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Determinants for Utilization of Free Maternal Services in Kenya

Lydia M. Kamau

Health Economist, Ministry of Health, Nairobi, Kenya

Dr. Moses Muriithi

Lecturer, University of Nairobi, Kenya

Abstract:

Complications of pregnancy and childbirth can lead to increased deaths and disability than any other reproductive health problems. In order to reduce the health risk of both the mother and the un-born baby, there is need to increase utilization of healthcare services during delivery. Individual and community disparities are associated with low utilization of maternal health care in Kenya. Reversing the high maternal mortality rate is very vital in achieving vision 2030. Despite the fact that the government of Kenya embarked on an ambitious program (free maternal program) unfortunately only 61% of deliveries take place in health facilities according to the recent demographic health survey. In order to design effective policies and succeed in promoting welfare of mothers, with low maternal mortality, this study has explored factors influencing utilization of maternal health care services in Kenya using Kenya Demographic and Household Survey (KDHS, 2014). Three binary models were estimated, that is a model for antenatal care, hospital delivery and postnatal care respectively. The study results revealed; age of the mother, age of the mother at first birth, higher education level, birth order, being a catholic, being a Muslim, all wealth indexes, mass media and all regions except North Eastern and Nyanza regions had increased likelihood in the usage of antenatal care. Age of the mother at first birth, secondary education, higher education level, birth order, urban residence, poorer wealth quintile, middle wealth quintile, richer wealth quintile, richest wealth quintile, mass media and regions increased the probability of hospital delivery usage. For the Postnatal the key variables that increased the likelihood of it usage was; age of the mother, birth order, middle, richer and richest wealth quintiles, and central regions were statistically significant in determining usage of postnatal care services in Kenya. Based on the findings, this study recommends for a need to invest in education (i.e. secondary and higher education) especially female education which can promote usage of antenatal and hospital delivery among pregnant women in Kenya. Also, there is a need for the government to introduce more programmes meant to improve wealth status of households since it was associated with higher usage of hospital delivery and postnatal care. The government should consider involving religion as a channel for promoting usage of these maternal health services as religion raised likelihood of using antenatal and hospital delivery. On the other hand, effective, better and thus improved service delivery at health facilities located in North Eastern and Nyanza regions is vital since these regions were associated with lower usage of antenatal care. This action by the government will reverse the trends on utilization of maternal health services in these regions.

Keywords: Utilization, free maternity, antenatal care, hospital delivery, postnatal care

1. Introduction

1.1. Background

In Sub-Saharan Africa, higher maternal mortality rates were recorded at 870, 790 and 640 in 1990, 2000 and 2008 respectively. The Millennium Development Goals Report (2011) indicated that worldwide, maternal mortality rates were 400, 340 and 260 per 100,000 live births. Maternal mortality was estimated at 514,000 deaths and 98% of these occurred in developing countries (UNFPA, 2010). In developed countries maternal mortality rates are usually less than 10 per 100,000 births while maternal mortality rate of more than 500 per 100,000 live births is commonly observed in some developing countries (Antony.et al., 2013). The risk of maternal death during pregnancy and childbirth in Sub-Saharan Africa is 175 higher than in developed countries. Similarly, in sub Saharan African countries, economic difficulties have hindered mothers from accessing health care services. High poverty levels, poor growth and inadequate resources in these countries make it hard for governments in this region to make healthcare accessible to all in general. Thus, maternal healthcare aims at ensuring that every expectant and nursing mother maintains good health, has normal delivery and bears healthy children. Maternal health care begins from the time of conception of the child. The antenatal and post-natal care ensures that the health of expectant mothers is safe guarded and avoidable complications of pregnancy are prevented, detected or treated early enough, (Republic of Kenya, 2013).

Many countries especially developing countries have been striving to offer free health care. Kenya has not been left behind and has had a long history in her desire to provide health services including maternal healthcare at no cost. Following independence in 1963, the post-colonial government endeavored to have health care as a major policy goal. In 1965, the young Kenya government abolished user fees, which had been implemented by the colonialists and started providing free health care for all in government health facilities (Chuma, et al., 2013). Nevertheless, in general health indicators have improved however projected outcomes to reach Kenya's Millennium Development Goals (MDGs) by 2015 and Vision 2030 are far from satisfactory. This is associated with the leading causes of morbidity and mortality which were based on increased prevalence of HIV/AIDS, Peri-natal conditions, lower respiratory infections, tuberculosis, diarrhea and malaria, (WHO, 2012). This further resulted to high infant mortality rate of 52 per 1,000 live births; under-five mortality of 74 per 1,000 and maternal mortality rate of 488 maternal deaths per 100,000 pregnant women, (KDHS, 2008). Thus, the government of Kenya requires timely and effective strategies to curb these worrying trends. This is because the above trends are coupled by the current pace of improvement following introduction of subsidized and free maternal services.

1.2. Overview of the Kenyan Health System and Theoretical Expositions

Worldwide, health services are provided by both the public and private sector. In Kenya, the government owns 51% of all health facilities in the country. The private for-profit and not-for-profit sectors own 34.3% and 14.8% of all health facilities respectively. Due to lack of medical health cover, the health system relies heavily on out-of-pocket (OOP) payments as the main source of healthcare financing. In 2009/2010, out-of-pocket payments accounted for 36.7% (NHA, 2010). However, the majority of the population cannot afford to pay for health care and the poor are less likely to utilize health services when they are ill. In addition, wide disparities in utilization exist between geographical regions and between urban and rural areas, (Mwabu, 1986; Mbugua et al., 1995). Inpatient and outpatient care differ greatly in that socio-economic and geographic inequities are widespread across the country. Those who pay for care incur high costs that are sometimes catastrophic and adopt coping strategies with negative implications for their socio-economic status, while others simply fail to seek care (Chuma et al., 2006). In this case, reversing the high maternal mortality rate (MMR) in Kenya is very critical. The government of Kenya embarks on an ambitious program to ensure that the country does not further lose energetic, productive mothers when giving birth and that Kenyan children would not be left orphaned, (Republic of Kenya, 2012). In order to reduce the health risk of both the mother and the un-born baby however, there is need to increase utilization of healthcare services during delivery since that is where proper medical attention and hygienic conditions exist, (KDHS, 2008).

According to Mackian et al., (2004) psychological theory considers motivating forces by focusing on the idea of decision-making in seeking for health or utilizing of a particular health care service say Antenatal care or hospital delivery through perceptions and evaluating the cost-benefit of actions in relation to these services (Pillai et al., 2003; Mackian et al., 2004). On the other hand, Kroeger, (1983) focussed on explanatory theory which is aligned on the labelling of particular signs and symptoms of an illness and the interpretation of these in a decision-making process based upon experience (Olenja, 2003). In conclusion, utilization of health care services such as free maternity services are linked to household behaviours, further some studies align these theories to a resolution of the problem through recommended and accepted remedies and treatment (Oberlander and Elverdan, 2000; Olenja, 2003). Similarly, Behavioural Model on Health care service utilization considers the process of health care service utilization in a contextual situation. It consists of predisposing factors (such as age, sex occupation, education); enabling factors (such as income, household materials); and need factors (such as perception of illness and service indicators). According to Pokhrel and Sauerborn, (2004) this model is based on determinants that affect decision-making and take into account economic circumstance, distances to travel, level of education, individual satisfaction based on previous services utilized and perceived quality of services. On the other hand, Prosser, (2007) recognizes other cultural, social, organizational, environmental, geographic and economic aspects that appear to affect peoples' health and at times are seen as the prerogative of the studies. Consideration is given to individual level, household level and health systems level characteristics with regard to health care usage (Pokhrel & Sauerborn, 2004).

According to the recent national survey, mothers in age group 20-34 years have higher utilization of antenatal care compared with those in other age groups. Similarly, coverage is also higher in urban areas than in rural areas, among women with at least some primary education and among women in the higher wealth quintiles. Further, the majority of deliveries that occurred in the public health facilities took place in hospitals with only 41.7% occurring in dispensaries and health centers (KDHS, 2014). This scenario triggered introduction of free maternal services in 2013 by Kenyan government in order to reduce the high maternal mortality rate that stood at 488 deaths per every 100, 000 pregnant mothers as recorded in the KDHS (2008). Unfortunately, only 62% of births in Kenya are delivered by a skilled provider, (KDHS, 2014). A similar proportion of deliveries 61% take place in health facilities according to the survey. The cumulative loss of pregnant mothers when giving birth affects the entire economy of a country in the long-term. In order to design effective policies and realize the Kenyan vision 2030 of a healthy population with low maternal mortality, there is a need to understand factors associated with utilization of free maternal health care services in Kenya. This study therefore seeks to identify variations in utilization of Antenatal care, delivery and postnatal care across different counties in Kenya as well as explore factors that are associated with utilization of free maternal health care services in Kenya using data from KDHS, (2014). To realize the set target of reduction of maternal mortality rate by 2017 more efforts and comprehensive strategies to enable this reduction need to be put in place. This study uses the latest KDHS (2014) to reveal the factors associated with utilization of free maternal care services among the pregnant women in Kenya with a key focus on regional utilization.

2. Literature Review

According to Machio, (2008) women from urban set up seek more healthcare services than their counterparts in the rural areas. This was attributed to the levels of education, age, proxy to health facility, income, respectful maternal care, qualified health staff, attitude

of staff among other factors that influences utilization of health facilities in urban set up more than rural areas. Healthcare financing is considered as a means of improving the accessibility and affordability of healthcare, quality of life and sustaining economic growth in a country (Craigwell et al, 2012) Financing households to improve their healthcare service seeking can also improve health of the community and in so doing reduce maternal mortality rates. Abekah-Nkrumah et al (2011) established that improved access to micro-finance by women, combined with education may enhance maternal health service uptake and hence reduce cases of maternal and infant deaths. On the other hand, Becker et al. (1993); Fosu, (1994); and Costello et al., (1996), found a strong positive impact of mother's education on the utilization of health care services. Similarly, Chepkorir (2014) while using binary probit regression model indicated that age of the individual, size of the household members and birth order are significant factors which influenced utilization of hospital delivery. Gender of the head of the household also influences usage of antenatal care and postnatal care positively and significantly whereas a place of residence significantly reduced utilization of both hospital delivery and postnatal care whereas women in higher wealth index had lower utilization of both antenatal care, hospital delivery and postnatal care.

Other studies indicate a strong association between birth order and use of health care services. Due to perceived risk associated with first pregnancy, most women are likely to seek maternal health care services for first birth than subsequent birth, (Wong et al., 1987; Elo, 1992). In this case, Manishimwe (2011) adapted probit model to explore utilization of postnatal care where education, income, age of the mother, health insurance and living in urban areas had positive significant effects to utilization of maternal health care services. However, that being employed and birth order were revealed negatively influenced utilization of maternal health care services. Socio-economic and cultural factors were as well associated with individual woman or household, demographic status of a woman, availability and accessibility of health services as significant in determining delivery care in Kenya (Magadi et al., 2000). Wealth index was shown to have a positive relationship with utilization of maternal health care services (Ochako et al., 2011).

From the foregoing studies, different models have been employed including logit, probit and multinomial logit model in estimation. Among studies done in Kenya, most have focused on certain areas of the country such as slums in Nairobi, specific district or specific division and since these are not representative samples, the results so arrived cannot be generalized for the entire country. Others such as Machio, (2008) and Chepkorir, (2014) have used the national surveys but the former was conducted in absence of free maternity care while the later considered only the rural areas. This study proves to be timely in developing appropriate policies in utilization of free maternal health care services in Kenya. This has also been over emphasized by the Ministry of Health which indicated that the uptake of free maternal services was not impressive considering the political goodwill and efforts directed into the program (MOH, 2015).

3. Data and Methodology

3.1. Data and Theoretical Framework

The study used the latest Kenya Demographic Household Survey 2014. This is household-based cross sectional survey data containing general information on utilization of maternal health care services. Specifically, the survey asked questions on the visits made for antenatal care, place of delivery and postnatal care received. The information on the survey was conducted after the introduction of free maternal health care services and thus will be best placed to indicate the factors that specifically influence utilization of these services. The survey further collects information on free maternal health at county level which will enable us to achieve the set objective of determining significance in terms of regional variations. Information pertaining to mothers across the country is made clear.

This study borrows heavily from a health utilization model which is regarded as containing sets of interacting variables relating to utilization of health care services and in this case free maternal health care services. According to the model, individual's actions to treat and prevent disease are based on consideration of four main factors which include; the individual's perceived susceptibility to disease, the individual's perception of illness severity, the individual's rational perception of benefits versus costs and finally the individual's cues to action, this involves the media, friends, family members or relatives, or well-known citizens can provide a motivation for prevention. This study therefore estimates these factors using the appropriate estimation technique based on the literature reviewed. More other factors apart from the ones proposed in the framework are incorporated in estimation.

3.2. Model Estimation

The likelihood of a pregnant mother utilizing free maternal services shall be estimated using the binary probit models for all outcomes of maternal health care services (Antenatal care, hospital delivery and postnatal care). This is because all outcomes are binary in nature. The binary logit model takes a value of 1 if any outcome is observed and zero if no outcome is observed. The unobserved dependent variable (y_i^*) is linked to the observed dependent binary outcome y as indicated in the following equation;

$$y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases}$$

From the above equation, utilization of maternal health care services is observed as $y = 1$, while failure to utilize it is observed when $y = 0$. We shall consider the cumulative distribution function (cdf) of the probit model. The study thereafter makes interpretations on the probability of observing the dependent variable (ANC, delivery care and postnatal care). The computation of marginal effects is conducted to this effect. The specified model is expressed as indicated below;

$$\text{Antenatal Care (ANC)} = \alpha_0 + \alpha X + \varepsilon; \text{ Delivery Care (DC)} = \beta_0 + \beta X + \varepsilon \text{ and Prenatal Care (PC)} = \sigma_0 + \sigma X + \varepsilon$$

These models are based on an assumption that the likelihood of a pregnant mother utilizing free maternal healthcare services (antenatal care, delivery care and postnatal care) is determined by demographic and socio economic factors as reviewed. The dependent variables as well have been given their respective measures. X is a vector or a number of explanatory variables while α , β and σ is a vector of parameters for ANC, DC and PC to be estimated and ε is the error term.

3.3. Definition of Variable, Measurement and Expected Sign

Variables	Definition	Expected sign
Dependent Variables		
Antenatal care (ANC)	ANC=1 if a mother attends antenatal clinics and 0 otherwise.	
Delivery care (DC)	DC=1 if a mother delivers at hospital and 0 otherwise.	
Postnatal Care (PC)	PC=1 if a mother attends postnatal clinic and 0 otherwise.	
Explanatory Variables		
Age of the mother	Age of the mother in complete years	Negative
Age of the mother at first birth	Age in complete years	Positive
Birth Order	The order or number of a child among his/her siblings	Negative
Maternal education	Number of years spent in school (school attainment)	Positive
Wealth index	Poorest=1, poorer=2, middle=3, rich=4 and richest=5	Positive
Place of current residence	Residence= 1 if urban, 0 if rural.	Positive
Religion	1 if a mother has religion, 0 if no religion	Negative
Access to information	1= If possess Radio/TV or reads newspaper and 0 otherwise	Positive
Regional dummies	Nairobi Region=1, 0 otherwise	Positive
	Central Region=1, 0 otherwise	Positive
	Coast Region=1, 0 otherwise	Negative
	Eastern Region=1, 0 otherwise	Positive
	Rift Valley Region=1, 0 otherwise	Positive
	Western Region=1, 0 otherwise	Positive
	North-Eastern Region=1, 0 otherwise	Negative
	Nyanza Region=1, 0 otherwise	Positive

Table 1: Variable definition and measurement

4. Results and Discussions

4.1. Descriptive Statistics

Table 2 below indicates descriptive statistics of the study variables (age of the mother, education levels, residence, age of mother at first birth, wealth quintile, religion, birth order, region and access to information). These were the independent variables while the dependent variables were maternal health outcomes such as antenatal care (at least four visits), hospital delivery and postnatal care.

Variable	Mean	Std. Dev.	Min	Max
Antenatal care	0.5432273	0.4981446	0	1
Hospital delivery	0.5926428	0.491359	0	1
Post-natal care	0.6332775	0.4819435	0	1
Age of the mother	28.94163	9.393412	15	49
Age of the mother at first birth	19.42306	3.655827	13	44
No education	0.1345925	0.3412933	0	1
Primary education	0.5023649	0.5000025	0	1
Secondary education	0.2765533	0.4473008	0	1
Higher education	0.0864893	0.2810897	0	1
Birth order	3.596085	2.299082	1	15
Type of Residence	0.3736928	0.4837913	0	1
No religion	0.0162811	0.1265564	0	1
Christians	0.8462627	0.3607025	0	1
Muslim	0.1338846	0.3405338	0	1
Wealth index	2.914733	1.440879	1	5
Mass media	0.8266675	0.3785405	0	1
Nairobi Region	0.1646884	0.3709297	0	1
Central Region	0.1167161	0.3211082	0	1
Coast Region	0.1358391	0.3426459	0	1

Eastern Region	0.1183647	0.323066	0	1
Rift Valley Region	0.1221563	0.3274932	0	1
Western Region	0.1327069	0.3392856	0	1
North-Eastern Region	0.0947906	0.2929497	0	1
Nyanza Region	0.1147379	0.3187316	0	1

Table 2: Summary statistics

The study results show that an estimate of 54.32% of the respondents attended and received sufficient antenatal care. This implies that about 45.68% had less than four antenatal visits as recommended. The variation on the antenatal visits from the average was 49.82%. Similarly, about 59.26% of the women received skilled delivery. This was a slightly higher figure compared to previous years reported and the variation from the average was 49.14%. Postnatal care was reported to be attended by over half the proportion of respondents. The results indicated that approximately 63.33% of the respondents attended postnatal care with a close but lesser variation compared to that of both antenatal care and hospital delivery.

Most mothers had approximately 29 years on average with the youngest being 15 years while the oldest was 49 years. The variation in general was little at 9 years compared to the year 2008 which had a variation of 7 years from the average. Most mothers had their first births by the age of 19 years with the least age being 13 years while the oldest mother had first birth at the age of 44 years. On maternal education, the study showed that about 13.45% had no any education at all while 50.24% had primary level of education against those reported in the year 2008 being 20.2% and 55% respectively. Secondary level had the highest number of respondents and lastly the higher education level which comprised of college and University was found to be 8.65% compared to previous survey (2008) with 6.45% having higher education.

Birth order of child was assessed and found that most children were of third or fourth birth order with a variation being between the third and fourth child. The results also revealed that 37.37% of the respondents reside in the urban areas while a huge population of 62.63% are rural residents. Further, respondents with no religion at all were only 1.63% as Christians who comprised of both Catholics and Protestants formed the largest category of 84.63% while Muslims were 13.39% of the surveyed women population. On wealth index, majority of the respondents were in the third (middle) wealth quintiles. Further, majority of the respondents (82.67%) were shown to own either radio, TV or read newspaper frequently. On regional distribution of the respondents, it was found that Nairobi region led with highest respondents who were 16.47% of the regions considered followed by coast, western, and rift valley regions with 13.58%, 13.27% and 12.22% respectively. The rest of the regions had less than 12% of the respondents among the regions under study.

4.2. Utilization of Free Maternal Health Care Services Across Counties in Kenya

Finally, the study assessed counties with regard to utilization patterns antenatal care, hospital delivery and postnatal care services. As can be shown in the Appendix section, it can be observed that antenatal care utilization was leading in Nairobi County which can be attributed to the high levels of education as well as awareness level amongst the residence due to media and accessibility of health care facilities. Nairobi county was closely followed by Kilifi county (248), Homabay (239) and Migori (236) counties respectively. The least seeking counties in ante-natal care services included Tharaka Nthi (115), West Pokot (68), and lastly Mandera (57) counties. Considering skilled delivery care, Nairobi County was ranked as the leading county in seeking hospital delivery. Other counties that had the highest numbers of mothers delivering under skilled personnel were Migori (267), Homabay (256) and Kisii (261). The least seeking counties of hospital delivery included Samburu (97), Marsabit (90) and Turkana (69) counties respectively. Finally, Nairobi county emerged the first in seeking post-natal services, followed closely by Bungoma county and Makueni counties. The counties with least health-seeking behavior in this cohort of health care included Kericho (30), Mandera (17) and Turkana (5) respectively. More details are as presented in the appendix 1.

Therefore, variations in utilization of these essential health care services among women in Kenya across counties may be as a result of dynamic geographical locations of these regions in the country and the available population residing in these counties. Similarly, failure to have some exclusive health care services including infrastructures such as ambulances, good roads, theatres, beds among other critical requirements could contribute to meager usage of these services. Conclusively, the government should be expected to improve on resource allocation of manpower, material and money to the counties that demonstrated least usage of maternal health care services. Likewise, the counties leading in seeking healthcare in maternal services require need to maintain the pace as all these efforts are geared towards achieving the Kenya's Vision 2030 as well as the Global Sustainable Development goals (SDGs).

4.3. Estimation

To explore and thus understand clearly factors determining utilization of free maternal services in Kenya, the study considered both the demographic factors and socio economic factors that significantly influence utilization of free maternal health care by pregnant women and also new-born mothers. Table 3, 4 and 5 indicates factors influencing usage of free antenatal care, free hospital delivery and free postnatal care respectively. However, it should be noted that the probit regressions coefficients are interpreted as changes in the probit indexes (Marginal effects). From the Table 3 the study found a p value of 0.0000 which was less than 1% implying that the variables considered fit the model well thus the variables used in the model were significant at 1% significance level in explaining usage of antenatal care services in Kenya. The pseudo R was very low (0.0795). Specifically, the study found that an additional age of the mother at first birth or an additional birth was found to lower significantly the probability of utilizing antenatal care by 0.97% and 4.22% respectively holding other factors constant. Also, it was found that residing in central, eastern, rift valley or western regions

significantly lowered usage of antenatal care by 7.63%, 6.93%, 6.8% and 8.25% respectively compared to Nairobi region holding other factors constant. On the other hand, an additional current age of the mother by one year or being in higher education, catholic or being a Muslim significantly increased utilization of antenatal care by 1.31%, 28.95%, 10.95%, and 13.36% respectively holding other factors constant. Compared to being in the first (poorest) wealth quintile, second, third, fourth and fifth wealth quintiles significantly increased usage of antenatal care by 5.84%, 6.83%, 9.37%, and 16.38% respectively holding other factors constant. Access to mass media was also shown to increase utilization of antenatal care by 5.11% holding other factors constant. Finally, coast region was found to have significant and higher utilization of antenatal care by 9.81% compared to Nairobi region holding other factors constant. More details are indicated in Table 3.

Variables	ME	Std. Err.	t	P>t	[95% Confidence Interval]	
Age of the mother	0.0131186***	0.0026783	4.90	0.000	0.0078692	0.0183679
Age of the mother at first birth	-0.0096693***	0.0037105	-2.61	0.009	-0.0169417	-0.0023968
Education levels						
Primary education	0.0569535	0.0420754	1.35	0.176	-0.0255128	0.1394199
Secondary education	0.0661399	0.0478783	1.38	0.167	-0.0276998	0.1599796
Higher education	0.2894693***	0.0517653	5.59	0.000	0.1880111	0.3909275
Birth order	-0.0421713***	0.0083935	-5.02	0.000	-0.0586223	-0.0257203
Residence	-0.0084054	0.0243197	-0.35	0.730	-0.056071	0.0392603
Religion						
Catholics	0.1095137**	0.049528	2.21	0.027	0.0124406	0.2065868
Protestants and other Christians	0.0574063	0.046329	1.24	0.215	-0.033397	0.1482095
Muslims	0.1335544**	0.0526233	2.54	0.011	0.0304147	0.2366941
Wealth index						
Poorer wealth quintile	0.0584353*	0.0353553	1.65	0.098	-0.0108598	0.1277303
Middle wealth quintile	0.0683383*	0.0362066	1.89	0.059	-0.0026253	0.139302
Richer wealth quintile	0.0937472**	0.0383407	2.45	0.014	0.0186009	0.1688936
Richest wealth quintile	0.1637525***	0.0413648	3.96	0.000	0.082679	0.2448259
Mass media	0.051141*	0.0291917	1.75	0.080	-0.0060736	0.1083557
Regions (Base=Nairobi)						
Central region	-0.0762567*	0.0409803	-1.86	0.063	-0.1565766	0.0040631
Coast region	0.0980878**	0.0383591	2.56	0.011	0.0229054	0.1732702
Eastern region	-0.0693228*	0.0387839	-1.79	0.074	-0.1453378	0.0066921
Rift valley	-0.0680111*	0.0367908	-1.85	0.065	-0.1401198	0.0040976
Western region	-0.0824729**	0.0387147	-2.13	0.033	-0.1583523	-0.0065934
North eastern region	-0.0784994	0.0542741	-1.45	0.148	-0.1848747	0.0278758
Nyanza region	0.0436994	0.0369971	1.18	0.238	-0.0288135	0.1162124
Probit regression						
Number of Observations = 2741						
LR chi2 (15) =292.36; Prob> chi2= 0.0000; Log likelihood = -1692.1186and Pseudo R2 =0.0716						

Table 3: Marginal Effects (ME): Dependent variable - Antenatal care

Table 4 below shows a p value of 0.0000 which was less than 1% indicating that the variables used in the model were all significant in explaining hospital delivery and thus maternal healthcare service use in Kenya. The pseudo R (0.2910) was higher compared to the previous and subsequent indicators. This implies that explanatory variables employed explained 29.1% of hospital delivery. From the results of the model, age of the mother at first birth, secondary education, higher education level, birth order, urban residence, poorer wealth quintile, middle wealth quintile, richer wealth quintile, richest wealth quintile, mass media (access to information) and regions like central, eastern, western and north eastern regions were statistically significant in determining usage of hospital delivery while age of the mother, primary education level, religion, regions like coast, Rift valley and Nyanza regions were statistically insignificant at all significance levels. From estimated results, an additional age of the mother at first birth led to 0.6% increase in utilization of hospital delivery at ceteris paribus. On the other hand, education increases hospital delivery by 12.74% and 18.97% for mother who had secondary and higher education levels respectively holding other factors constant. Residence significantly increased utilization of hospital delivery by 6.26% for mothers who resided in urban areas compared to those in rural areas. Similarly, all wealthy indexes led to an increase in utilization of hospital delivery with 8.97% for women in poorer wealth quintile, 16.74% for women in the middle wealth quintile, 27.56% for women in richer wealth quintile and 35.35% for women in the richest wealth quintile compared to women in the poorest wealth quintile. Further, women who had access to mass media and central region increased the probability of hospital delivery by 5.21% and 9.61% respectively holding all other factors constant. However, there was a negative and significant relationship between hospital delivery and birth order whereby an additional birth lowered usage of hospital delivery by 2.49% holding other factors constant. On the other hand, some regions were associated with lower usage of hospital delivery such as eastern, western and north eastern regions with 9.33%, 12.63% and 12.05% respectively holding other factors constant.

Variables	ME	Std. Err.	t	P>t	[95% Conf. Interval]	
Age of the mother	0.0018508	0.0022291	0.83	0.406	-0.0025182	0.0062198
Age of the mother at first birth	0.0060005*	0.0031816	1.89	0.059	-0.0002354	0.0122363
Education levels						
Primary education	0.0427658	0.0349417	1.22	0.221	-0.0257186	0.1112502
Secondary education	0.1274093***	0.0407893	3.12	0.002	0.0474637	0.2073549
Higher education	0.1896539***	0.0525541	3.61	0.000	0.0866497	0.2926581
Birth order	-0.0248506***	0.00679	-3.66	0.000	-0.0381587	-0.0115424
Residence	0.0625822***	0.0195399	3.20	0.001	0.0242847	0.1008796
Religion						
Catholics	0.0656181	0.0409427	1.60	0.109	-0.0146281	0.1458643
Protestants and other Christians	0.0601873	0.0376534	1.60	0.110	-0.0136121	0.1339867
Muslims	0.0619117	0.0442439	1.40	0.162	-0.0248048	0.1486282
Wealth index						
Poorer wealth quintile	0.0896995***	0.0338694	2.65	0.008	0.0233167	0.1560823
Middle wealth quintile	0.1674261***	0.034774	4.81	0.000	0.0992703	0.2355819
Richer wealth quintile	0.2756468***	0.0370435	7.44	0.000	0.2030428	0.3482509
Richest wealth quintile	0.3535333***	0.0392706	9.00	0.000	0.2765644	0.4305023
Mass media	0.0520959**	0.0225845	2.31	0.021	0.007831	0.0963607
Regions (Base=Nairobi)						
Central region	0.0961345**	0.0390809	2.46	0.014	0.0195374	0.1727316
Coast region	0.0524772	0.0368338	1.42	0.154	-0.0197157	0.1246701
Eastern region	-0.0932511**	0.0364727	-2.56	0.011	-0.1647363	-0.0217659
Rift valley	-0.0316264	0.0351253	-0.90	0.368	-0.1004707	0.0372179
Western region	-0.1262365***	0.0369081	-3.42	0.001	-0.198575	-0.053898
North eastern region	-0.1204702**	0.0509349	-2.37	0.018	-0.2203008	-0.0206395
Nyanza region	0.0140019	0.0351875	0.40	0.691	-0.0549644	0.0829682
Probit regression						
Number of Observations =2715; LR chi2 (15) = 1027.24; Prob > chi2 =0.0000; Log likelihood = -1251.3597						
Pseudo R2 = 0.2910						

Table 4: Marginal Effects (ME): Dependent variable - Hospital delivery

From table 5 below, the study found a p value of 0.0189 which is at 5% indicating that the variables used in the model were significant in explaining usage of post-natal care services in the health facilities across the country. The pseudo R was very low (0.0412). However, this is normal for most of cross sectional studies. From the study results, age of the mother, birth order, middle, richer and richest wealth quintiles, and central regions were statistically significant in determining usage of postnatal care services in Kenya while the other variables were statistically insignificant at all significance levels. Particularly, an additional age of one year led to a significant increase of usage of postnatal care services by 0.67% holding other factors constant. On the other hand, middle wealth quintile, richer wealth quintile and richest wealth quintile increase utilization of postnatal care by 11.75%, 10.74% and 14.81% respectively holding other factors constant. Central region was associated with increased usage of postnatal care services by 12.15% at ceteris paribus. Finally, birth order led to lower usage of these services such that an additional birth by one child led to a significant reduction in the usage of postnatal care services by 2.25% holding other factors constant.

Variables	ME	Std. Err.	t	P>t	[95% Confidence Interval]	
Age of the mother	0.0066748*	0.0036313	1.84	0.066	-0.0004425	0.0137921
Age of the mother at first birth	-0.0023504	0.0050201	-0.47	0.640	-0.0121896	0.0074888
Education levels						
Primary education	-0.0031687	0.0507725	-0.06	0.950	-0.102681	0.0963437
Secondary education	-0.0369889	0.0593066	-0.62	0.533	-0.1532277	0.0792499
Higher education	-0.0215974	0.0724683	-0.30	0.766	-0.1636328	0.1204379
Birth order	-0.0225257**	0.0113572	-1.98	0.047	-0.0447853	-0.000266
Residence	-0.0141858	0.0325751	-0.44	0.663	-0.0780319	0.0496603
Religion						
Catholics	-0.032453	0.0579577	-0.56	0.576	-0.1460479	0.0811419
Protestants and other Christians	-0.0239324	0.0529206	-0.45	0.651	-0.1276549	0.0797902
Muslims	0.0886347	0.0604079	1.47	0.142	-0.0297627	0.207032
Wealth index						
Poorer wealth quintile	0.0214524	0.051186	0.42	0.675	-0.0788702	0.1217751

Middle wealth quintile	0.117469**	0.049041	2.40	0.017	0.0213503	0.2135877
Richer wealth quintile	0.1073944**	0.0533426	2.01	0.044	0.0028448	0.211944
Richest wealth quintile	0.1481492***	0.0558389	2.65	0.008	0.0387069	0.2575914
Mass media	-0.0303696	0.040541	-0.75	0.454	-0.1098285	0.0490892
Regions (Base=Nairobi)						
Central region	0.1214943***	0.0467277	2.60	0.009	0.0299097	0.2130789
Coast region	-0.0306533	0.0554625	-0.55	0.580	-0.1393578	0.0780512
Eastern region	0.0274676	0.0488496	0.56	0.574	-0.0682759	0.1232111
Rift valley	-0.0790621	0.0495092	-1.60	0.110	-0.1760983	0.0179742
Western region	0.0311712	0.0483225	0.65	0.519	-0.0635391	0.1258816
North eastern region	-0.0959884	0.0793181	-1.21	0.226	-0.2514491	0.0594723
Nyanza region	-0.014819	0.0502467	-0.29	0.768	-0.1133006	0.0836627
Probit regression						
Number of Observations = 1316;						
LR chi2 (15) = 61.49; Prob > chi2 = 0.0000; Log likelihood = -714.73163 and Pseudo R2 = 0.0412						

Table 5: Marginal Effects (ME): Dependent variable - Post natal care

5. Discussion, Conclusions and Recommendations

5.1. Discussion and Conclusions of the Study Results

The study focused on the significant factors determining utilization of the maternal health care services in Kenya. From estimation, first; age of the mother was shown to significantly increase in use of antenatal and hospital delivery services. Older mothers demand for delivery and postnatal care which is due to complications that elderly mothers might have gone through in earlier births. On the other hand, women in higher age are associated with being aware on the importance of attending clinic and the knowledge of new breastfeeding habits offered only at the health facilities. Thus, women's current age is important in utilization of medical services. Similarly, age of the mother at first birth is associated with lower usage of antenatal care and increase in usage of hospital delivery. Theoretically, this is expected as mothers giving birth older compared to the young mothers may have learned from their peers on taking care of pregnancy and this may ultimately lower urge to utilize antenatal care services whereas due to suspected complications associated with first pregnancy, they may tend to prefer delivering at the health facilities (skilled delivery). Secondly, education had a significant and positive impact on utilization of maternal healthcare services in Kenya however, on usage of antenatal care and hospital delivery. These significant relations increase the probability of utilizing maternal healthcare services in Kenya. This result may be associated with rationality on decision making among educated mothers regarding utilization of any antenatal care or hospital delivery. This finding concurs with a study conducted by Machio (2008) which indicated that education on the women and the husband increases demand for postnatal care, hospital delivery and antenatal care. Thirdly, as expected, birth order was found to have negative influence on utilization of all maternal health care services (antenatal care, hospital delivery and postnatal care). This may be as a result of resource competition. Having more children causes resource constraints which negatively affect healthcare utilization. A woman is more likely to seek maternal healthcare services at first birth than subsequent births. Further, (Shariff and Singh 2002) determined that as the number of children a mother has increases, the need to utilize healthcare services tends to fall. This finding also concurs with the result obtained by Wu (2011) evaluating china's one child policy. Fourthly, residence was only found to impact usage of hospital delivery whereby mothers residing in urban areas compared to their counterparts in rural areas had higher urge to use skilled delivery. This result may be related to the fact that urban residents have more access to information or better infrastructure which influences, due to its easiness, the usage of hospital delivery. Fifthly, religion had a positive and significance influence only on usage of antenatal care. The study results showed that being a catholic or Muslim increased the likelihood of attending antenatal care services compared to those who had no religion. These results may be attributed to increased campaigns by the government through the religious organizations/groups on the importance of attending antenatal care thus increased usage of the same services. According to a study conducted by (Shariff and Singh 2002), they found a contradicting finding whereby Muslims had low utilization of maternal healthcare services.

The empirical findings support the theoretical expectation of the wealth index on the increase usage of all maternal care services. The estimated results found that wealth index significantly increased usage of antenatal, hospital and postnatal care services. On closer examination of the finding of antenatal and hospital delivery it can be seen that as one moves from lower wealth quintile to higher wealth quintile, the proportion or magnitude of usage of maternal health care services consequently rises. Sixthly, access to mass media (information) significantly increased antenatal care and hospital delivery. Mothers who had access to either TV, radio or read newspapers frequently are likely to get more information on maternal health care services compared to those who had no access to such information in the country. In a study conducted by Shariff & Singh, (2002), found that women who are exposed to more information on health issues through electronic and print media better utilize healthcare services than those who don't get the information. Finally, assessment of regional variation revealed significant utilization associated with different regions as well as maternal health care services. Central region compared to Nairobi region was shown to have lower utilization of antenatal care but higher utilization of hospital and postnatal care. Coast region had higher significant usage of only antenatal care compared to Nairobi region. Both eastern and western regions were found to be associated with lower and significant usage of both antenatal care as well as hospital delivery. On the other hand, rift valley and North eastern regions had lower usage of antenatal care and hospital delivery

respectively. In conclusion, complications of pregnancy and childbirth can lead to increased deaths and disability than any other reproductive health problems. In order to reduce the health risk of both the mother and the un-born baby, there is need to increase utilization of healthcare services during delivery. It is only in health facilities where proper medical attention and hygienic conditions exist. Policies reversing declining trends on usage of maternal health care services as well as policies meant to maintain and even improve to higher levels of utilization of these services can be derived based on the findings in this study. This can be achieved through factors revealed to have either negative or positive and significant linkage to three dependent variables (antenatal, hospital delivery and postnatal care).

5.2. Recommendations

Education is a very important investment which can promote usage of maternal health services in Kenya. Investing in education especially female education need to be promoted based on the study findings which indicated a positive and significant influence of education on antenatal care and hospital delivery. The government of Kenya introduced free primary education and now digital programmes through ICT sector. Nevertheless, the government of Kenya needs therefore to effect the existing free primary and secondary education by releasing the resources (educational funds) in time and ensuring proper utilization of the same funds. There is need to have also more institutions of higher learning to contain increased upsurge for higher education. This is based on the higher magnitude associated with increased usage of maternal health care services among women with higher education levels. To promote this policy, the government needs to increase educational infrastructures that are equipped with better equipment of learning to encourage female education in Kenya.

The government of Kenya also need to introduce more programmes that will enhance economic status of women i.e. women empowerment programmes should be revived so as to enable more women to be on the higher wealth quintiles and thus improve their own well-being and that of their households. Further, the government of Kenya will need to focus and revitalize existing programmes to achieve efficiency. This is based on the study findings whereby women in the higher wealth quintiles significantly increased usage of all maternal health care services. Similarly, the government needs to create awareness on mothers with second birth and above on the importance of continuous consumption of maternal health care services to discourage the lower utilization of these services by women with children in higher birth order. This is because; birth order was significantly associated with lower utilization of maternal health care services in Kenya. On the other hand, pregnant women should be encouraged to deliver through skilled assistance at the health facility. However, for this to be effective, better and thus improved service delivery at the nearby health facilities is vital. For instance, the government needs to train more health workers and distribute them throughout the country with better coverage in rural areas to encourage women to use professional care. This is based on the positive relationship established between hospital delivery and urban residence. Also, the government should consider involving religion as a channel for promoting usage of these services. This is because the estimated results indicated a significant positive contribution of religion/ faith based organizations (Christians and Muslims) in creating awareness and the benefits of utilizing antenatal care services. Finally, there is a need by the government to focus and reverse the trends on regions which were found to be associated with lower utilization of maternal health care services such as central regions (antenatal care), eastern, rift valley, western and north eastern regions and boost regions such as central (hospital delivery and postnatal care), and coast regions to maintain and even increase the rates of utilization of maternal health care services.

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APPENDIX

NAME OF THE COUNTIES	COUNTIES CODES	ANTENATAL VISITS (at least 4 visits)	HOSPITAL DELIVERY	POSTNATAL CARE
BARINGO	705	151	169	84
BOMET	714	138	193	84
BUNGOMA	803	207	187	150
BUSIA	804	206	220	136
ELGEYO MARAK	707	138	206	60
EMBU	405	130	200	108
GARISSA	501	145	117	51
HOMA BAY	604	239	256	112
ISIOLO	402	166	134	60
KAJIADO	712	224	202	126
KAKAMEGA	801	166	195	51
KERICHO	713	174	210	30
KIAMBU	205	175	248	111
KILIFI	303	248	214	124
KIRINYAGA	203	124	193	88
KISII	605	184	261	141
KISUMU	602	221	226	110
KITUI	406	187	162	118
KWALE	302	198	172	97
LAIKIPIA	709	157	153	133
LAMU	305	151	123	75
MACHAKOS	407	184	191	121
MAKUENI	408	199	159	146
MANDERA	503	57	95	17
MARSABIT	401	130	90	103
MERU	403	135	234	126
MIGORI	603	236	267	117
MOMBASA	301	174	222	81
MURANGA	204	138	202	78
NAIROBI	101	314	386	158
NAKURU	710	202	245	114
NANDI	708	207	182	74
NAROK	711	201	177	187
NYAMIRA	606	140	220	122
NYANDARUA	201	147	207	90
NYERI	202	159	218	107
SAMBURU	703	191	97	94
SIAYA	601	190	228	84
TAITA TAVETA	306	130	139	76
TANA RIVER	304	220	148	144
THARAKA	404	115	175	72
TRANS-NZOIA	704	154	160	78
TURKANA	701	158	69	5
UASIN GISHU	706	203	195	78
VIHIGA	802	169	155	119
WAJIR	502	143	121	61
WEST POKOT	702	68	125	32
TOTAL		8,093	8,748	4,533

*Table 1: Utilization of maternal health care services across the counties
Source: KDHS (2014)*