DEMAND FOR MATERNAL HEALTH SERVICES: ANALYSIS OF ANTENATAL CARE SERVICES IN THE RIFT VALLEY REGION, KENYA

RICHARD KIPYEGON CHEPKWONY
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DEDICATION

To my wife Violet, for the perseverance and support and my children Roy, Ryan and Rita for what they mean to me

DECLARATION

This research paper is my original work and has not been presented for a degree in any other university.

Richard   Kipyegon   Chepkwony

Signature…………….. 　 Date………………

Declaration by University Supervisors

This research paper has been submitted with our approval as university supervisors.

Prof. Jane Kabubo-Mariara

Signature…………….. 　 Date…………………

Ms. Laura N. Barasa

Signature……………… 　 Date…………………

ABSTRACT

This study investigates the factors that determine the demand of maternal health care services in the Rift Valley region with a specific focus on antenatal care services (ANC). The 2008-09 Kenya Demographic and Health Survey Data is used while the logit model is employed to analyze demand. The special focus on antenatal care is based on established evidence that proper antenatal care has a significant effect on the outcome of pregnancy and consequently affects the health of the mothers and their babies. Moreover, the government of Kenya in June 2013 introduced a policy of free maternity services in all public facilities which when added to free ANC and family planning services has lead to a drastic reduction in out of pocket payments for maternal care services. Consequently, a study on determinants of demand and utilization of services is imperative.

A binary logistic regression in Stata with ANC attendance as the dependent variable indicates that mother's age, education level, religion and birth order are significant predictors of ANC attendance in the Rift Valley region of Kenya.The findings of this study indicate that policies should be put in place to target increased enrolment of the girl child in schools, increase retention and transition through the education system. Moreover, maternal health services will benefit from targeted health message policies which will help in dispelling myths and practices that hamper use of maternal health services.

ACKNOWLEDGEMENTS

LIST OF ABBREVIATIONS

ANC   - Antenatal Care

CBS   - Central Bureau of Statistics

FANC - Focused Antenatal Care

GoK   - Government of Kenya

KDHS - Kenya Demographic and Health Survey

MDGs - Millennium Development Goals

MMR – Maternal Mortality Rate

MOH -   Ministry of Health

NCPD - National Council for Population and Development

PNC-   Post Natal Care

TBA-   Traditional Birth Attendant

UN – United Nations

WHO - World Health Organization

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE: INTRODUCTION

1.1 Background

The 62nd UN General assembly revised the millennium development goals (MDG`s) monitoring framework to include new targets and indicators. MDG 5 (improving maternal health) was disaggregated into two targets: reducing, by three quarters, between 1990 and 2015, the maternal mortality rate (MMR) and achieving, by 2015, universal access to reproductive health. Six indicators were identified for these targets which are: Maternal mortality rate, proportion of births attended by skilled health personnel, contraceptive prevalence rate, adolescent birth rate, ANC coverage (at least one visit and at least 4 visits) and the unmet need for family planning (UN, 2005).

In developing countries, pregnancy related complications are a leading cause of mortality among women of reproductive age (15-49 years). In 2007, WHO estimates put annual maternal deaths at 536,000 worldwide with 95% coming from sub- Saharan Africa and Asia. Recent estimates puts maternal mortality rate in Kenya at 488 per 100,000 live births (KDHS, 2008-09). Other sub Saharan countries have higher rates e.g. Sierra Leone at 2100, Niger at 1800 per 100,000 live births, Cameroon, Malawi and Nigeria at 1100 per 100,000 live births (WHO, 2007). Research has shown that maternal and perinatal deaths can be drastically reduced by increasing accessibility and utilization of maternal health services especially ANC (Carroli et al. 2001). Availability of maternal health services alone does not guarantee utilization because of other constraints like lack of information. The United Nations (UN) in 1998 observed that the most proximate determinant of maternal health and survival is the extent to which mothers have access to, and utilize high quality maternal health care services such as ANC, family planning, skilled delivery and post natal care.

In Kenya, maternal health services started in 1972 as part of an integrated maternal and child health program but specific programs to reduce maternal mortality and improve maternal health only started with the inauguration of safe motherhood initiative in Nairobi in 1987. While earlier efforts concentrated on training of traditional birth attendants (TBA`s) to screen high –risk pregnancies for complications, since 2002 focus

has shifted to providing women with access to skilled care during pregnancy and delivery. National reproductive health strategy for 1997 (MOH, 1996) had two maternal health objectives; reduce maternal mortality to 170/100,000 live births by 2010 and increase professionally attended deliveries to 90% in the same period through helping facilities to manage pregnancy related complications, unsafe abortions, newborn care and establishing functional referral systems. In 2001, researchers recommended a goal oriented antenatal care approach known as focused ANC (FANC) which was adopted by WHO and by extension Kenya in 2002. FANC aims to promote the health of mothers and their babies through targeted assessments of pregnant women and provide holistic individualized care to each woman to help maintain the normal progress of pregnancy and timely guidance as opposed to the old ANC model developed in the early 1900`s which assumed that frequent visits and classifying women into low risk and high risk by predicting complications ahead of time, was the best way to care for the mother and the fetus.

Despite the above policy directions, the Kenya Health Policy Paper (MOH, 2012) shows that the millennium development goals (MDGs) 4 and 5 which relate to child and maternal mortality are lagging behind in terms of progress both in Kenya and at the global level. Poor policy implementation and weak health systems have been cited as some of the contributors to this situation. Health systems have been cited as being unresponsive to the needs of the communities they operate in, hence poor access and utilization of both curative and preventive health services (MOH, 2012-2030).

Antenatal care (ANC) is a key component of ensuring safe motherhood. The special focus on ANC is based on established evidence that proper ANC has a higher bearing on the outcome of pregnancy because it determines the health of both the mother and the fetus, where the mother will eventually give birth and also the attendance of mothers to Post Natal Care (PNC) which, overall affect the health of the mothers and their babies. The WHO is supporting countries in providing integrated, evidence-based effective care for mothers and babies starting before conception to pregnancy, childbirth and the post-delivery period.

In this study, demand for ANC services is used to proxy the demand for all maternal and child health care services because it comes first and when ANC is done properly, there is a higher likelihood of safe delivery and proper post natal care. The main objective of ANC visits during pregnancy is to identify and treat problems like malaria worms' infestation and anemia, screen for complications and offer counseling on relevant issues like place of delivery, care of the baby and danger signs during pregnancy among others.

1.2 Situational analysis of maternal health status in Kenya

The trends in maternal health status in Kenya can be seen from a tabulation of the six indicators associated with MDG 5 targets across the last 4 KDHS reports as presented in table 1.

Table 1: Maternal health indicators in Kenya for the period 1993 to 2009

Maternal health indicators		*Year of the KDHS report*			
		1993	1998	2003	2008-09
ANC coverage	*At least 1 visit (%)*	95	92	88	92
	At least 4 visits (%)	64	61	52	47
Proportion of births attended by a professional (%).		45	44	42	44
Maternal mortality (per 100,000 live births).		365	590	414	488
Contraceptive prevalence rate (%)		33	39	39	46
Proportion of women between the ages of 15-19 years that has began childbearing (%).		40	45	46	36
Proportion of children of age of 12-23 months during the survey that were fully vaccinated (%)[1]		79	65	57	77

Source: CBS, MOH and ORC Macro (2004); KNBS and ICF Macro (2010); NCPD, CBS and MI (1994; 1999)

It is clear from the table that little progress has been made on the area of maternal health care in Kenya since the advent of MDGs in the year 2000. Save for improving contraceptive prevalence rate, all the other indicators have been deteriorating or at best

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[1] This indicator is not one of the six indicators proposed by the UN to monitor MDG 5 but has been included here to demonstrate the trends in immunization in Kenya, which is closely linked to the outcomes of proper ANC services (Carroli et al. 2001).

stagnating. A case in point is maternal mortality rate which instead of dropping by 75% from the 1990 figure of 365 deaths per 1000,000 live births, actually rose to 488 deaths per 100,000 live births in 2008-09. These statistics however mask glaring regional discrepancies that exist throughout Kenya, some being extremely far removed from the national averages.

In June, 2013, the Government of Kenya (GoK) made a policy declaration that all deliveries in public health facilities will be done free of charge where the central Government will reimburse the provider all the costs. This adds to the policy on free reproductive health care services that have been in place since 1997 (MOH, 1996).

1.3 Statement of the problem

Kenya, among other sub-Saharan African countries continue to post grim statistics regarding the attainment of MDG goal 5 ahead of the 2015 deadline despite the presence of various policies and efforts towards their attainment. Earlier, Kenya had targeted to reduce maternal mortality to 170 per 100,000 live births by 2010 (MOH, 1996) a target which was obviously missed as indicated by a maternal mortality rate of 488 per 100,000 live births (KDHS 2008-09). Statistics from table 1 above indicates that little progress has been made towards achieving the MDG goal 5 in Kenya despite policy and resource efforts expended over the years. With the advent of Constituency Development Fund, several health facilities have been set up across the country which coupled with the low ought of pocket payments for most maternal health services should have improved the MDG 5 indicators for Kenya by now.

While it is believed that maternal and child health indicators can be improved drastically if access and utilization of maternal and child health services is increased, it is clear that earlier efforts have been focused mainly on the supply side factors such as more facilities, opening hours, contact cost reduction and very little or none on the equally important demand side factors e.g. income, distance to the nearest service provider or the consumers perception of quality of the service provided. It is therefore imperative to ascertain those factors that determine demand for health services, the strength of their

influence so as to guide the policy direction towards better maternal health services in Kenya. This study is necessary because few studies have been done on the subject in Kenya and none to the best of my knowledge has been done in the Rift Valley region, yet it is the most cosmopolitan Province after Nairobi. This cosmopolitan nature is expected to yield more insightful policy lessons because health care demand is influenced by a people's culture (Chakraborty et al. 2003). Past studies in Kenya like Muriithi (2011), Njaramba (1994), Chepkoech (2003) and Owino (2001) did not investigate the role of ethnicity and religion in influencing health care demand. The Rift Valley offers variety in terms of the ethnic mix, socioeconomic status and rural- urban dwelling.

1.4 Objectives of the study

The general objective of this study was to analyze the utilization of maternal health care services in Kenya with specific reference to the Rift Valley region. Specific objectives included to:

a) Investigate factors that influence the demand for maternal health care services in Kenya.

b) Analyze the correlates of demand for maternal health care services in Kenya.

c) Make policy recommendations for improving of maternal health care services in Kenya based on the findings.

1.5 Study justification

The policy environment in Kenya at present indicates a shift towards zero out of pocket payment for maternal and child health care services in public health facilities. In this regard, socioeconomic and demographic variables can only be the main limiting factors in the demand for maternal health care services. This study aims to ascertain those factors and the extent to which they influence demand for maternal health care services with a specific focus on ANC.

The findings of this study will be of utmost importance to both the central and county governments as they strive to attain MDG targets regarding maternal health ahead of the 2015 deadline. In this regard, results obtained from this study will guide policy interventions aimed at increasing uptake of maternal health services in public health facilities. Moreover, the results of this study will add to the pool of available data and literature in the field of health economics, and also form a basis for further research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Since no model has been developed to analyze demand for ANC specifically, theoretical literature focuses on models on general demand for health care. Empirical literature review targeted studies that have investigated general health care seeking behavior and those with specific emphasis on demand for ANC. However, the literature review as much as possible was limited to those published studies done in developing countries and sub-Saharan Africa in particular because these countries have the same socioeconomic conditions as Kenya where the proposed study is to be undertaken.

2.2 Theoretical review

Grossman's pioneering work postulated that individuals demand health both because it provides direct utility and because it influences their performance in the labour market and that, the individual utility is a function of consumption commodity and time spent in sickness (Grossman 1972). Time spent in sickness in turn is dependent on the health capital level. The net investment in the stock of health capital depends on gross investment in health, depreciation and environmental factors. Individuals are deemed to produce gross investment in health by combining their own time with bought medical care and food. This model assumes that individuals allocate resources so as to maintain a constant health stock every year. The individuals' problem is seen as a trade-off between maximizing discounted lifetime utility and wealth accumulation given appropriate health technologies. This formulation gives rise to the structural demand for health and the derived demand for medical care. The equation for the demand for medical care can then be derived from the structural demand for health. The main criticism of the Grossman model is that it envisages a positive correlation between health status and demand for medical services whereas empirical studies yield a negative correlation. Secondly, the assumption that the health seeking behavior is a product of individual rational choice devoid of any communal or household influence may not hold in real life environment (Wagstaff, 1986).

Acton (1975) building on the work of Grossman (1972) introduced the role of time in determining demand for health care. He postulated that consumers of health care are rational and respond to incentives and that since non monetary factors increasingly assumed an important role in determining demand for medical care due to falling out of pocket money prices (with the increasing role of insurance and health policies for free care in the USA in 1975) travel time and waiting time assumed the role of `new prices` to ration access to care. He explored the role of money prices, time prices, earned and non earned income on the demand for health care services. He assumed that two goods enter an individual's utility function: medical services and a composite for all other goods and services. Further, he made an assumption of fixed proportions of money and time to consume the two goods and that every individual strive to earn the full income. Since this model is a slight improvement on the Grossman model, it shares in its limitation.

Heller (1982) building on the work of Acton (1975) assumed that an individual's health status is a product of preventive services used, composite commodity of other goods and services, age of the individual, hygienic quality of the environment and virulence of the disease agents in the community. This means that the healthier an individual, the lesser the demand for curative health services. He further assumed that, for every sick episode, there is a minimum level of "necessary" curative medical care which is inversely related to health status. The model assumes that the consumption of health care is a function of morbidity, discretion. A greater consumption of "discretionary" medical care will essentially reduce the need for "necessary" curative care. Because of the relationship between "necessary" and "discretionary" medical care, the demand for medical services will be ambiguous and this is where this model differs from the Acton model which assumes that all consumption of medical care is discretionary. This model assumes that, the individual derives utility from three types of goods and services; preventive health services, discretionary medical care, and a composite commodity of all other goods, the necessary component of health care which is deemed to be a necessary cost of survival. This models` main criticism is the difficulty in making a distinction between necessary curative care and discretionary care since only total consumption is observed.

Ellis and Mwabu (2004) divided the health care seeking decision into two parts; reporting an illness and seeking treatment. They developed a four level nested logit outpatient demand model based on probability of reporting an illness, whether or not to seek treatment, choice of facility to visit and the choice of mode of transportation. While earlier econometric models on demand for medical care in developing countries (Akin et al. 1986; Gertler et al. 1987; Sahn et al. 2003 and Dor et al. 1987) were based on choices among representatives of classes of providers, the model proposed by Ellis and Mwabu (2004) is based on choices amongst specific providers. Save for Acton (1975) who recognizes the mode of transport as an endogenous variable in the demand for health care, Ellis and Mwabu (2004) are the first authors to include the mode of transportation in their model. While the Ellis and Mwabu model may better model demand for curative care, it may not be very useful in modeling demand for preventive care like demand for ANC since there is no "illness" per se to report hence step 1 of the four level nested logit is redundant.

Rosenzweig and Schultz (1983) developed a behavioral model on household health production in which inputs are endogenous choices based on individual or household preferences. The model postulates that the household production framework has an underlying technology composed of biological processes which in conjunction with household preferences determine health outcomes. While the idea of underlying technology has reduced the number of potential inputs to the health production function, empirically, the estimates of the technical or biological effects of such inputs are often constrained by limitations in data availability hence the need to incorporate "hybrid" health equations that contain one or two health inputs and prices and income variables on the right hand side. Schultz (1984) borrows largely from Rosenzweig and Schultz (1983) model. The main limitation of the Rosenszwig and Schultz (1983) is that though reference is made of family specific health endowments in the model but in practice, due to difficulty in data measurement, is never included in model estimation.

Building on the work of Grossman (1972) and Rosenszwig and Schultz (1983), Mwabu (2008) proposed a broader model capable of analyzing a number of issues that may affect demand for health care. The model named `the unified model of health care demand` is capable of incorporating marketable health inputs like immunizations to non-tradable inputs like behavior change. This model is based on three key assumptions: that individuals in a household know what is required to maintain health, prevent and cure illnesses and are capable of ranking those requirements and the ranking is shared by all the members of the household, the assets and income of a household determine the type and intensity of actions directed at promoting and maintaining health and lastly, individuals hope to maximize utility. The main criticism of this model is that individuals of a household may not have adequate information to facilitate the making of choices on matters pertaining to their health.

Since the data used in this study were obtained from a household survey, the assumptions of the Mwabu (2008) model on demand for health at the household level makes it the most appropriate model to analyze the demand for ANC attendance.

2.3 Empirical review

Acton (1975) in his study in the United States found that in situations where out of pocket prices for health care services is zero or near zero, the time required to consume those services act to ration access to services. However, empirical studies in developing countries have continued to give two conflicting sets of results. On the one hand, some studies find that the demand for health services is insensitive to price and travel time (Akin et al. 1986; Heller 1982) while on the other hand some studies show that indeed prices and travel time influence demand for health care services (Dor et al. 1987; Gertler and Van der Gaag 1990; Gertler et al. 1987; Lavy and Quigley 1993; Mwabu 1986; Mwabu et al. 1993; Bolduc et al. 1996). These studies exhibit variations at various levels i.e. what they model, the number and types of variables investigated, the countries and years of study as well as the methods of model estimation and these may partially explain the discrepancies in the results. A case in point is that most studies model the static

conditional provider choice while a few like Lavy and Quigley (1993) and Heller (1982) model the frequency of visits to a particular provider.

Dor et al. (1987) and Gertler and Van der Gaag (1990) using data from rural Cote d` Ivoire and rural Peru found income as a key determinant of demand for medical care. This finding is consistent with the findings by Muriithi (2013) and Gertler et al. (1987) but contradicts Heller (1982) and Akin et al. (1986) who found no relationship between demand for medical care and income. Dor et al. (1987) also found that the price elasticity of demand for care in public facilities increases with income while Gertler et al. (1987) using data from rural Peru found that demand becomes more price elastic with fall in income. However, there are variations on how individual or household incomes have been measured as well as the assumption on the relationship between price and income. Muriithi (2013) used land acreage to proxy family income in a slum environment as opposed to the more relevant variable of wage earnings while Gertler and Van der Gaag (1990) used average monthly value of total household consumption.

 Most empirical studies on demand for medical services indicate that education is significantly associated with use of health care services (Mwabu et al. 1993; Gertler and Van der Gaag 1990 using Peruvian data; Chakraborty et al. 2003; Muriithi 2013; Mpembeni et al. 2007; Tsegay et al. 2003). However, a finding by Gertler and Van der Gaag (1990), using Ivorian data, that there is no association whatsoever between education level and utilization of health care services is surprising. Literature indicates that most studies collect data on education at the time of the survey and not when health care was sought which can be misleading especially where a time difference of 5 years is involved.

Few studies on the role of marital status on demand for health services are available and the few are only concerned with aspects of maternal health services like ANC and skilled birth attendance. Tsegay et al. (2003) in a study in Ethiopia found that married and divorced women had a higher propensity to use services than single and widowed women. This finding is consistent with other previous studies (Onah et al. 2006;

Gabrysch and Campbell 2009). They postulated that perhaps women who conceive out of wedlock were possibly less motivated to attend ANC due to marginalization and stigmatization by the community (Mekonen and Mekonen 2003) or discriminatory attitudes of providers (Gabrysch and Campbell 2009). One main limitation of this study is that, while the data on use of ANC relates to the last 5 years, marital status refers to the time of questionnaire interview and may not relate to the time of the pregnancy.

Literature has yielded inconclusive results regarding the influence of age on the demand for health services. While ordinarily, one would expect a U shaped relationship i.e. high demand in early childhood and old age and low demand in middle age groups, various studies have produced different results. Muriithi (2013) found that age is positively associated with health service utilization. Gertler and van der Gaag (1990) using Ivorian data found that health care consumption reduces with age but Dor et al. (1987) in a study in the same country found that there was no association between age and demand for health care. Mpembeni et al. (2007) found that younger women use health services more than older women, a finding which is consistent with the findings by Yanagisawa et al. (2006) and Stekelenburg et al. (2004). As in the case of education level and marital status, literature indicates that most questionnaire interviews collected data on the age at the time of the interview and not the time when health services were sought which can be misleading.

The occupation of the household head has been found to be a significant predictor of health care service demand. Chakraborty et al. (2003) found that women whose spouses engage in business or service provision were associated with demand for maternal health care services which contrasts with the findings by Muriithi (2013) that there is no association between the occupation of the household head and the demand for health care services. The two studies above indicate that the occupation of the household head was taken to be at the time of the interview and not at the time of seeking care which may not be the same.

Studies on general demand for health care uses the number of adults (Dor et al. 1987) or the number of individuals in the household (Muriithi 2013) to indicate household size but for maternal services, the number of children born to the mother (parity) is the more relevant variable. Muriithi (2013) found that the household size is positively associated with demand for services. While this finding that the household size was positively associated with demand for health services agrees with the findings of other authors (Sahn et al. 2003 and Bolduc et al. 1996) it contradicts the findings of Ochako et al. (2011) and Regassa (2011) who found that parity affects demand for ANC in an inverse manner. However, Tsegay et al. (2003) and Chakraborty et al. (2003) found no relationship at all between parity and ANC.

Adamu (2011), in an unpublished study using data from the 2008 National demographic and health Survey in Nigeria found that religion was a significant predictor of demand for maternal and child health care services in some regions of Nigeria. However, as is the case for all ecological studies, information obtained relates to the particular group but may not represent the situation at the individual level. To the best of my knowledge, no study has tried to investigate the role of ethnicity in demand for health services in sub-Saharan Africa. However Heller 1982 in a study in Malaysia found that ethnicity was associated with demand for health services.

Empirical literature review reveals that most variables give inconsistent findings across studies. This calls for localization of research findings to probably reflect only those areas with similar socio-economic characteristics. Moreover, literature reveals that the effect of religion and ethnicity on demand for health services has not been investigated in Kenya.

Other studies on health seeking behavior in Kenya
Owino (2001) in a study of the use of maternal health care services in Nyanza province found that the most significant factors in predicting service utilization include parity, age of the mother, education level of both the woman and the husband, place of residence, family planning and the number and timing of ANC visits. This finding is shared by other studies like Machio (2008), Chepkoech (2003) and Njaramba (1994) however some

variables have exhibited a variation in the sign of their influence from one study to the other e.g. Chepkoech (2003) found that family size is negatively associated with utilization of maternal services while Njaramba (1994) found family size to be positively associated with use of maternal services.

The main limitation of the above studies done in Kenya is that they were urban based and may not be generalizable to a rural urban setting like the Rift. Moreover, some of the studies were looking at a time horizon of 5 years, some of the variables like education level and marital status could have changed between the time of the pregnancy and the time of data collection hence leading to misleading findings.

2.4 Overview of literature

Available literature indicates that most studies on demand for health care use quantitative analysis to try and establish any statistical associations between demand for care and the various variables (Mpembeni et al. 2007; Tsegay et al. 2003; Chakraborty et al. 2003) and very few are based on qualitative analysis (Lubbock and Stephenson 2008) and rarely both quantitative and qualitative. Moreover, in most cross sectional studies reviewed, some variables like marital status and age refer to the time of the survey and not the more relevant time of the pregnancy which when taken with a time horizon of 5 years of the study can be misleading. It is also evident that there are mixed results on most variables as they exhibit differences across studies even within the same country. A case in point is household size which Muriithi (2013) and Njaramba (1994) find to be positively associated with service utilization while Chepkoech (2003) finds a negative association. This finding lends credence to the widely held belief that demand for health care is a complex behavioral phenomenon related to availability, quality and cost of services as well as to social structure, health beliefs and personal characteristics of users (Chakraborty et al. 2003).

The KDHS 2008-09 report indicates that 10.2% of pregnant women in Rift Valley do not attend ANC as compared to 8% for Kenya and 28.9% for North Eastern province. Since most previous studies on health care demand in Kenya e.g. Muriithi 2013 (Kibera slum) or Chepkoech 2003 (Nairobi slums) did not investigate the variables of ethnicity and religion on demand for health services, this study attempts to fill that gap. These variables have not been investigated in Kenya before to the best of my knowledge.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter presents the analytical methods, data types and sources to be used in this study. The methodology adopted is informed by the literature review and the available data.

3.2 Theoretical Framework

The literature reviewed indicates that the demand for health care is influenced by demographic and socioeconomic factors which affect health. This study proposes to model the decision by a pregnant woman whether to attend ANC or not. This being a discrete choice, the estimates obtainable are actually probabilities that a particular woman opts for a certain option given a set of socioeconomic and demographic variables. This study proposes to adopt and adapt the health production model proposed by Rosenzweig and Schultz (1983) to formulate a reduced form equation for the demand for ANC services and analyze the impact of various variables on attendance or non attendance of ANC. The main advantage of the Rosenzweig and Schultz (1983) model is that it provides an integrated framework for analyzing the biological determinants of health in the presence of heterogeneity as well as the economic constraints that determine the selection of various health inputs.

The Rosenzweig and Schultz model (1983) while modeling child health production, postulated that household utility is given by:

$U = u (X, Y, H)$ …………………………………………….... (1)

Where, H – Investments in child health

      Y – All goods that affect child health

      X – A composite of all other goods

The child health production function on the other hand is given by:

$H = F(Y, I, \mu)$ ……………….…………………………………. (2)

Where, Y - Refers to all goods that affect child health

      I – Refers to proximate inputs to child health and

μ – Family specific health endowments known to the family but not controlled by them.

Households always hope to maximize utility according to equation (1) given production function (2) subject to a household budget constraint given by:

$$W = XP_x + YP_y + IP_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (3)$$

Where P_y - is the price vector for all goods that affect child health

   P_x - is the price vector for all other goods consumed by the household

   W - Total household income

   P_i - is the price vector for all proximate inputs to child health

Following Mwabu (2008), we assume prices and income are exogenous to the household and the reduced form demand functions for X, Y and I can be defined as;

$$D_x = D(P_y, P_i, W, \mu) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.(4a)$$

$$D_y = D(P_y, P_i, W, \mu) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.(4b)$$

$$D_i = D(P_y, P_i, W, \mu) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. \quad (4c)$$

Substituting the demand functions for X and Y (4a and 4b) in the health production function (2), gives:

$$H = F(D_x(P_y, P_i, W, \mu), D_y(P_y, P_i, W, \mu), \mu)$$

$$= F(P_y, P_i, W, \mu) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. \quad (5)$$

Since prices and income determines the type and volume of goods to be consumed, it is clear from equation (5) that child health can be predicted by proximate inputs to child health (I), child health inputs (Y) and their respective prices, the wealth of the household (W) and a family specific health endowments (μ).

3.3 Model Specification

Based on the literature, this study estimates a model with several vectors of variables based on equation (5) above. The vectors are:

X_{ij} – a vector of mother`s characteristics

X_{kj} – a vector of household characteristics

X_{mj} – a vector of health facility variables

ε - An error term

The functional form of the model to be estimated can thus be specified as:

ANC = F (HHI, EDUC, OCC, AGE, BO, MAR, ETH, REL) …..…. (6)

While the estimable model takes the following form:

$ANC = \beta_0 + \beta_1 HHI + \beta_2 EDUC + \beta_3 OCC + \beta_4 AGE + \beta_5 BO + \beta_6 MAR + \beta_7 ETH + \beta_8 REL + \varepsilon$ ……………………………………………… (7)

Where, *ANC* – is the dependent variable equal to 1 if a woman attended ANC, 0 otherwise

HHI – Household wealth index

EDUC- Mother`s level of education

OCC- Husband`s occupation

AGE- Mother`s age

BO - Birth order

MAR- Marital status

ETH- The woman`s ethnicity

REL - Woman`s religion

Equation 7 is estimated using logistic regression in STATA.

3.4 Definition and measurement of variables

The use of ANC is the response variable and is defined as whether a mother made at least one visit to the provider of ANC during the period of the last pregnancy or not. The independent variables are defined in table 2 below.

Table 2: Definition, measurement and expected signs of independent variables

Variable	Measurement	Expected sign and literature source
Household wealth index	1 if Poorest, 0 otherwise	*Positive*
	1 if poorer, 0 otherwise	The higher the wealth index of a household, the higher the capacity to afford health care services (Dor et al. 1987; Gertler and Van der Gaag 1990; Machio 2008; Chepkoech 2003; and Gertler et al. 1987).
	1 if middle, 0 otherwise	
	1 if richer, 0 otherwise	
	1 if richest, 0 otherwise	
Ethnicity	1 if Kalenjin, 0 otherwise	*Not known a priori*
		Heller found that in Malaysia, the Chinese used health services more than the Indians and the Malays probably because they predominantly lived in urban areas (Heller 1982; Gabrysch and Campbell 2009).
Mother`s level of education	1 if no education, 0 otherwise	*Positive*
	1 if primary education, 0 otherwise	Educated women have higher awareness of their health needs hence demand more health services (Mwabu et al. 1993; Gertler and Van der Gaag 1990 using Peruvian data; Chakraborty et al. 2003; Muriithi 2013; Mpembeni et al. 2007; Tsegay et al. 2003; Onah et al. 2006).
	1 if secondary education and above, 0 otherwise	
Mother`s age (age of the woman in completed years at last birthday)	1 if < 20 yrs, 0 otherwise	*Negative*
		Younger women are more educated and more economically empowered hence use health services more (Mpembeni et al. 2007, Stekelenburg et al. 2004 and Yanagisawa et al. 2006).
	1 if 20-34yrs, 0 otherwise	
	1 if over 34 yrs, 0 otherwise	
Birth order	1 if 1st order , 0	*Negative*

	otherwise	Increasing confidence with every subsequent birth reduces demand for health services (Ochako et al. 2011; Regassa 2011).
	1 if 2nd order, 0 otherwise	
	1 if 3rd order, 0 otherwise	
	1 if 4th order, 0 otherwise	
	1 if 5th order and above, 0 otherwise	
Marital status	1 if married, 0 otherwise	*Indeterminate* Marital status influence health care choices via its link to female autonomy and status as well as access to financial resources (Tsegay et al. 2003 ; Onah et al. 2006; Gabrysch and Campbell 2009).
Husband`s occupation	1 if agriculture based, 0 otherwise	*Negative* Women whose husbands are involved in agriculture use less health services because of less income and lack of insurance (Chakraborty et al. 2003; Lubbock and Stephenson, 2008).
Religion	1 if Protestant, 0 otherwise	*Indeterminate* Religion is a marker of cultural background and determines societal beliefs, norms and values which may affect health care utilization (Adamu 2011; Gabrysch and Campbell 2009).

3.5 Data type and source

This study is based on the 2008 Kenya Demographic and Health Survey (KDHS) Data. The data is deemed to be representative at both provincial and national levels. For the purposes of this study, only data relating to women interviewed in the former Rift Valley will be extracted.

The study area known here as the former Rift Valley Province was an expansive Province in Kenya (182,505.1 square kilometers) before the administrative structure of Kenya was reconfigured into counties with the advent of the 2010 constitution. It encompassed all that area covering the present day Counties of Narok, Bomet, Kericho, Nakuru, Laikipia, Samburu, Baringo, Turkana, West Pokot, Transnzoia, Uasin Gishu, Elgeyo Marakwet, Kajiado and Nandi.

According to the KDHS 2008-09, the total population of the Province was 10,006,805 mostly living in rural areas though urbanization is increasing. The Maasai, Kalenjin and Kikuyu are the major ethnic groups living here although it is believed to be the most cosmopolitan area in Kenya. It encompasses an arable south towards Tanzania and the arid north towards Ethiopia and South Sudan.

The most recent health statistics from the region (KDHS 2008-09) indicates that the region is not performing well in terms of maternal health. ANC attendance stood at 88.4 % against a national average of 92%, home deliveries stood at 66.3% against a national average of 56% and of those who delivered at home 31.3% believed that skilled attendance during delivery is unnecessary against a national average of 21%. Moreover, these statistics could be masking even worse intra-county disparities especially in the clash-torn arid north. These statistics indicate the need for urgent action to improve maternal health in the region that can only be beneficial if it is informed by research on the determinants of ANC attendance that this study seeks to provide.

3.6 Data analysis

The statistical package (Stata version 12.1) was used to analyze the data. Descriptive statistics was used to portray the socio-demographic characteristics of the study participants and their use of ANC services. Tables were used to illustrate the socio-demographic distribution of the respondents as well as their percentage utilization of ANC services.

The dependent variable (ANC attendance), being binary in nature, a binomial logistic regression was used to do inferential analysis. However, a bivariate analysis was first done, using the Chi-Squared test, to ascertain the association between the utilization of ANC services and the various socio-demographic variables. To ascertain independent variables that predict the utilization of ANC services, a multivariate logistic regression technique was used. All independent variables were incorporated in the model. The level of significance for all statistical analyses was set at $\alpha = 0.05$

CHAPTER FOUR: RESULTS

This chapter presents the results of both the descriptive and regression analysis.

4.1. Descriptive Statistics

Some variables in the dataset extracted had missing values. Appendix 1 shows a summary of the missing values. The missing values in the dependent variable (ANC) and the independent variable (husband`s occupation) were so significant that it would have led to biased and less efficient results if list-wise deletion of missing values is allowed. To generate the missing values, Multiple Imputation technique in Stata (Version 12.1) was used. Multiple Imputations is a method where missing values are replaced using a value derived from the dataset using a procedure established by Little and Rubin (2002) and Allison (2001). A summary of descriptive statistics is shown in table 3.

Table 3: Summary of descriptive statistics

Variable		Obs.	Mean	Std. Dev.	Min.	Max.
ANC attendance dummy	At least one visit	1278	.935	.247	0	1
Age dummies	<20	1278	.227	.419	0	1
	20-34	1278	.503	.500	0	1
	>34	1278	.270	.444	0	1
Education level dummies	No education	1278	.178	.383	0	1
	Primary	1278	.540	.499	0	1
	Secondary and above	1278	.281	.450	0	1
Birth order dummies	1st	1278	.245	.430	0	1
	2nd	1278	.117	.322	0	1
	3rd	1278	.139	.346	0	1
	4th	1278	.117	.322	0	1
	5th and above	1278	.381	.486	0	1
Wealth index dummies	Poorest	1278	.291	.454	0	1
	Poorer	1278	.176	.381	0	1
	Middle	1278	.173	.378	0	1
	Richer	1278	.179	.384	0	1
	Richest	1278	.181	.385	0	1

Ethnicity dummy(1 if Kalenjin, 0 otherwise)	1278	.534	.499	0	1
Religion dummy(1 if protestant, 0 otherwise)	1278	.709	.454	0	1
Marital status dummy (1 if married, 0 otherwise)	1278	.565	.496	0	1
Husband's occupation dummy(1 if agriculture, 0 otherwise)	1278	.329	.470	0	1

Source: Author's computation based on KDHS 2008-09 Data

As part of the study of the relationship between ANC attendance and various socio-demographic variables, a bivariate analysis was undertaken, whose results are shown alongside tables of descriptive statistics. Pearson's Chi-squared test was used to measure association at a 5% level of significance.

Age

The majority of the respondents (50.31%) are in the age category of 20-34 years. The distribution of respondents by age group is presented on table 4.

Table 4: Summary of distribution of respondents according to age

Age category	No. of respondents	Percentage (%)	Percentage attending ANC(*at least one visit*)
< 20	290	22.69	94.83
20-34	643	50.31	93.16
35-49	345	27.00	93.04
TOTAL	1278	100	

Pearson Chi2 (2) = 1.0845   Pr = 0.581*; Source: Author's computation based on KDHS 2008-09 Data*

The relationship between ANC attendance and the mother`s age at the time of delivery was found to be insignificant. (χ^2= 1.0845, df= 2, P>0.05). This means that the probability of attending ANC does not vary with the age of the woman.

Marital status

56.49 % of the women reported being in marriage while 43.51% were not.

Table 5: Distribution of respondents according to marital status

Marital status	No. of respondents	Percentage (%)	Percentage attending ANC
Divorced	6	0.47	100
Living with a man	35	2.74	94.29
Married	722	56.49	92.11
Never married	402	31.46	95.77
Not living with a man	69	5.40	98.55
Widowed	44	3.44	86.36
TOTAL	1278	100	

Pearson Chi2 (5) = 12.7687 Pr = 0.026; *Source: Author's computation based on KDHS 2008-09 Data*

The relationship between marital status and ANC attendance was found to be significant. Divorced women (100%) and those not living with a man (98.55%) are more likely to attend ANC than women who are living with a man (94.29%) or widowed (86.39%).

Education

The majority of the respondents (54.07%) have attained a primary education level. This implies that, the transition rate to secondary schools is very poor and hence the health awareness and empowerment associated with schooling could be hampered.

Table 6: Distribution of respondents according to educational level

Years of schooling	No. of respondents	Percentage (%)	Percentage attending ANC
No education	228	17.84	78.51
Primary	691	54.07	95.95
Secondary and above	359	28.09	98.33
TOTAL	1278	100	

Pearson Chi2 (2) = 104.9793 Pr = 0.000; *Source: Author's computation based on KDHS 2008-09 Data*

ANC attendance and education show a significant association (χ^2= 104.9793, df =2, P<0.05). ANC attendance increases linearly with increase in the number of years of formal schooling where women with no education has the lowest proportion attending ANC (78.51%), 95.95% for those with primary level and 98.33% for those with secondary education and above.

Religion

The respondents were predominantly Protestants (70.99%).

Table 7: Distribution of respondents according to religion

Religion	No. of respondents	Percentage (%)	Percentage attending ANC
Protestant	906	70.89	95.81
Roman catholic	295	23.08	92.20
No religion	65	5.09	66.15
Muslim	8	0.63	100
Others	4	0.31	100
TOTAL	1278	100	

Pearson Chi2 (4) = 89.6258 Pr = 0.000; *Source: Author's computation based on KDHS 2008-09 Data*

A significant association was found between ANC attendance and religion (χ^2= 89.6258, df= 4, P<0.05). Muslims (100%), others (100%) and protestants (95.81%) are more likely to attend ANC than those with No religion (66.15%).

Ethnicity

The majority of the respondents in the sample were from the Kalenjin ethnic group.

Table 8: Distribution of respondents according to ethnicity

Ethnicity	No. of respondents	Percentage of total sample (1278)	Percentage attending ANC
Kalenjin	682	53.36	94.72
Kikuyu	136	10.64	97.06
Luhya	124	9.70	98.39
Masai	116	9.08	84.48
Others	220	17.21	89.55
TOTAL	1278	100	

Pearson Chi2 (4) = 30.5858 Pr = 0.000; *Source: Author's computation based on KDHS 2008-09 Data*

There is a significant association between ANC attendance and the ethnicity of the woman (χ^2 = 30.5858, df= 4, P< 0.05). Some ethnic groups like Luhya and Kikuyu are more likely to attend ANC than say Masai and others.

Household wealth index

The households were classified into 5 groups to proxy the financial position of the households. Most of the respondents came from households in the lowest wealth quintile (29.12%) while the balance was evenly distributed in the other four quintiles.

Table 9: Distribution of respondents according to wealth index

Wealth index	No. of respondents	Percentage (%)	Percentage attending ANC
Poorest	372	29.11	87.10
Poorer	225	17.61	93.78
Middle	221	17.29	95.93
Richer	229	17.92	96.94
Richest	231	18.08	97.84
TOTAL	1278	100	

Pearson Chi2 (4) = 38.9103 Pr = 0.000; *Source: Author's computation based on KDHS 2008-09 Data*

The household wealth index is significantly associated with ANC attendance (χ^2= 38.9103, df= 4, P< 0.05). The proportion of women attending ANC increases linearly with an increase in the household income quintile. Women from households with a highest income quintile are more likely to attend ANC (97.84%) as compared to those from the lowest income quintile (87.10%).

Husband`s occupation

A significant proportion of the respondents (32.86%) reported that their husbands are engaged in the agriculture sector while the rest (67.14%) are involved in various service sectors like teaching, sales etc.

Table 10: Distribution of respondents according to Husband`s occupation

Occupation	No. of respondents	Percentage (%)	Percentage attending ANC
Agriculture sector	420	32.86	93.56
Clerical	61	4.77	91.80
Household	85	6.65	96.47
Professional teacher	292	22.85	96.23
Sales	99	7.75	93.94
Service	66	5.16	95.45
Skilled	112	8.76	91.96
Unskilled	143	11.19	97.90
TOTAL	1278	100	

Pearson Chi2 (7) = 23.4398 Pr = 0.015; *Source: Author's computation based on KDHS 2008-09 Data*

The occupation of a woman`s husband is significantly associated with ANC attendance (χ^2= 23.4398, df= 7, P<0.05). Women whose husbands are engaged in the Agriculture sector, clerical and skilled services are less likely to attend ANC as compared to those in other whose husbands are engaged in household or unskilled services.

Birth Order

The number of live births ever born to a mother was found to range between 0 and 15 with a mean of 3.07 live births per woman.

Table 11: Distribution of respondents according to the number of live births ever born to mother

No. of live births	No. of respondents	Percentage (%)	Percentage attending ANC
0	313	24.49	99.36
1-3	478	37.40	92.89
4-6	319	24.96	90.60
7-9	137	10.72	91.97
10-15	31	2.43	80.65
TOTAL	1278	100	

Pearson Chi2 (4) = 31.3953 Pr = 0.000; *Source: Author's computation based on KDHS 2008-09 Data*

The association between ANC attendance and the number of live births ever born by the mother was found to be significant. An inverse linear relationship exists between ANC attendance and the number of live births ever born to the mother i.e. the probability of ANC attendance decreases with increase in the number of births.

ANC attendance

The number of visits to ANC clinic is presented in table 13. It indicates that a majority of the respondents (93.51%) made at least one visit to ANC clinic. This percentage is slightly higher than the national average of 92%.

Table 12: Distribution of respondents according to ANC attendance

ANC attendance	No. of respondents	Percentage (%)
Never visited	83	6.49
At least one visit	1195	93.51
TOTAL	1278	100

Source: Author's computation based on KDHS 2008-09 Data

4.2 Regression Results and Discussion

4.2.1 Regression Results

A multivariate logistic regression was done to find out the socio-demographic characteristics that predict utilization of ANC services. Though a bivariate analysis shows that there is no association between ANC attendance and the independent variables of mother's age and ethnicity, these variables were included in the model estimation. Table 13 shows the logit estimates for the demand for ANC services in the Rift Valley region. Each coefficient shows how the logit index changes as the relevant variable increases or decreases.

Table 13 – Results of Binomial Logistic Regression showing logit index for ANC attendance

Variable		Coeff.	Std. error	Z	P value
Education dummies	Primary	1.514^{***}	0.328	4.61	0.000
	Secondary	1.955^{***}	0.539	3.63	0.000
Age dummies	20-34	1.516^{***}	0.524	2.90	0.004
	>34	2.184^{***}	0.620	3.52	0.000
Birth order Dummies	2nd	-3.904^{***}	0.809	-4.83	0.000
	3rd	-3.690^{***}	0.912	-4.04	0.000
	4th	-3.532^{***}	0.983	-3.59	0.000
	5th	-4.233^{***}	0.930	-4.55	0.000
Wealth index dummies	Poorer	-0.036	0.360	-0.10	0.921
	Middle	0.383	0.416	0.92	0.357
	Richer	0.638	0.470	1.36	0.175
	Richest	0.421	0.584	0.72	0.471
Religion dummy(I if protestant)		0.675^{*}	0.263	2.57	0.010
Ethnicity dummy(1 if Kalenjin)		0.212	0.274	0.77	0.438
Marital status dummy(1 if married)		0.367	0.286	1.28	0.200
Husband's occupation dummy(1 if agriculture)		-0.406	0.266	-1.53	0.127
Constant		3.011	0.747	4.03	0.000

No. of observations = 1278
Pseudo R^2 = 0.2273
Log likelihood = -237.362

Source: Author's computation based on KDHS 2008-09 Data

***,* significant at 1% and 10% respectively

The results of the multivariate analysis show that marital status, husband's occupation, ethnicity and wealth index of the household are insignificant. However, four independent variables were found to be strong predictors of ANC attendance in the Rift Valley region. These variables are education level, birth order, mother's age and religion. Further, marginal statistics were computed for all the variables and the findings are presented in table 14.

Table 14 - ANC attendance: Average Marginal Effects after Logit Regression

Variable		dydx.	Std. error	Z	P value
Education dummies	Primary	0.0778***	0.0169	4.59	0.000
	Secondary	0.1004***	0.0280	3.58	0.000
Age dummies	20-34	0.0779***	0.0269	2.90	0.004
	>34	0.1122***	0.0318	3.53	0.000
Birth order dummies	2nd	-0.2006***	0.0426	-4.71	0.000
	3rd	-0.1896***	0.0477	-3.97	0.000
	4th	-0.1815***	0.0513	-3.54	0.000
	5th	-0.2175***	0.0488	-4.46	0.000
Wealth index dummies	Poorer	-0.0018	0.0185	-0.10	0.921
	Middle	0.0197	0.0214	0.92	0.357
	Richer	0.0328	0.0242	1.35	0.175
	Richest	0.0216	0.0300	0.72	0.472
Religion dummy(I if protestant)		0.035*	0.014	2.57	0.010
Ethnicity dummy(1 if Kalenjin)		0.0109	0.0141	0.77	0.438
Marital status dummy(1 if married)		0.0188	0.0147	1.28	0.201
Husband's occupation dummy(1 if agriculture)		-0.0208	0.0137	-1.52	0.128

Source: Author's computation based on KDHS 2008-09 Data

 ***,* significant at 1% and 10% respectively

4.2.2 Discussion

Pregnancy and childbirth is an integral part of every woman`s life. It ought to be a period of excitement and joy but often it is associated with pain and suffering especially in developing countries. While this pain and suffering can be avoided through various interventions like access and utilization of quality ANC care, Skilled Birth Attendance and Post-Natal Care, several factors often conspire to prevent women from accessing

these interventions. These factors have been a subject of several studies both in Kenya and internationally. Several studies have tried to find out the relationship between utilization of maternal health care services and the socio-demographic characteristics of the mother. The findings of those studies were then used to predict the demand for services and formulate policy interventions (Chakraborty et al. 2003; Mekonnen and Mekonnen 2003). This study specifically sought to investigate these factors as it relates to the Rift Valley region of Kenya. The four variables found to be significant predictors of ANC attendance are;

Mother`s Age

Mother's age at birth is significantly associated with ANC attendance. The findings of this study indicate that on average, women aged between 20 and 34 years are 7.79 percentage points more likely to attend ANC than those aged less than 20 years. Moreover, those aged over 34 years are 11.22 percentage points more likely to attend ANC than women aged less than 20years.This concurs with other studies done in Kenya (Owino 2001; Muriithi 2013 and Chepkoech 2003). This can be attributed to increasing awareness of availability of health services in one's surrounding and the accumulation of knowledge of the benefits of various health interventions that accrue over time.

Birth Order

This study found that there is a significant association between birth order and utilization of ANC services. Women with 2nd order pregnancies are 20.1 percentage points less likely to attend ANC than women with 1st order pregnancies, women with 3rd order pregnancies are 18.96 percentage points less likely to attend ANC than women with 1st order pregnancies, women with 4th order pregnancies are 18.15 percentage points less likely to attend ANC than women with 1st order pregnancies while women with pregnancies of the 5th order and above are on average, 21.75 percentage points less likely to attend ANC than women with 1st order pregnancies.   The proportion of women attending ANC decreases linearly with increase in the order of the pregnancy. This concurs with findings of other studies (Ochako 2011; Sahn et al. 2003 and Njaramba 1994). This can be attributed to the increasing confidence by the mother with every

subsequent birth or a strain in the household budget associated with an increasing household size that lessens resource allocation to seeking health services or both.

Education Level

This study found that the level of maternal education has a significant association with ANC attendance. Women with primary level of education are on average 7.78 percentage points more likely to attend ANC than women with no education. On the other hand, women with secondary level of education and above are on average, 10.05 percentage points more likely to attend ANC than women with no education. This finding is consistent with other studies done in Kenya and elsewhere (Owino 2001; Chakraborty et al. 2003 and Muriithi 2013). This could be attributed to the fact that educated women are in a better position to resist traditionalist pressures, can easily utilize health opportunities in their vicinities and are more empowered to make decisions regarding their health.

Religion

This study found that religion is significantly associated with ANC attendance. On average, protestant women are 3.47 percentage points more likely to attend ANC than women of other religions. This is consistent with the findings of Adamu (2011) in a study in Nigeria. Protestant women are more likely to attend ANC than women in other religions. This implies that the societal beliefs, norms and values of the protestant faith promote utilization of ANC services.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter provides a summary, conclusion, policy recommendation and the limitations of the study.

5.1 Summary and Conclusion

This study set to investigate the determinants of ANC attendance in the Rift Valley region of Kenya. The specific objectives are to determine factors which influence demand for maternal health care services and to make policy recommendations based on the findings. This is based on the understanding that when ANC is properly done it improves the outcome of the other maternal health indicators as specified in the MDG targets. It follows therefore that an understanding of the determinants of ANC attendance may help in policy formulation aimed at achieving the MDG 5 targets.

KDHS 2008-09 data was used to analyze how the independent variable of ANC attendance was affected by a set of independent variables like mother's educational level, age, marital status, religion, household wealth index, ethnicity, birth order and husband's occupation. Both a bivariate analysis and a multivariate regression were done.

The results of a bivariate analysis shows that mother's age and ethnicity are not associated with ANC attendance while education level, marital status, birth order, husband's occupation, household wealth index and religion are significantly associated with ANC attendance. A multivariate analysis of data as shown in table 14 indicates that birth order, education level, age and religion are significant predictors of ANC attendance in the Rift Valley region. While education level, mother's age and religion are positively associated with ANC attendance, birth order is negatively associated with ANC attendance.

The regression results indicate that; mother's level of education, birth order, religion and age are strong predictors of ANC attendance in Rift Valley region of Kenya.

The findings on education imply that educated women are more aware and empowered about available health choices than women with no education. It is evident that maternal

health services will benefit from increased enrolment in schools, retention and the subsequent transition of students to higher levels of education. This finding is consistent with other studies done in Kenya and elsewhere (Owino 2001; Chakraborty et al. 2003 and Muriithi 2013).

The results of religion variable imply that protestants use maternal health services more than women from other religions which means that something inherent in their teachings, way of life and norms improve use of maternal health services. This is consistent with the findings of Adamu (2011) in a study in Nigeria.

On birth order, the findings imply that mothers gain confidence with every birth and the probability of attending ANC drops with every subsequent birth. This concurs with findings of other studies (Ochako 2011; Sahn et al. 2003 and Njaramba 1994).

On age, it is clear that use of services increases with age and this could be due to increasing awareness of availability and importance of health interventions in ones surroundings. This concurs with other studies done in Kenya (Owino 2001; Muriithi 2013 and Chepkoech 2003).

5.2 Policy Recommendations

The findings of this study indicates that maternal health will benefit from health policies targeting women's education, religion, birth order and age and their influence on ANC attendance. Since a woman's education is positively and significantly associated with ANC attendance, policy interventions aimed at increasing school enrolment of the girl child, retention and improving transition rates to higher levels will positively impact ANC attendance and maternal health in general.

Since religion is a marker of cultural background and determines societal beliefs, norms and values which may affect health care utilization, formulation of health information messages aimed at improving maternal health and removing any myths or practices that maybe nugatory to use of maternal health services.

The findings on birth order imply that with every increase in birth order, the mother becomes confident about motherhood and the probability of using maternal health services decreases. This calls for targeted health messages that emphasize the need to utilize maternal health services irrespective of birth order and also dispel the notion that pregnancy complications are only found in first order pregnancies.

On age, policy formulation and sustained dissemination of information on the availability and benefits of maternal health services will positively impact on utilization.

5.3 Limitations of the Study and Areas for Further Research

The main limitation of the data used is the absence of some relevant variables like the money prices of ANC care, distance to health facility, waiting time and quality perception in ANC as they were not captured during the survey. Moreover, the use of ANC in this study to proxy the entire spectrum of maternal health services may be less than ideal.

Further research should be done on this subject to include the independent variables of quality, distance to health facility and the money prices for ANC. This is because the situation in Kenya now points to an increasing amount of money being spent on free maternity services in public hospitals though no research seems to validate this policy intervention.

This subject will also benefit from a research on the norms and teachings of Protestants that predispose their women to use maternal health services more than the other religions. This will guide policy interventions to improve maternal health services.

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APPENDIX

Appendix 1: Missing data

Variable	Missing Data	
	Count value	Percentage
ANC	596	52.27
Religion	1	0.08
Husband`s Occupation	444	34.74

Source: Author's computation based on KDHS 2008-09 Data