The Determinants of Maternal Health Care Services in Kenya

Mr. Stephen Mungai[1], Dr. Martine Odhiambo Oleche[2]

[1]Senior Economist, Ministry of Devolution and Planning, Nairobi, Kenya
[2]Lecturer-School of Economics, University of Nairobi, Nairobi, Kenya

Abstract: **This study explored three main indicators for maternal health status that is the antenatal care, skilled attendance at birth and postnatal care. It was conducted with the main objective of determining the factors influencing utilization of maternal health services in Kenya. A probit model was estimated on antenatal care, hospital delivery and postnatal care respectively. A national representative data (Kenya demographic and household survey-KDHS, 2008) was used. From the study result, age of the mother, secondary education, more than secondary education, birth order, richer wealth quintile, richest wealth quintile and access to information were significant factors which influence utilization of antenatal care. Hospital delivery was shown to be influenced significantly by age, primary education, secondary education, more than secondary education, birth order, residence, and all wealth indexes, access to information. On the other, primary education levels and secondary education levels were shown to be statistically significant in influencing postnatal care. Analysis across and within the models indicate that education significantly determine utilization of the three models antenatal care, hospital delivery and postnatal care whereby in all cases, it increases the usage. Similar to education, age of the mother also influences usage of Antenatal care and hospital delivery positively and significantly. Finally, the study found out that access to information positively and significantly led to increase in utilization of antenatal care and hospital delivery while birth order reduces the usage of both antenatal and hospital delivery. In order to improve the effectiveness of the health policy, the government should have to introduce more health care facilities to enhance consumption of Antenatal and hospital delivery. Since each level of education leads to improved utilization of these services, there is need for the government to introduce more institutions to increase knowledge and consequently knowledge on usage of these services. There is need for increased utilization of family planning services among mothers which encourages the respondents to reduce the number of children born by a single mother in order to improve usage of hospital delivery. Finally, messages through other modes of communicating are important as they are shown to accelerate usage of health care services.**

Keywords: **Maternal Health, Probit, antenatal care, hospital delivery and postnatal care.**

1. INTRODUCTION

Maternal health is the health care provided to women during pregnancy, the birth of a child, and the postnatal period. It also includes family planning, preconception, prenatal, and postnatal care aimed at reducing maternal morbidity and mortality [1]. The main objective of this research is to investigate the factors determining utilization of maternal healthcare services in Kenya. Specifically, it seeks to examine the profiles of maternal healthcare services in Kenya and analyze the determinants of maternal healthcare services in Kenya.

The health care provided to a mother during pregnancy, delivery, and after delivery is important for the well-being and survival of both the mother and the child. Maternal health (MH) is therefore a very important issue as women strive to fulfill their potential as individuals, mothers and family members, and also as citizens of a wider community. At the

individual level, women's poor health causes lack/loss of employment, leading to poor income. This contributes to women's persistent poverty and lack of empowerment. Poor maternal health can also have huge costs on families in emotional, health and economic terms. It is well documented that maternal morbidities and mortalities directly affect the well-being and survival of children and also contributes to poor family relationships [2].

Globally, maternal deaths have been reduced, including in sub Saharan African, but the decline is has not been sufficient enough to make any significant improvement towards the attainment of the MDG goal number 4 targets of reducing maternal mortality. A woman who lives in Africa and especially in sub Saharan Africa has 1 out of 39 chance of dying during pregnancy or during childbirth in comparison to 1out of 3,800 chances in developed countries. The Leading causes of maternal morbidity in the world are related to obstetric complications during the time of childbirth. More than three-quarters of maternal deaths can be prevented by access to full utilization of quality maternal health care services [3].

Pregnancy Complications and childbirth are some of the leading cause of maternal deaths and mortalities for women of child bearing age (15 – 49 years) in most developing countries. The WHO estimate is that over 500,000 women in child bearing age in the world die from complications in childbirth and during pregnancy each year with approximately 99% of these deaths occurs in developing countries. Maternal morbidity and subsequent child death is associated with a loss of productivity which leads to an estimated global economic loss of about US$ 15 billion [4]. Hence, maternal health also has developmental consequences beyond its more obvious health ones

It is estimated that millions of women in least developed countries more often experience life threatening and other serious healthcare problems related to pregnancy and childbirth. It is this Complications of childbirth and in pregnancy that cause more deaths and disability than any other reproductive health issues. In least developed countries, most of the deaths of women in child bearing age are attributed to pregnancy-related issues. In some rural areas of South Asia and Africa, out of every two women who die, one dies from pregnancy related issues. The risk of maternal death during childbirth or during pregnancy in the south of Sahara Africa is 175 times higher than in most developed countries. Furthermore, it is estimated that risk of illness related to pregnancy and the negative consequences that occurs after child birth is even higher. Maternal health, Poverty and outcomes for the childbirth and survival are all interconnected. Neonatal deaths in least developed countries account for 98% of global yearly infant deaths [5].

Maternal mortality and morbidity has been unacceptably high in Kenya. According to Canadian International Development Agency [6], over 500,000 women globally die every year due to pregnancy related complications, and half of all global maternal mortality and morbidity occurs in sub-Saharan Africa. It is estimated that about 800 women die from pregnancy related causes or childbirths complications globally every day. In year 2010, it is estimated that around 287 000 women died during pregnancy and following childbirth. Most of these maternal deaths occurred in low-resource settings; however these deaths could have been prevented. Despite the various interventions in other health indicators over decades in Kenya, high maternal mortality and morbidity rates are still being recorded [7]. He further states, for each and every woman who dies in childbirth in Kenya, estimates indicate that another 30 women undergo serious injury or disability due to complications arising from pregnancy or delivery.

While being a mother is a positive and fulfilling experience for many women, it is associated with ill-health, suffering and sometimes death. In Kenya, Comprehensive Public Expenditure Review 2013 indicates that maternal mortality rate deteriorated from 414 per 100,000 live births in 2003 to 488 deaths per 100,000 live births in 2008/09. Also, births attended to by skilled health personnel declined from 51% in 2007 to 43% in 2010/11. The Health Policy Paper of 2012 indicates that most maternal and infant deaths are caused by hemorrhage during childbirth, malaria, HIV and AIDS , unsafe abortions and the low number of deliveries conducted by skilled birth attendants as well as low staffing levels among other causes. Each minute, a woman dies during childbirth in developing countries according to the Research Agenda on Population and Development in Kenya (2006). The report states further that in Kenya, childbirth claims many more mothers daily [8].

A number of studies have identified access to maternity health services as a key indicator for reducing maternal and infant mortality in developing countries. According to Making Pregnancy and Childbirth Safer (fact sheet), in developing countries, millions of women experience life threatening and serious health problems related to pregnancy or childbirth. Complications of childbirth and pregnancy cause more deaths and disability than any other reproductive health problems. This situation is worse in developing countries due to inadequate access to modern health services and poor utilization. The World Health Organization indicates that equitable access to quality health services for mothers, infants and children

is critical for the achievement of the Millennium Development Goal number four (MDG4). in past years significant progress has been made in reducing maternal and child deaths, however the overall decline in mortality is not fast enough to reach 147 infant deaths per 100,000 live births by 2015, MDG 4 (reducing child mortality) and MDG 5 (improving maternal health) in all countries [9].

The Government of Kenya's 2009 National Road Map for accelerating the attainment of the MDGs Related to Maternal and Newborn Health in Kenya and the Child Survival and Development Strategy 2008 -2015, identified several barriers for improvement of prevention of mother to child transmission (PMTCT) services. The barriers include: lack of recognition of danger signs in pregnancy; poor accessibility and low utilization of skilled attendance during pregnancy, child birth and post birth period; among others. According to the Health Policy Paper of September 2012, only 40% of antenatal care (ANC) facilities currently offer PMTCT services. For the general population, 26% of women have un-met family planning needs. It further says that only 44% of women deliver babies under the care of a health professional [10].

Kenya introduced free maternal health services in public hospitals from June 2013. The government made budgetary allocation in 2013/14 financial year for free maternity and prenatal care to mothers giving birth in public health institutions with an aim of reducing maternal and prenatal mortalities. In addition, the government also waived the charges for registration. This move by the jubilee government will improve maternal health, as most mothers will now deliver under skilled care. Maternal, newborn and child mortality and morbidity are limiting Africa's development. Preventable maternal mortality and morbidity are pressing human-rights issues that violate a woman's rights to health, life, education, dignity, and information. Response to maternal morbidity and mortality should include implementation of specific legal and ethical obligations such as the establishment of effective mechanisms of accountability (i.e., maternal death audits or reviews) [11].

High maternal mortality rates are an indication of poorly functioning health systems. According to the World Health Organization, A woman's chance of dying or becoming disabled during pregnancy and childbirth is closely connected to her social and economic status, the norms and values of her culture, and the geographic remoteness of her home. The poorer and more marginalized a woman is, the greater her risk of death. Maternal mortality rates reflect disparities between wealthy and poor countries more than any other measure of health. It is approximated that every year about 210 million women conceive; approximately 30 million develop complications; and 515,000 die. In addition, 3 million babies are still born while 3 million die in the first week of life and many more bear different levels of disability. These are misfortunes which can be avoided [12].

Maternal health care use in Kenya has improved but is not adequate specifically the proportion of women who make four antenatal care visits, who deliver at health facility and who receive postnatal care. These has impeded the progress toward achievement of the vision 2030 on maternal mortality target of less than 200 per 100,000 live births as well as the millennium development goal five[13]. The government in Kenya implemented free maternal care in June 2013 in order to enhance utilization of maternal healthcare services. Similarly, there has been other initiative aimed at increasing utilization of maternal health services. However, despite these initiatives, utilization of maternal care services still remains low

Figure 1 summarizes the trends in key maternity care indicators in Kenya between the 2003 and the 2014.
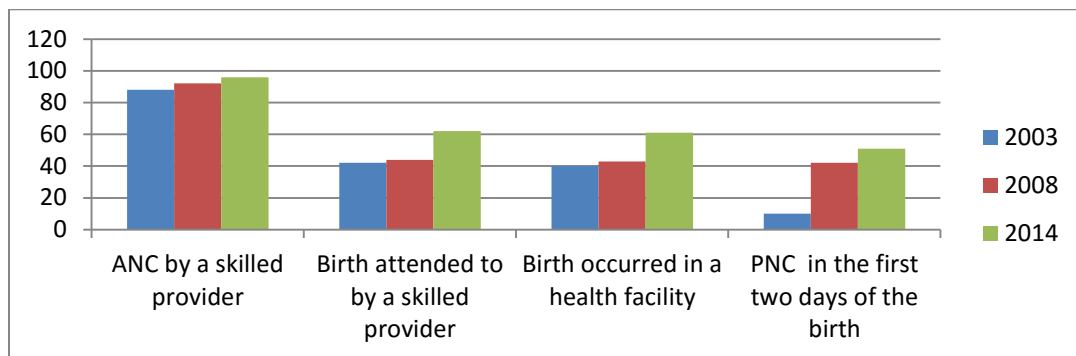

Figure 1: Trends in Maternal Health Care services in Kenya

Source: KDHS, 2014

Figure 1 shows that the proportion of mothers reporting ANC from a health professional increased between 2003 and 2014, from 88 percent to 96 percent. Skilled assistance during delivery has increased from 42% in 2003 to 62% in 2014.Facility-based deliveries have increased from 40% in 2003 to 61% in 2014. The percentage of mothers receiving post natal care increased from 10 percent in 2003 to 50 percent in 2014.The MDG target for ANC by skilled provider is 100%. Kenya is close to reaching this goal. The MDG target for skilled assistance during delivery is 90%. Kenya has not reached this MDG target.

Despite its commitment to maternal health care, Kenya continues to make slow progression with this regard. With a maternal mortality rate of 488 deaths per 100,000 live births, the country is off track in achieving the UN Millennium Development Goal numbers four and five by 2015. Kenya had committed to reduce these deaths to 147 per 100,000 live births by 2015.

Based on the preceding discussions, it is clear therefore that there is low utilization of maternal healthcare services in Kenya which could be having adverse effect on the maternal mortality and morbidity rate. This study seeks to analyze the profiles of maternal health care services in Kenya and explore the determinants of the demand for maternal healthcare service utilization in Kenya using data drawn from 2008 Kenya Demographic and Health Survey (KDHS).

2. METHODOLOGY

2.1 Theoretical Model:

Maternal health care demand in this study is based on the theory of consumer behavior. In the theory of consumer behavior, a rational consumer will allocate his income among different competing needs so as to maximize his utility. In this study a mother is assumed to maximize the benefits of utilizing maternal health services subject to her health production function and the budget constraints. This study uses theoretical model formulated by Machio 2008 in the model she assumed a mother maximizes a utility function given as

$U=f(X,Y,H)$……………. (1)

Where U is the utility derived by the mother, X is the consumption goods and Y is the health related goods and H is health status of the mother and the child (maternal health care). The mother strives to maximize this utility function subject to a budget constraint and health production function. The budget constrain is stated as follows

$I=XP_x+YP_y+MP_m$…….(2)

Where I is the exogenous income, M is the maternal health care and P_x, P_y, P_m are the prices of consumption good (X), health related good (Y) and maternal health care (M) respectively.

The health production function is given by

$H=f(Y,M,Z)$……… …… (3)

Where Y, M are as defined above and Z are the socio-economic and demographic characteristics of the mother such as age, birth order, income, place of residence, education

Using equation (1),(2), and (3) we can express the lagragian function as follow;

$L= f(X, Y,H)+\lambda_1\{(H- f(Y,M,Z)\}+\lambda_2\{ I- XP_x–YP_y-MP_m\}$…..........(4)

Solving equation (4) generates the reduced form demand function for maternal health care service

$Dm=f(P_x,P_y,P_m,I,Z)$………… ………..(5)

Where Dm is the demand for maternal health care services, P_x, P_y, P_m, I and Z are as defined above. This implies that maternal health care demand depends on price of goods and services, social economic and demographic characteristics of the mother.

Table 1: Definition of variables

VARIABLES	DEFINITION	EXPECTED SIGN
DEPENDENT VARIABLES		
Antenatal care (A)	This will be coded as: A=1 if a mother attends antenatal clinics and A=0 otherwise.	Dependent Variable
Delivery care (D)	Delivery care will be coded 1 for hospital delivery and 0 otherwise.	Dependent Variable
Postnatal care (P)	This will be coded as: P=1 if a mother attends postnatal clinics and P=0 otherwise.	Dependent Variable
INDEPENDENT VARIABLES		
Age of the mother at birth	A continuous variable measured by the age of the mother in years	Negative
Education of the mother	A discrete variable measured by level of education as: 1= no education 2= primary incomplete 3=primary complete 4= secondary+	Positive
Residence	Urban =1 Rural= 0	Negative
Wealth quintile	A dummy variable measured as: Poorest=1, 0 otherwise Poorer=1,0 otherwise Middle=1, 0 otherwise Rich=1,0 otherwise Richest=1, 0 otherwise	Positive
Religion	A dummy variable measured as: 0= (base variable, Not religion) 1= protestants and other Christians 2= Muslims	Negative
Birth order	A continuous variable measured by the number of children a mother has	Negative
Access to information through mass media	A dummy variable measured as: 1= mass media 0= no mass media	Positive

2.2 Empirical Model Specification:

This study used probit model to analyze the determinants of utilization of maternal healthcare services since the dependent variable is a dummy. It is a type of regression where the dependent variable can only take two values. Binary-choice models assume that individual consumers are faced with a choice between two alternatives and the choice of any of the two depends on certain factors [14]. Probit model limit the values of the regressor between zero and one which is realistic for probability values. The estimation of this model is done using Maximum Likelihood estimation techniques.

This study analyses maternal health care demand looking at antenatal care, delivery care and post natal care. It intends to estimate the probability that a mother uses these services or not. Therefore binary probit model was used for this purpose.

The study used data from the Kenya Demographic and Health Survey, 2014. The survey is carried out after five years and is designed to provide data to monitor the population and health situation in Kenya. The survey, which is a household-based, utilized a two-stage sample based on the 1999 Population and housing Census. It used a representative sample of 10,000 households to allow for separate estimates of key indicators for each of the eight provinces in Kenya then as well as for urban and rural areas separately. A representative sample of 8,444 women aged between 15 and 49 and 3,465 men aged between 15 and 54 was used. The sample was selected from 400 sample points (clusters) throughout Kenya.

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2.2.1 Binary Probit Model:

Binary probit model is used to analyze determinants of demand for antenatal care, delivery care, post natal care among pregnant women since the variables are binary in nature. We assume the probability of an individual utilizing or not utilizing the above services is determined by underlying response variable

$Y_i = X_i\beta + \varepsilon$……………………(6)

Where Y_i is the dependent variable; antenatal care (D_1), delivery care (D_2), post natal care (D_3)

$D_1 = 1$ if a woman attended antenatal care

    0 if otherwise

$D_2 = 1$ if a woman was attended to by a skilled attendant during delivery

    0 if otherwise

$D_3 =$ if a woman received post natal care

    0 if otherwise

X_i is a vector of independent variables such as maternal education, income, place of residence, age of the mother, husbands education, religion, ethnic group, marital status

β is a vector of the parameters to be estimated

ε is the error term

Since Y_i represent D_3, D_2 and D_1, three binary probit models was estimated which represent antenatal care utilization, delivery services utilization and postnatal care utilization.

$D_1 = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 X_7 + \varepsilon$……………………….(7)

$D_2 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon$……………………….(8)

$D_3 = \sigma_0 + \sigma_1 X_1 + \sigma_2 X_2 + \sigma_3 X_3 + \sigma_4 X_4 + \sigma_5 X_5 + \sigma_6 X_6 + \sigma_7 X_7 + \varepsilon$……………….............(9)

The error term is assumed to have a standard normal distribution which leads to a probit model.

We can define the binary response model (Greene 2002) by transforming $X\beta$ into a probability such that;

Prob $(y_i = 1) = F(X, \beta)$…………………………………..............…….(10)

Therefore the probability that Y=1 given X was given by the standard normal cumulative distribution function described as follows:

$\text{Prob}(y_i = 1/X) = G(Z) = \Phi(Z) = \int_{-\infty}^{-z}(2\square)^{-1/2}\exp(-Z^2/2)dZ$…………………..(11)

where Z= Y- X'β

The estimation of the model by maximum likelihood technique implies to maximize the log likelihood function indicated by equation 12 which is the log of the likelihood function shown by equation 13. The optimal solution is a set of parameter estimates $\hat{\beta}$

$$\ln \mathcal{L}(\beta) = \sum_{i=1}^{n} \left(y_i \ln \Phi(x_i'\beta) + (1 - y_i) \ln\left(1 - \Phi(x_i'\beta)\right) \right)$$
………………………………………………………….……(12)

$L = \prod_{i}^{n}[\Phi(X'\beta)]^{y_i}[1 - \Phi(X'\beta)]^{1-y_i}$ ………………….............…….(13)

3. RESULTS AND DISCUSSION

To explore and understand clearly factors influencing maternal health status in Kenya, the study considered both the demographic factors and socio economic factors that significantly influence utilization of maternal health care by pregnant women and also new-born mothers. The study conducted three probit regression model(s) in estimating the effect of the demographic as well as socio-economic characteristics on utilization of maternal health care. Table 2, 3 and 4 indicates factors influencing usage of antenatal care, hospital delivery and postnatal care respectively. However, it should be noted that the probit regressions coefficients are interpreted as changes in the probit indexes (Marginal effects).

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From Table 2 the study found a p value of 0.0000 which was less than 5% implying that the variables considered fit the model well thus the variables used in the model were significant in explaining how antenatal care affects maternal healthcare services in Kenya. The pseudo R was very low (0.0716). From the results of the model, age of the mother, secondary education, more than secondary education, birth order, richer wealth quintile, richest wealth quintile and access to information were statistically significant in determining antenatal care while primary education, residence, being catholic, Muslim and protestants and other Christians, poorer wealth quintile and middle wealth quintile were shown to be statistically insignificant at all significance levels.

Birth order was found to have a negative relationship with antenatal care. The study found out that an additional birth reduces the probability of utilizing antenatal care by 3.5%. Education is a highly significant factor which indicated a positive relationship with antenatal care. Having secondary education increased utilization of antenatal care by 1.15% while more than secondary education led to an increase on antenatal care by 3.0% all factors held constant.

On the wealth index, it was found that being in the richer and richest wealth index increases the probability of antenatal care by 9.3% and 12.4% respectively. Usage of mass media led to increased usage of antenatal care by 4.4% all factors held constant.

Table 2: Marginal Effects: Dependent variable - Antenatal care

Variables	Marginal Effects	Std. Err.	z	P>z	[95% Conf. Interval]	
Age of the mother	0.01324030	0.0019278***	6.87	0.000	0.0094619	0.0170187
Education levels						
Primary education	0.0438669	0.0341946	1.28	0.200	-0.0231532	0.1108871
Secondary education	0.1149212	0.0396956***	2.90	0.004	0.0371193	0.192723
More than secondary education	0.2953462	0.0498672***	5.92	0.000	0.1976082	0.3930842
Birth order	-0.0348695	0.0061006***	-5.72	0.000	-0.0468265	-0.0229125
Residence	-0.0017629	0.0274687	-0.06	0.949	-0.0556005	0.0520748
Religion						
Catholics	0.0340898	0.0661359	0.52	0.606	-0.0955343	0.1637139
Protestants and other Christians	0.0202159	0.0642252	0.31	0.753	-0.1056631	0.1460949
Muslims	-0.0305584	0.0668459	-0.46	0.648	-0.1615739	0.1004572
Wealth index						
Poorer wealth quintile	-0.0117126	0.0292989	-0.40	0.689	-0.0691374	0.0457123
Middle wealth quintile	0.0236851	0.0298413	0.79	0.427	-0.0348029	0.0821731
Richer wealth quintile	0.0925757	0.0314107***	2.95	0.003	0.0310118	0.1541395
Richest wealth quintile	0.1243144	0.0392022***	3.17	0.002	0.0474796	0.2011493
Access to information	0.0439608	0.0180184**	2.44	0.015	0.0086454	0.0792762
Probit regression Number of obs ervations= 3265 LR chi2 (14) = 324.24 Prob> chi2 = 0.0000 Log likelihood = -2100.9524 Pseudo R2 = 0.0716						

*** 1% significance, ** 5% significance

Table 3 shows a p value of 0.0000 which was less than 5% indicating that the variables used in the model were significant in explaining how hospital delivery affects maternal healthcare services in Kenya. The pseudo R (0.1991) was very low. From the results of the model, age of the mother, primary education, secondary education, birth order, more than secondary education, residence, poorer wealth quintile, middle wealth quintile, richer wealth quintile, richest wealth quintile and access to information were statistically significant in determining how hospital delivery affects maternal healthcare services in Kenya, while being catholic, protestant and Muslim were statistically insignificant at all significance levels.

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Age was highly significant and had a positive impact whereby an additional age of the mother led to 1.0% increase in utilization of hospital delivery. On the other hand education increases hospital delivery by 1.2% secondary education and 2.6% more than secondary education all other factors held constant. Similarly, wealthy index led to an increase in utilization of hospital delivery with 0.8% poorer wealth quintile, 1.4% middle wealth quintile, 1.7% richer wealth quintile and 2.9% richest wealth quintile.

Residence significantly increases utilization of hospital delivery by 7.7% while access to information has increased the probability of hospital delivery by 0.9% all other factors held constant. Finally, birth order had a negative influence on hospital delivery where the birth of an extra child reduces the probability of utilizing hospital delivery by 0.5%.

Table 3: Marginal Effects: Dependent variable - Hospital delivery

Variables	Marginal Effects	Std. Err.	z	P>z	[95% Conf. Interval]	
Age of the mother	0.0100277	0.0015271***	6.57	0.000	0.0070346	0.0130208
Education levels						
Primary education	0.119788	0.0247102***	4.85	0.000	0.071357	0.1682191
Secondary education	0.264844	0.0296907***	8.92	0.000	0.2066513	0.3230367
More than secondary education	0.3972298	0.0424908***	9.35	0.000	0.3139495	0.4805102
Birth order	-0.0457527	0.0046035***	-9.94	0.000	-0.0547754	-0.03673
Residence	0.0769333	0.0210414***	3.66	0.000	0.035693	0.1181736
Religion						
Catholics	0.044679	0.0473228	0.94	0.345	-0.048072	0.13743
Protestants and other Christians	0.0217309	0.045729	0.48	0.635	-0.0678962	0.1113581
Muslims	0.0284851	0.0476146	0.60	0.550	-0.0648378	0.121808
Wealth index						
Poorer wealth quintile	0.0824908	0.0217408***	3.79	0.000	0.0398796	0.1251019
Middle wealth quintile	0.1417579	0.022654***	6.26	0.000	0.0973569	0.1861589
Richer wealth quintile	0.1696573	0.0241531***	7.02	0.000	0.122318	0.2169966
Richest wealth quintile	0.2914465	0.031523***	9.25	0.000	0.2296625	0.3532305
Access to information	0.0910053	0.0129302***	7.04	0.000	0.0656625	0.1163481
Probit Regression Number of observation = 4798 LR chi2(14) = 1324.61 Prob> chi2 = 0.0000 Log likelihood = -2663.3834 Pseudo R2 = 0.1991						

*** 1% significance, ** 5% significance

From Table 4, the study found a p value of 0.0189 which is less than 5% indicating that the variables used in the model were significant in explaining how post natal care affects maternal healthcare services in Kenya. The pseudo R was very low (0.0140). From the results in the model, primary education and secondary education were statistically significant in determining how postnatal care affects maternal healthcare services in Kenya while the other variables were statistically insignificant at all significance levels.

Education levels proved to be the only factor with a positive relationship on utilization of postnatal care. Primary and secondary education increased the usage of post natal care by 0.8% and 1.0% respectively all other factors held constant.

Table 4: Marginal Effects: Dependent variable - Post natal care

Variables	Marginal Effects	Std. Err.	z	P>z	[95% Conf. Interval]	
Age of the mother	0.00133	0.0028982	0.46	0.646	-0.0043504	0.0070105
Education levels						
Primary education	0.0844268	0.0402324**	2.10	0.036	0.0055727	0.1632809

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Secondary education	0.1026805	0.0518038**	1.98	0.047	0.0011468	0.2042141
More than secondary education	0.1600166	0.1093638	1.46	0.143	-0.0543326	0.3743658
Birth order	-0.0058655	0.0083548	-0.70	0.483	-0.0222405	0.0105096
Residence	0.0606871	0.0468085	1.30	0.195	-0.0310558	0.15243
Religion						
Catholics	0.1108693	0.0816156	1.36	0.174	-0.0490943	0.2708329
Protestants and other Christians	0.1011742	0.0785839	1.29	0.198	-0.0528473	0.2551958
Muslims	0.0681529	0.0817571	0.83	0.405	-0.092088	0.2283939
Wealth index						
Poorer wealth quintile	0.0084567	0.0334674	0.25	0.801	-0.0571382	0.0740516
Middle wealth quintile	-0.0506988	0.0363021	-1.40	0.163	-0.1218496	0.020452
Richer wealth quintile	0.0439369	0.0393075	1.12	0.264	-0.0331044	0.1209783
Richest wealth quintile	0.002619	0.0590861	0.04	0.965	-0.1131877	0.1184257
Access to information	-0.0322825	0.0254558	-1.27	0.205	-0.082175	0.01761
Probit regression Number of observations = 1549 LR chi2(14) = 27.06 Prob> chi2 = 0.0189 Log likelihood = -953.16139 Pseudo R2 = 0.0140						

*** 1% significance, ** 5% significance

From Table 2, 3 and 4 its clear that Education was discovered to have a positive impact on utilization of maternal healthcare services in Kenya that is antenatal care, hospital delivery and postnatal care. These significant relations increase the probability of utilizing maternal healthcare services in Kenya. This finding concurs with [15, 16] who in their studies established that a higher level of education positively influences utilization of maternal healthcare services in Kenya. Also a study conducted by [17] revealed that education of the women and the husbands increases the utilization of all the component of maternal health care services. According to [18] mother's education is the most consistent and important determinant of the use of child and maternal health services. This result implies that educated mother makes rational decision regarding utilization of any antenatal care, hospital delivery and postnatal care.

The study finding indicates that age of the mother significantly led to increase use of antenatal and hospital delivery services. As indicated by [19] older mothers demand for delivery and postnatal care is usually higher because of complications that older mothers may have gone through in their earlier births [20]. Further [21], established that women's current age is important in utilization of medical services.

Birth order was found to negatively influence antenatal care and hospital delivery. This corresponds with studies by [22]. The author found that having more children causes resource constraints which negatively affect healthcare utilization. The author established that a woman is more likely to seek maternal healthcare services at first birth than subsequent births. Further [23], determined that as the number of children a mother has increases, the need to utilize healthcare services tends to fall.

Access to information significantly increased antenatal care and hospital delivery. In a study conducted by [24], the results of the study found that women who are exposed to more information on health issues through electronic and print media have higher utilization of maternal healthcare services than those who don't get the information.

Religion had a negative significance influence on all indicators. According to a study conducted by [24], they found that Muslims have low utilization of maternal healthcare services. Another study by [25] indicated that religion has no significant impact in determining utilization of maternal healthcare services.

4.   CONCLUSIONS

Maternal health care plays an important role in maternal mortality reduction. Maternal mortality rates reflect disparities between wealthy and poor countries more than any other measure of health. Literature shows that response to maternal morbidity and mortality is associated with implementation of specific legal and ethical obligations such as the establishment of effective mechanisms of accountability. This study explored three main indicators for maternal health

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status that is the antenatal care, skilled attendance at birth and postnatal care. This study has been conducted with the main objective of determining the factors influencing utilization of maternal health care services in Kenya. Hypotheses were tested at 1%, 5% and 10% significance level upon estimating the probit models on antenatal care, hospital delivery and postnatal care respectively. A national representative data (Kenya demographic and household survey-KDHS, 2008) was used. Other necessary estimation issues (such as multicollinearity) were undertaken to validate the model employed.

The study found out that age of the mother, secondary education, more than secondary education, birth order, richer wealth quintile, richest wealth quintile and access to information were significant factors which influence utilization of antenatal care. Hospital delivery was shown to be influenced significantly by age, primary education, secondary education, more than secondary education, birth order, residence, and all wealth indexes, access to information. On the other, primary education levels and secondary education levels were shown to be statistically significant in influencing postnatal care.

Analysis across and within the models indicate that education significantly determine utilization of the three models antenatal care, hospital delivery and postnatal care whereby in all cases, it increases the usage. Similar to education, age of the mother also influences usage of Antenatal care and hospital delivery positively and significantly. Finally, the study found out that access to information positively and significantly led to increase in utilization of antenatal care and hospital delivery while birth order reduces the usage of both antenatal and hospital delivery.

The millennium development goal five and vision 2030 maternal mortality target is less than 200 per 100,000 live births. Kenya is committed to reduce maternal mortality rate at 147 per 100,000 live births by 2015.To realize this among women in Kenya, the government need to consider factors which lead to utilization of antenatal care (education levels, age, wealth index, birth order and access to information); hospital delivery include considering factors like age, education levels, birth order, residence, wealth index and access to information; and lastly postnatal care services include considering education levels.

The Government of Kenya, on 2013 introduced a policy of free maternity services in all public facilities with an objective of reducing maternal and prenatal mortalities. This was meant to ensure that mothers were not charged for delivering in public health facilities and thus promote and improve hospital deliveries. To improve the effectiveness of the policy, the government needs to increase the number of health care facilities to reduce the distance to the nearest health facility which in turn will boost consumption of these services (Antenatal and hospital delivery). This is because age was shown to increase the likelihood of utilizing both antenatal care and postnatal care. Since all levels of education improved utilization of these services, there is need for the government to introduce more institutions to increase knowledge and consequently knowledge on usage of these services. There is also a need for family planning among mothers which encouraged the respondents to reduce the number of children born by a single mother in order to improve usage of hospital delivery. This is because higher birth order was associated with low usage of maternal health care services. Wealth quintiles (richer and richest) were associated usage of antenatal care while all wealth quintiles were positively and statistically related with usage of hospital delivery. Finally, messages through other modes of communicating are important as they are shown to accelerate usage of health care services. Apart from Radio, TV and newspaper, the study recommends usage of more other channel.

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