 and 4.3 present descriptive statistics of the variables and section 4.4 provides results of Logit regression. The data of this study was analyzed in STATA version 11.

4.2 Descriptive Statistics

The main descriptive statistics used was Mean values of the variables. Therefore, below is the table that gives the summary of the descriptive statistics.

Table 1: Mean values of Selected Variables

VARIABLE	MEAN
Age	26.18
Parity	2.27
Education	11
Income	4946.58
Location	0.49
PLHIV-Support Group	0.48
Distance	12
Sex	0.55
Mother –Infant –Pair (MIP)	0.66

By summerising results in the Table 1, on average, the respondents earn MK4, 946.58 per month and that their average age was 26 years. According to this study, on average, the respondents had 2 children and that they were covering a mean distance of 12Km, which is greater than recommended distance of 10 kilometers by Ministry of Health (GoM, 2012). In terms of education, on average, the respondents had attended secondary education evidenced by 11 years (on average).

With respect to the location of the respondents, Table 1 shows that on average, 0.49 respondents were based in rural areas implying that majority (0.51) lived in urban or semi-urban areas. In the same Table, on average, majority (0.55) of the respondents lived in the male headed family.

Furthermore, the results indicate that many respondents were not in the PLHIV support groups, evidenced by the mean value of 0.48. However, many respondents were on mother – infants – pair with a mean value of 0.66.

4.3 Demographic Characteristics of the Respondents

In this section, the demographic characteristics of the 73 women who participated in this study are presented in the form of figures i.e. bar charts and pie chart in line with their frequencies and percentages according to the age distribution, level of education, sex of the head of household and membership to the PLHIV support group.

4.3.1 Age Distribution of the Respondents

Figure 1: shows the age distribution of the 73 respondents who participated in the study. It indicates that 14% of the respondents were below twenty years of age, 30% of the respondents were between 20- and 25-years, 26% of the respondents were between 26 - and 30-years, 27% of the respondents were between 31- and 35-years and, 3% were above thirty-six years of age. Based on this study, many (30%) of the respondents were within the age range of 20 to 25 years. Refer to the Figure 4 below.

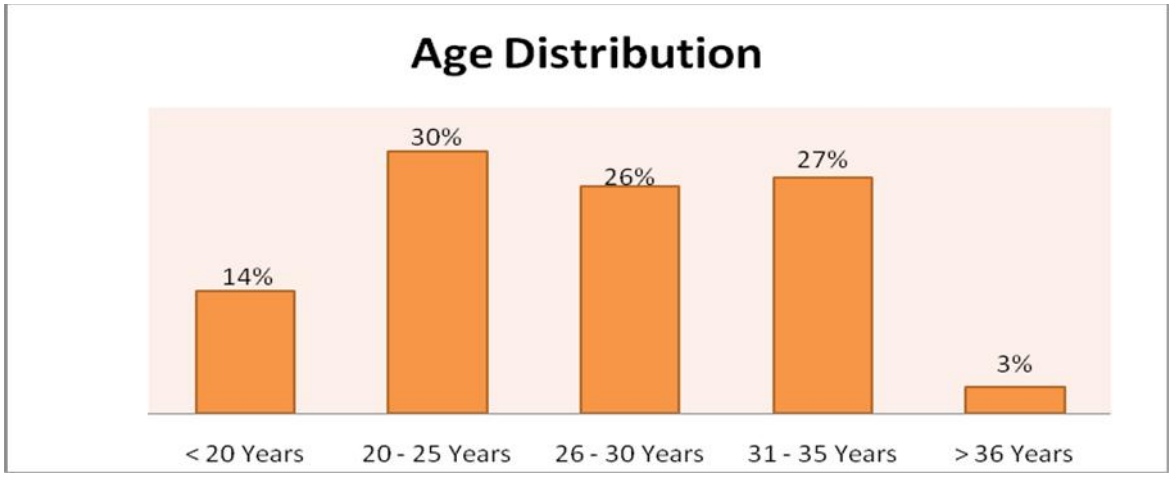

Figure 4: The age distribution of the respondents in the study

4.3.2 Level of Education of the Respondents

The majority 21(29%) had attained senior secondary education, 15 (21%) had attained junior secondary education, 14 (19%) attained junior primary education 12(16%) of the respondents had attained senior primary education and 11(15%) had not attained education. Below is the summery of education attainment of the respondents in the study, depicted by Figure 5.

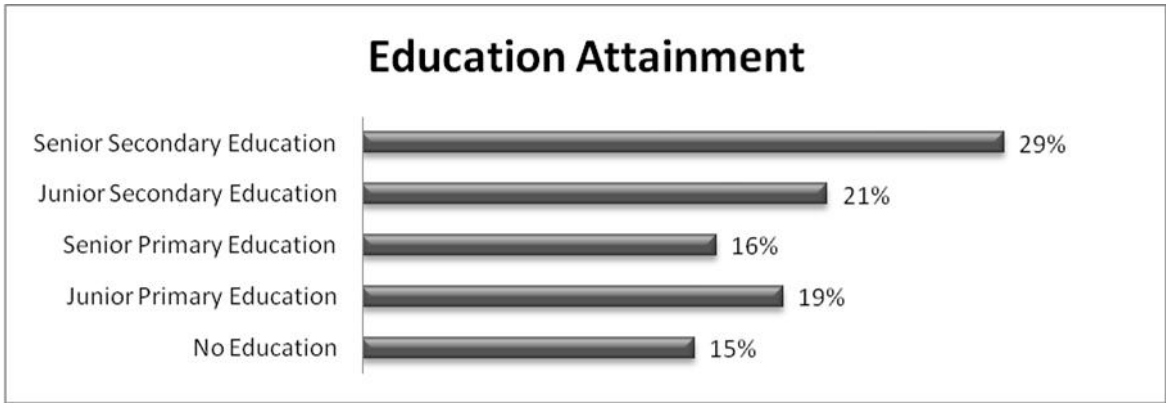

Figure 5: The bar chart indicating education attainment of respondents in the study

According to the UNAIDS (2001) report, education plays an important role in predicting how well an individual is able to incorporate current lifestyle messages into their sexual behaviour. It further notes that the better educated young women tended to delay their first sexual debut.

Therefore, this study assumed that pregnant women (or women on PMTCT) who had attained higher levels of education would be more knowledgeable and have positive attitudes towards PMTCT programmes, when compared to those with lower educational attainment.

4.3.3 The Respondent's Membership to PLHIV Support Group

The study discovered the following in terms of the membership to the PLHIV support groups. Therefore, below is the summery depicted by Figure 6.

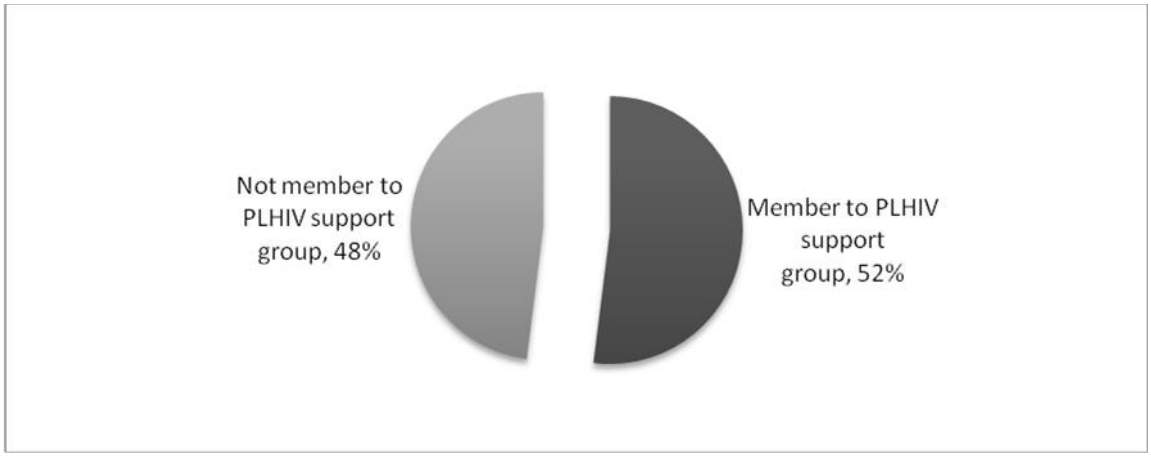

Figure 6: The Pie chart indicating membership of the respondents to the PLHIV support groups

The Figure 6 above indicates that majority 38(52%) of the respondents were in the PLHIV support groups and that 35(48%) were not in support groups. The study assumes that support groups are very significant to women in PMTCT for that they are community institutions where group therapies and psychosocial counseling tend to take place and as such members are likely to observe the recommended PMTCT services. Since to be a member to a support group indicates disclosure of one sero status, then during this study majority (52%) had disclosed their HIV statuses to their communities. Like what FHI (2003) puts it that people who have disclosed their statuses mostly do not find it hard to take up HIV&AIDS related chemoprophylaxis therapy.

4.3.4 The Sex of the Head of the Household

In terms of sex of the head of the household, Figure 7 illustrates the sex of the households captured in this study. Below is the detailed discussion of this variable in this study

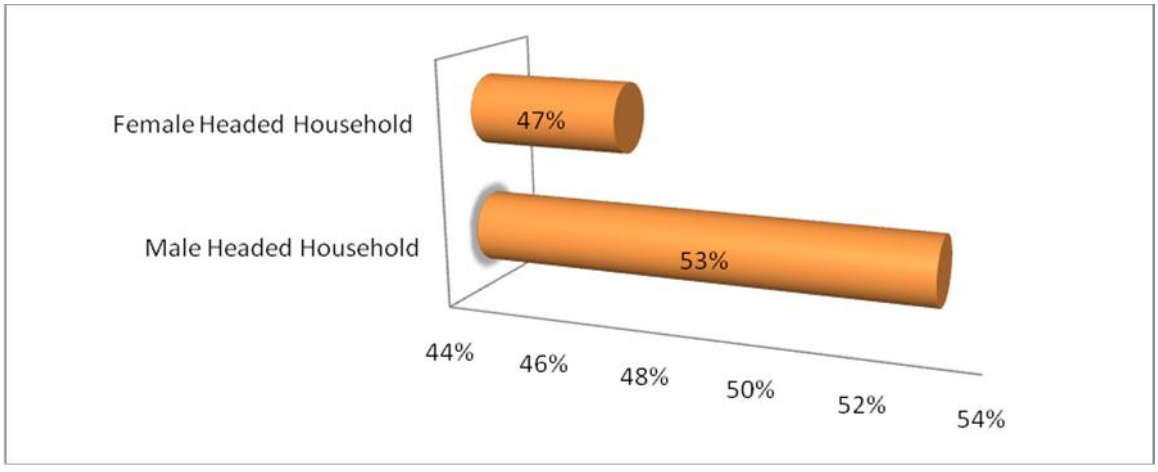

Figure 7: The Bar chart indicating sex of the head of the household of the respondents in the study

Figure 7 above indicates that majority 39(53%) of the respondents were living in the male headed households. Therefore, based on the research findings by Richard *et al* (2011), that "only 18% of women are able to adhere to the recommended package of PMTCT in Zomba", the descriptive statistics suggest that male involvement in maternal medical care services is a big problem contributing to poor uptake of the PMTCT services.

4.4 The Logit Regression and Results

Table 2: Standard Coefficients from Logit Regression of the overall model

VARIABLE	Robust Regression's Results			
	Coefficients	**Std. Error**	**Z**	**P > | Z |**
AGE	0.3189782	0.1267192	2.52**	0.012
PAR	-1.332769	0.4775409	-2.79**	0.005
EDUC	0.8960685	0.4879855	1.84***	0.066
INCOME	0.000188	0.0002437	0.77	0.441
LOC	0.5417305	1.21059	0.45	0.655
PLHIVSG	2.058401	1.523378	1.35	0.177
DIST	-0.2525938	0.1155937	-2.19***	0.029
SEX	-1.306031	1.775871	-1.68***	0.092
MIP	1.663688	0.8741328	1.90***	0.057
CONSTANT	-6.543625	4.267839	-1.53	0.125
Number of Observations		=		73
Wald chi2 (9)		=		39.68
Pro > Chi2		=		0.0000
Log likelihood		=		(-15)
McFadden's R^2		=		0.7047

Note: * ** *** indicates that the figures are statistically significant at 1%, 5% and 10% respectively.[15]

The first regression model as shown in Table 2 above had all variables used in this study. The results show that seven variables are statistically significant save for income and location which are insignificant {see Table 3 below that shows Logit Regression results (Marginal Effects)}. Of all the significant variables, it is noted that membership of a woman to PLHIV support group, Education of the woman, Parity of the woman, distance, Sex and Mother - Infant - Pair (MIP) have the greatest magnitudes and hence the major determinants of women adherence to PMTCT services in Malawi.

[15] See the original version of Robust Regression results from Appendix B

Table 3: Logit Regression Results (Marginal Effect after logit) of overall model

VARIABLE	Marginal Effects After Logit		
	$\frac{\partial Pr(P=1\|X)}{\partial x_k}$	Std. Error	P > | z |
AGE	0.0756003 (2.67)*	0.02828	0.008
PAR	-0.3158766 (-3.00)*	0.10546	0.003
EDUC	0.2123752 (1.74)***	0.12185	0.081
INCOME	0.0000445 (0.79)	0.00006	0.429
LOC*	0.1276288 (0.46)	0.28014	0.649
PLHIVSG*	0.450628 (1.65) ***	0.27272	0.098
DIST	-0.0598667 (-2.38)**	0.02512	0.017
SEX*	-0.2964331 (-1.69)***	0.17539	0.091
MIP*	0.3901145 (2.07)**	0.18872	0.039

* ** *** indicates significance at 1%, 5% and 10% levels, respectively. In terms of the variables, (*) implies $^{dy}/_{dx}$ which is the discrete change of dummy variable from 0 to 1. All the figures in parentheses are Z – statistics and $\frac{\partial Pr(P=1|X)}{\partial x_k}$ is the marginal effect (change) in outcome as one variable changes (ceteris paribus).

4.5 The Sensitivity Analysis

As outlined in the sensitivity analysis section, Table 4 below indicates models with omitted variables. This was done to check the effect of omitting a variable on the magnitude, significance and direction of influence of the rest of the variables as already discussed. The variables like location and education of the woman were omitted in model 2 and the effect of this omission is the slight changes in terms of their magnitudes and their levels of significance. Refer to Logit regression – Marginal effects with omitted variables below.

Table 4: Logit regression (Marginal effects) results after omitting some variables.

VARIABLE	Marginal Effects with Omission of Variables			
	Model 1	**Model 2**	**Model 3**	**Model 4**
AGE	0.0756003 (2.67)*	0.0694775 (2.38)**	0.0703464 (2.28)**	0.0737264 (2.68)*
PAR	-0.3158766 (-3.00)*	-0.2866471 (-2.17)**	-0.2871012 (-2.43)**	-0.2846008 (-3.20)*
EDUC	0.2123752 (1.74)***		0.223105 (1.91)***	0.2216377 (2.05)**
INCOME	0.0000445 (0.79)	0.0000409 (0.96)	0.0000323 (0.61)	
LOC	0.1276288 (0.46)			0.085596 (0.46)
PLHIVSG	0.450628 (1.65) ***	0.4226272 (1.74)***		0.4750129 (2.78)*
DIST	-0.0598667 (-2.38)**	-0.0680102 (-2.65)*	-0.0710653 (-2.64)*	
SEX	-0.2964331 (-1.69)***	-0.3188625 (-1.42)	-0.4722947 (-3.47)*	-0.1392003 (-0.78)
MIP	0.3901145 (2.07)**	0.2138055 (1.79)	0.4142827 (2.47)**	0.4570358 (2.87)*

**** **, **,* denotes significance at 1%, 5 % and 10% respectively while the figures in parentheses are Z-statistics.***

In model 3, location and PLHIV support group variables were omitted. The omission of these variables caused both MIP and Sex which were insignificant in model 2 to be significant. The omission also changed the direction of the effect of the variables. Therefore, it reduced the influence of parity on uptake of PMTCT services from 32 percent in the first model to 29 percent in model 2. The same omission further increased the impact of Sex variable from almost 30% percent to 47% percent.

The last regression model had all the independent variables except income and distance. Due to the omission, impact of membership of the woman to PLHIV support group has increased from 45% in model 1 to 48% in model 4 and the marginal effect of MIP also changed from 39% in model 1 to 46% in model 4. Furthermore, the omission has now caused Sex variable to be insignificant which was significant in model 3.

Based on Table 4, we can conclusively say that all the variables that were found to be insignificant on the uptake of PMTCT services in our overall model, were also insignificant in any of the other models having some omissions. It has been further found that some economic variables are related in one way or the other and therefore the omission of some of them may have an effect on the direction, significance and magnitude of the remaining variables. However, based on the sensitivity analysis, the problem of multicollinearity among the variables used is not serious (see Appendix C). To verify this, the pair-wise correlation analysis has been employed in section 4.6 below.

4.6 Diagnostic Test

The study carried out some diagnostic tests to check any possible problems that may make our analysis less meaningful so as to obtain regression results which are robust and reliable. One of these tests was to examine how well the model fits the data. On the basis of the likelihood ratio statistics, all the models reported in this study passed the goodness of fit. This implies that for every one of these models, there is at least one variable that is not equal to zero.

This means that the dependent variable {W (ADH-PMTCT)} is better explained by at least some of the independent variables than the constant alone. We also tested the individual parameters to determine whether they are independently and significantly different from zero. Based on Z-statistics which are presented in the parentheses in the Table 3 and Table 4 all the variables passed this test except for location and income level of a woman/household as discussed in the following section. As stated earlier on, that heteroskedasticity problem has been dealt with by using robust standard errors. F- test indicates that all coefficients are statistically significant in the model. {See the results in the Appendix A}.

By using pair-wise correlation analysis (see appendix D) none of the correlation coefficient between any two variables was greater than 0.8, implying that multicollinearity is not a serious problem. The results of this test are in tandem with multicollinearity test's results established in the sensitivity analysis.

4.7 Discussion of the Results Based on General Model

PLHIV-Support Group

The results show that being a member of the PLHIV-Support Group is found to positively influence probability of women's willingness to adhere to PMTCT services by 45% and is significant at 10%. Therefore, the results indicate that women who are not likely to adhere to PMTCT services are those that are not in PLHIV support group(s). PLHIV-Support Groups are the structures where people living with HIV tend to be reminding each other on different health related instructions and advice from the health practitioners. This could be the reason why those women who are in these structures are likely to adhere to the PMTCT services, than those who are not.

Additionally, to be a member of the PLHIV-Support Group is a clear indication that a woman has disclosed her sero – status and as FHI (2003) puts it that people who have disclosed their statuses mostly do not find it hard to take up HIV&AIDS related chemoprophylaxis therapy. According to Chiroro (2002), disclosure of an HIV-test result to a partner can be an important step for an HIV-positive woman in accessing care and support. Following such a disclosure a woman can openly seek medical care and other post-test support services, since this can be an entry point to enlist support for behavioural change to reduce risk of HIV-infection.

Education

The results show that education positively influences probability of women's willingness to adhere to the PMTCT services by 21% (statistically significant at 10%) because it increases the woman's ability to make informed decisions thereby making rational choices regarding willingness to adhere to the PMTCT services. Thus educated women may have greater decision making power on health related matters and also attach a higher value to their health and therefore would utilize health care when it is necessary.

The finding is consistent with two study findings in developing countries by Henze, (2004) in Honduras and Celik, (2000) in Turkey who found a positive and significant relationship between education and prenatal care use. Therefore, the results depict that women who are likely to default in PMTCT services are those who are not educated or with little education attainment.

Parity

The results show that parity of the woman matters in as far as adherence to PMTCT services is concerned. Therefore, the results indicate that a unit increase in number of children one has, there is a negative likelihood to adhere to the PMTCT services by 32%. This variable is statistically significant at 1%. A study by Chandiok, Dhillon *et al* (2006) found that there was significant reduction in the proportion of women obtaining ANC services with increasing number of living children in India. This may partly explain the negative relationship exhibited by the results.

Age

The variable, age is significant at 1% in the model. The results indicate that a unit increase in age of the woman has a positive influence in the probability of women's adherence to PMTCT services by 8%. The results provide support to the results by Govindansamy and Ramesh, (1997) in India and Celik, (2000) in Turkey, who found that maternal age was positively associated with utilization of ANC. The results state that utilization of the maternal health services is positively associated with increase in age of the woman. The finding corresponds to Grossman's model (1982) that states that increase in age causes demand for health services to increase to compensate for higher depreciation rates.

Distance

The results show that distance covered by women when going to access the PMTCT services has a negative influence to women's willingness to adhere to PMTCT services by 6% and is statistically significant at 5%. Therefore those women travelling long distances are likely to default in the uptake of the PMTCT services.

The results are in tandem with several studies that report distance as an important barrier to health services utilization. For instance, findings by Griffiths and Stephenson, (2001) in India, Jackson, Loveday, *et al* (2006) in South Africa and Materia *et al* (1993) in Ethiopia revealed that distance is an important determinant of maternal health care utilization. Therefore, women who are close to the health facility are likely to adhere to the proper uptake of the required PMTCT services.

Sex

The sex of the head of the household is significant at 10% according to the results. However, the negative sign of its marginal effect (-0.296) indicates that male headed households have a negative influence to the adherence to the PMTCT services by women. The study showed to some extent that women do not have powers to decide on their own to join the PMTCT programme and that the male partners are the decision makers. Mothers therefore fail to join the PMTCT programme because of opposition from their male partners. Opposition from male partners was attributed to lack of involvement of male partners in delivery of the PMTCT programme. However, as lessons from family planning programmes have shown, the highest uptake of services is achieved where male partners approve and give support for services (Abdula, 2004).

Mother – Infant – Pair (MIP)

This variable is significant at 5% and has a positive influence to the uptake of the PMTCT services by 39%. As discussed earlier on, mother –infant – pair strategy in PMTCT programmes, aims at reducing poor uptake of PMTCT services by women. Therefore, HSAs tend to follow up the women on PMTCT so that where necessary; they should get reminded about the dates for visiting their health centres. MIP on the other hand serves a purpose of the PLHIV support groups. However, to be involved in MIP strategy is also a clear indication that a woman has disclosed her sero – status and as FHI (2003) puts it that people who have disclosed their statuses mostly do not find it hard to take up HIV&AIDS related chemoprophylaxis therapy. According to Chiroro (2002), disclosure of an HIV-test result to a partner can be an important step for an HIV-positive woman in accessing care and support.

Location and Income

According to this study, the results indicate that location and income have no significant influence on the adherence to PMTCT services. Therefore, as long as women are in PLHIV support groups, educated, on MIP programme, with low parity and are empowered to make their own right choices, the probability for them to adhere to PMTCT services in Malawi is high.

4.8 Conclusion

This chapter has given a presentation of the results of this study. Section 4.3 has presented the descriptive analysis of the sample used in the study. Section 4.4 has presented Logit regression and results. Diagnostic results and discussion of the results are presented in sections 4.6 and 4.7 respectively. More specifically, results have been interpreted through the analysis of marginal effects. The following chapter outlines the conclusion of the study as well as some policy implications and limitations of the study with suggestions for future research.

CHAPTER FIVE

CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusion and policy recommendations based on the findings of this study. Firstly, it presents a brief summary of the results in section 5.2 followed by policy implications in section 5.3. In section 5.4 the limitations of the study and suggestions for areas of further study were outlined.

5.2 Summary of the Results

The major objective of the study was to establish empirically the determinants of willingness of the women to adhere to PMTCT services in Malawi. There were nine variables used in the model, however it has been found that the possible determinants of willingness of women to adhere to PMTCT services are: age of the woman, parity of the woman i.e. number of live-born children a woman has delivered (Parity), education of woman, membership of a woman to PLHIV support group, distance covered by a woman when going to access health services, sex of the head of the household and Mother – infant – pair (MIP).

According to our specific objectives, it has been established that the aforementioned variables have impact on willingness of the women to adhere to PMTCT services in Malawi and have a significant role in influencing adherence. The study hypothesized that age of a woman, education of a woman, parity of a woman, distance covered by a woman when going to health centers, membership of the woman to the PLHIV support group, sex and MIP have no influence on the uptake of PMTCT services. The findings of this study therefore mean that we reject most of the null hypotheses that this study sought to test. That is, age of the woman, education of the woman, parity of the woman, distance covered when accessing to health services, sex, MIP and membership of the woman to PLHIV support group have a significant impact on the dependent variable.

It has been found, for example, that being a member of the PLHIV-Support Group is found to positively influence probability of women's willingness to adhere to PMTCT services by 45%, distance covered by women when going to access the PMTCT services has a negative influence to women's willingness to adhere to PMTCT services by 6%. The results also indicate that a unit increase in age of the woman has a positive influence in the probability of women's adherence to PMTCT services by 8%. It further reveals that 1% increase in number of children that one has (parity), there is a negative likelihood to adhere to the PMTCT services by 32%. The results also show that education positively influences probability of women's willingness to adhere to the PMTCT services by 21%. Furthermore, the study indicates that male headed households have a negative influence to the adherence to the PMTCT services by women by almost 30%. Finally, mother – infant – pair (MIP) has a positive influence to the uptake of the PMTCT services by 39%. Despite the fact that some variables are said to be insignificant in all models, they are having the expected signs. This implies that $^{dy}/_{dx}$ of the insignificant variables like location and income are having positive signs respectively. Therefore, they are in tandem with the anticipated signs in this study.

The study was conducted in Zomba district. The study area was chosen due to the fact that only 18% of women (according to Richard *et al*, 2011) are able to follow all the recommended PMTCT services. This implies that 82% of women are unable to follow the recommended PMTC services in Zomba which is a threat to the battle of HIV in Malawi. Therefore, in recognition that PMTCT is an integral part of Millennium Development Goals the study was assessing the possible determinants of the women's willingness to adhere to PMTCT services in Malawi. The study used logit regression model and the data was analyzed in STATA version 11.

5.3 Policy recommendations

The findings of the study indicate that a membership of the woman to PLHIV support group is essential to the uptake of the PMTCT services. Support groups tend to be the forum where people living with HIV conduct group therapies, encourage each other on drug adherence and frequent visiting of the health centers etc. therefore, in view of this, it is imperative for all the women tested HIV positive and are on the course of PMTCT services to be attached to these support groups. As such it is important to establish PLHIV support groups within walking distances or at Group Village Headman level, so that those women on PMTCT services should have easy access to these structures.

All the support groups at district level should be known by the office of the DHO so that when the woman is tested positive and is on PMTCT services, she should get referred to such support groups. However, “many people do not join these support groups in fear of the stigma and discrimination” (Abdula, 2004). Therefore, it is as well important to put in place mechanisms of dealing with stigma and discrimination in all levels so that when these women are referred to these support groups, they should be willing to join.

Another interesting finding of this study concerns the relationship between distance covered by a woman when going to access health services and adherence to PMTCT services. The results depict the negative influence of distance to uptake of PMTCT services. In view of this, policies that would reduce the distances covered by women when going to access the PMTCT services would help to reduce the act of defaulting in the uptake of PMTCT services. Since the Malawi’s health system is already in the process of promoting the close to client (CTC) approach such as mobile clinic, it is therefore, imperative to strengthen this approach so that there must be even distribution of medical facilities.

It is also noted from the results that parity is very crucial in determining willingness of the women to adhere to PMTCT services in Malawi. One of the measures that the government could put in place is to come up with programmes that would discourage these women from having a desire of having more children when they are HIV positive if at all we are to win the battle against HIV&AIDS in Malawi. This could be done by, among others, sensitizing the women of the importance of child spacing and /or not child bearing when one is HIV positive.

WHO recognizes that community mobilization is critical to the success of increased access to and uptake of HIV testing and counseling because it can be used to overcome the barriers of ignorance, denial, stigma and discrimination while raising awareness and encouraging people to utilize HIV testing and counseling services (MOHCW 2008). The following elements of community mobilized interventions are recommended; use of role models, e.g. PMTCT success stories, training of community health care and other service providers in the issues of non-discrimination and ethics and involving people living with HIV.

It has been discovered that attainment of education by the women has a positive influence to the adherence to the PMTCT services in Malawi. In this regard therefore the government could introduce a free secondary education policy for all girls so that they are motivated to go further with their studies which may in the long run result in increase in the knowledgeability among the females. Education helps the females to be able to read what has been inscripted in the health passport books, hence can easily get reminded about what is in that book.

Age has also been found to have a significant impact on willingness of the woman to adhere to the PMTCT services in Malawi. This could be due to the fact that, increase in age, causes a woman to be responsible for her health. Therefore, in view of this the government should put in place programmes that should discourage young women especially who are HIV positive from reproducing.

In case they have reproduced, a close monitoring by the government's HSAs should take place so that they should not be defaulting in required PMTCT services. This implies that they should be on mother – infant – pair strategy. It has been also discovered that sex of the head of the household has a significant impact on the uptake of PMTCT services. Therefore, it is much more imperative to encourage male involvement in this realm. The health facilities should be made male friendly so that men should not find it awkward to get involved in this programme.

Finally MIP is another important variable for that it is statistically significant in influencing women to adhere to PMTCT services in Malawi. Therefore, it is necessary to encourage this strategy. This implies that the government should strengthen this strategy if at all we want to combat mother to child transmission of HIV in Malawi.

5.4 Limitations of the study and Suggestions for future research

The study was specifically conducted in the community of Zomba district in Malawi. Therefore, this may affect the generalisability of the findings to other sites. Additionally, the study used a small sample (73 respondents) due to insufficient funds that could be used to finance the respondents especially in terms of transport reimbursement. Therefore, this could cause the results to have effects on generalisability of findings. The incorrect information given by respondents could be another limitation of this study. This could be due to aforementioned hypothetical bias which arises due to the respondents not taking structured questions seriously and respond by giving whatever answer comes first to mind leading to non systematic relationship between woman's willingness to adhere to PMTCT services and other factors suggested by economic theories.

In the light of the above shortcomings, a more comprehensive study would be required that would investigate the determinants of willingness of the women to adhere to PMTCT services in Malawi by involving many study sites other than the ones in this study. This would cause the generalisability of the findings to other sites to be perfect.

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APPENDICES

Appendix A: Diagnostic Tests

F-Test: Using Pseudo R^2 to test the fitness of the Model.

WORKING

Model: W (ADH-PMTCT = $\beta_j X_i + \varepsilon$, where β_j = Number of beters in the model

X_i = Number of independent variables

Null hypothesis: H_0: $\beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = 0$

Alternative hypothesis H_1: $\beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 \neq 0$

Lets come up with restricted model first

Therefore: $W\ (ADH - PMTCT) = \alpha_1 + \varepsilon_i$.....(ii)

This implies that: (i) Will have R^2_{UR} (Pseudo R^2) ..... from unrestricted model

(ii) Will have R^2_R..... from restricted model

But: $R^2_R = 0$

Therefore: $F^* = \{(R^2_{UR} - R^2_R)/ q\} \div \{(1 - R^2_{UR})/ (n - k - 1)\}$

Since $R^2_R = 0$

Then: $F^* = (R^2/q) \div \{(1- R^2)/ (n - k - 1)\}$

But q = number of regressors in the model and in this case it is 9

$\{0.7047/ 9\} \div \{(1- 0.7047) / (73 - 10 - 1)\}$

Therefore, $F^* = 16.44$ (to two decimal places)

But the F statistics is 3.48 at 5% level of significance

Since, $\mathbf{F^*_{16.44} > F_{3.48}}$: then we reject the null hypothesis i.e. accept the fact that regressors are statistically significant explanatory factors of the variation in dependent variable "*W (ADH – PMTCT*".

Appendix B: The Logit Regression Results (overall Model) & Marginal Effects

Logistic regression

Number of obs	=	73
Wald chi2(9)	=	39.68
Prob > chi2	=	0.0000
Pseudo R2	=	0.7047

Log pseudolikelihood = -14.844373

wpmtct	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
age	.3189782	.1267192	2.52	0.012	.0706132	.5673432
parity	-1.332769	.4775409	-2.79	0.005	-2.268732	-.3968063
educ	.8960685	.4879855	1.84	0.066	-.0603655	1.852503
income	.000188	.0002437	0.77	0.441	-.0002897	.0006657
loc	.5417305	1.21059	0.45	0.655	-1.830982	2.914443
plhivsg	2.058401	1.523378	1.35	0.177	-.9273644	5.044166
dist	-.2525938	.1155937	-2.19	0.029	-.4791533	-.0260343
se x	-1.306031	.775871	-1.68	0.092	-2.82671	.2146486
mip	1.663688	.8741328	1.90	0.057	-.049581	3.376957
_cons	-6.543625	4.267839	-1.53	0.125	-14.90843	1.821186

. mfx

Marginal effects after logit
y = Pr(wpmtct) (predict)
= .61398354

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
age	.0756003	.02828	2.67	0.008	.020176	.131024	26.1781
parity	-.3158766	.10546	-3.00	0.003	-.522565	-.109188	2.27397
educ	.2123752	.12185	1.74	0.081	-.026442	.451192	2.28767
income	.0000445	.00006	0.79	0.429	-.000066	.000155	4946.58
loc*	.1276288	.28014	0.46	0.649	-.421443	.676701	.493151
plhivsg*	.450628	.27272	1.65	0.098	-.083899	.985155	.479452
dist	-.0598667	.02512	-2.38	0.017	-.109109	-.010624	11.5753
sex*	-.2964331	.17539	-1.69	0.091	-.640186	.047319	.547945
mip*	.3901145	.18872	2.07	0.039	.02023	.759999	.657534

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Appendix C: Sensitivity Analysis

Logit regression (Marginal effects) results after omitting some variables.

VARIABLE	Sensitivity Analysis's Results			
	Model 1	Model 2	Model 3	Model 4
AGE	0.0756003 (2.67)*	0.0694775 (2.38)**	0.0703464 (2.28)**	0.0737264 (2.68)*
PAR	-0.3158766 (-3.00)*	-0.2866471 (-2.17)**	-0.2871012 (-2.43)**	-0.2846008 (-3.20)*
EDUC	0.2123752 (1.74)***		0.223105 (1.91)***	0.2216377 (2.05)**
INCOME	0.0000445 (0.95)	0.0000409 (1.05)	0.0000323 (0.76)	
LOC	0.1276288 (0.41)			0.085596 (0.41)
PLHIVSG	0.450628 (1.65) ***	0.4226272 (1.74)***		0.4750129 (2.78)*
DIST	-0.0598667 (-2.38)**	-0.0680102 (-2.65)*	-0.0710653 (-2.64)*	
SEX	-0.2964331 (-1.69)***	-0.3188625 (-1.42)	-0.4722947 (-3.47)*	-0.1392003 (-0.78)
MIP	0.3901145 (2.07)**	0.2138055 (1.79)	0.4142827 (2.47)**	0.4570358 (2.87)*

Appendix D:Pairwise Correlation Analysis of the Variables

	wpmtct	age	parity	educ	income	loc	plhivsg	dist	sex
wpmtct	1.0000								
age	0.1938	1.0000							
parity	-0.3489	0.5928	1.0000						
educ	0.6028	0.1074	-0.2471	1.0000					
income	-0.0195	0.1866	0.2504	0.1246	1.0000				
loc	0.0151	0.0526	0.1574	0.1075	0.4864	1.0000			
plhivsg	0.5411	0.0286	-0.2630	0.3801	-0.0596	-0.0143	1.0000		
dist	-0.6552	-0.0408	0.3305	-0.4665	-0.0511	-0.1374	-0.3941	1.0000	
sex	-0.3826	-0.2200	0.0591	-0.3925	0.0967	0.0701	-0.3955	0.1114	1.0000
mip	0.4465	0.0233	-0.2883	0.2447	-0.0479	0.1922	0.2881	-0.6267	0.0405

	mip
mip	1.0000

Appendix E: Consent Form

Hello, I am …….. I study at the University of Malawi [UNIMA], Chancellor College. I'm asking women who are on PMTCT services in Zomba district in Malawi to answer a few questions, which we trust will benefit policy makers in Malawi. The purpose of the research is to explore the attitudes of women towards the Prevention of Mother - to -Child Transmission of HIV in Zomba district. Please understand that **your participation is voluntary** and you are not being forced to take part in this study. However, I would really appreciate, if you do share your thoughts with me. If you choose not take part in answering these questions, you will not be affected in any way whatsoever. If you agree to participate, you may stop at any time and tell me that you don't want to go on with the interview. If you do this there will also be no penalties and you will NOT be prejudiced in ANY way. I will not be recording your name anywhere on the questionnaire and no one will be able to link you to the answers you give. The information will remain confidential and there will be no "come-backs" from the answers you give. The interview will last around (20 to 35) minutes. I will be asking you a few questions and request that you are as open and honest as possible in answering these questions.

I hereby agree to participate in the research regarding attitudes of women towards Prevention of Mother-to-child-transmission of HIV in Zomba district. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop this interview at any point should I not want to continue and that this decision will not in any way affect me negatively. I understand that this consent form will not be linked to the questionnaire, or to the test results.

Signature of researcher…….. Date……

Signature of participant……..Date: ……..

Appendix F: In-Depth Interview Questionnaire

QUESTIONNAIRE NO: …… ADMINISTERED AT…….

Are you ready to attend to the following questions about your personal experiences? YES NO

Q01	How old are you?	Any discrete figure				
Q02	How many children do you have as of now?	0	2	4	6	8
		1	3	5	7	9
Q03	What is your level of education?	LEVEL			CODING	
		NA			0	
		JU - PRI			1	
		SE -PRI			2	
		JU - SEC			3	
		SE - SEC			4	
		TERTIARY				
Q04	How much do you earn at the end of the month?	Any discrete figure			**MK**……	
Q06	What is the distance covered from where you stay to the health centre to access PMTCT services?	≤ **10 km**				
		> **10 km**				
Q07	Are you involved in Mother – infant – Pair programme?	YES			NO	
Q08	Ever heard the existence of PLHIV Support Group within your locality?	YES			NO	
Q09	If yes, are you a member of such a Support Group?	YES			NO	
Q10	Where are you located?	Urban			Rural	
Q11	Who is the head of your household?	Me (woman)			Husband	

THANK YOU VERY MUCH FOR SPARING YOUR PRECIOUS TIME TO ATTEND THIS INTERVIEW

Appendix G: A Letter to DHO Seeking for Research Conduction Approval

FROM: Adam Chikapa Guys

TO: The District Health Officer (DHO), Zomba

EMAIL: chikapaadam2@gmail.com

DATE: 12/06/2016

RE: REQUEST FOR THE APPROVAL BY YOUR OFFICE TO CONDUCT A RESEARCH ON ANALYSIS OF THE WILLINGNESS OF WOMEN TO ADHERE TO PREVENTION OF MOTHER TO CHILD TRANSMISSION OF HIV SERVICES IN MALAWI: A CASE OF ZOMBA DISTRICT.

I hereby requesting for the above mentioned caption. I am a student at Chancellor College, one of the constituent colleges of University of Malawi, doing Master of Arts degree in Economics, with a strong bias in Health Economics. As a preliquisite requirement for the fulfillment of Master of Arts degree, I am writing a dissertation on Analysis of the willingness of women to adopt PMTCT services in Malawi: A case of Zomba district. This request is coming about for that I will be using ART registers where necessary. The following are the targeted hospitals and clinics: Zomba Central Hospital, Domasi rural hospital, Pirimiti community hospital, St Lukes hospital, Mayaka health centre, Thondwe health centre, Namikango maternity clinic, Chingale health centre, Chipini health centre, Nkasala health centre, Makwapala health centre, Namasalima health centre and Matawale health centre. This research will help *inter - alia* appreciating how demographic factors, biographic factors and programmatic factors affect women's willingness to adopt the recommended PMTCT services in Malawi, but Zomba in particular. Therefore, I would like to seek for the official approval from your office before indulging myself in this task. Your cooperation with respect to this request is highly appreciated.

Yours in Health

ADAM CHIKAPA GUYS

Appendix H: An Approval Letter from the Zomba District Health Office.

Zomba D.H.O

P.O Box 21

Zomba,

MALAWI

Tel: +265(0) 1525195

+265(0) 1526266

Ref No: R/DHO/16/ZA

Date: 15/06/2016

To: Mr. Adam Chikapa Guys

University of Malawi,

Chancellor College,

P.O Box 280, Zomba

Dear Mr. Adam Chikapa Guys,

RE: GRANTING PERMISSION FOR THE RESEARCH CONDUCTION WITHIN ZOMBA DISTRICT HOSPITAL OFFICE'S CATCHMENT AREA

Upon realizing the importance of the study titled "Analysis of the Determinants of the Willingness of Women to Adhere to Prevention of Mother to Child Transmission (PMTCT) of HIV in Malawi: A Case of Zomba District", we are hereby granting you a permission to conduct a research in our district. Therefore, you can access to all the required documents from the relevant authorities in all 13 targeted health centres in Zomba district. We realize fully that the results will provide interventional directions in our day to day activities about PMTCT in Zomba district. Should you find any challenge in the course of your data collection, please do not hesitate to consult or contact us and we will help you accordingly.

Yours Faithfully,

DR GIFT CHINOMBA
ZOMBA DISTRICT HEALTH OFFICER