Socio-economic Determinants of Maternal Services Uptake in Kenya

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Summary

BACKGROUND

Kenya had relatively high early childhood and maternal mortality. Maternal health care services have shown to be an effective strategy for reducing early childhood and maternal mortality. A worldwide study carried out in 2014 found about 73% of all the 2,443,000 maternal deaths between 2003 and 2009 were due to direct obstetric causes and almost half of them occurred in Africa [5]. Infant and under-five mortality were 65 and 141 deaths per 1000 live births, respectively [12] in Kenya.

AIM

This study sought to establish the effects of socio-economic factors on the uptake of maternal health care services in Kenya.

METHODOLOGY

The study used data drawn from the 2014 Kenya Demography and Health Survey (KDHS) which was a nationwide survey that used a cross-sectional research design. The survey interviewed 31,000 women of reproductive age. However, this study focused on a nationwide sample of 14,398 women aged 15-49 years who had carried a live birth within five years preceding the survey. It was guided by *Andersen behavioural model.* Descriptive statistics and logistic regression were used to analyse the data.

RESULTS

Nearly all 14,398 women who were included in the study sought antenatal care during their most recent pregnancy. The majority of the women (67%) initiated antenatal visits during the second trimester. Region of residence, household wealth status, education, type of place of residence, and age were to be determinants of early initiation of antenatal visits. Slightly over half of the women made at least 4 antenatal visits and about 40% made between 1 and 3 visits. Education, household wealth index, and region of residence were found to be strongly associated with making at least 4 antenatal visits. About sixty per cent of all the women delivered in a health facility. Delivering in a health facility was found to be strongly associated with the mother's education, type of place of residence, region of residence, household wealth index, maternal age, and whether or not the woman had made at least 4 antenatal visits.

CONCLUSION

There is need for concerted efforts to have the majority of women in the country initiate antenatal visits early, make at least four antenatal visits and deliver in health facilities. A statistical percentage of women were partaking antenatal care services during their last trimester.

Keywords: Maternal health services, uptake, associated factors, Kenya

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Introduction

Provision and uptake of a continuum of maternal health care services during pregnancy, labour, delivery, and the postnatal period prevent maternal and neonatal morbidity and mortality [1, 2, 3]. Expectant women are expected to receive antenatal care and to deliver their babies with the assistance of trained and experienced health workers. It is equally important that mothers deliver their babies in health facilities, where proper medical attention and hygienic conditions can reduce the risk of complications and infections which may cause serious illness or even death to either the mother or the baby or both of them. Births that occur at home or the roadside are less likely to be attended to by skilled health providers [4]

Various studies indicate that most non-abortion maternal deaths occur around the time of labour and delivery or within a few hours after birth [1, 3, 5]. For instance, a worldwide study carried out in 2014 found about 73% of all the 2,443,000 maternal deaths between 2003 and 2009 were due to direct obstetric causes, and deaths due to indirect causes accounted for 27·5% of all deaths. Haemorrhage accounted for 27·1%, hypertensive disorders 14·0%, and sepsis 10·7% of maternal deaths. The rest of the deaths were due to abortion (7·9%), embolism (3·2%), and all other direct causes of death (9·6%). Almost half of these maternal deaths occurred in Africa [5].

Several studies have shown that increased access and uptake of maternal health care services, including delivery under the supervision of skilled attendants, is closely associated with better maternal outcomes [1, 3, 6, 7].

For example, it has been estimated that having a skilled delivery could reduce maternal mortality by 16 to 33 % in a developing country7. It has also been reported that maternal health care services would reduce maternal mortality by 20 -30 % [8, 9.] Thus, the uptake of maternal care services is an effective strategy for reducing maternal morbidity and morbidity and neonatal mortality [7, 8, 9, 10].

In a bid to significantly expand access to maternal health care services across the country, the Kenya Government introduced a free maternal care policy in June 2013 [11]. The policy enables pregnant women to access free maternity services (antenatal, delivery, and postnatal care services) in all the public health facilities across the country. The public health facilities provide the services for free and seek reimbursement from the Ministry of Health, Headquarters.

Research Problem

In the recent past, there has been no comprehensive analysis of the level of utilization of maternal health services and the factors associated with their use in the country. As a result, little is known about how the various socioeconomic factors are associated with the uptake of antenatal care services during pregnancy and delivery among the women in the country as a whole.

Therefore, the level of use of maternal health care services and the associated determinants in the country are poorly understood. Understanding the level of uptake of the maternal services and the factors influencing their uptake helps very much in the design of appropriate strategies and policies to improve their uptake, thereby reducing maternal and early childhood mortality.

Early child mortality and maternal mortality are fairly high in Kenya; infant mortality and under-five mortality are 65 and 141 deaths per 1000 live births, respectively [12]. While maternal mortality ratio is estimated at 319 deaths per 100,000 live births compared to 496 deaths per 100,000 live births for the whole country [13].

Therefore, this study seeks to establish the effects of socioeconomic factors on the uptake of maternal health services among women in the reproductive age 15 -49 years in the country who were interviewed during the 2014 Kenya Demographic and Health Survey. Specifically, the study focuses on the initiation of antenatal services, the number of antenatal visits, and the place of delivery.

MATERIALS AND METHODS

Source of Data

The data for this study is drawn from the 2014 Kenya Demographic and Health Survey (KDHS) that the Kenya National Bureau of Statistics (KNBS) and

partners carried out in the whole country in 2014. The 2014 KDHS collected data on fertility, marriage, sexual activity, fertility preferences, family planning, maternal and child health, information about HIV/AIDS and other sexually transmitted diseases, information on malaria, and use of mosquito nets and domestic violence. The survey was carried out as part of the worldwide DHS program.

The 2014 KDHS sample was drawn from the Fifth National Sample Survey and Evaluation Programme (NASSEP V) that KNBS uses to conduct household-based surveys throughout the country. In the NASSEP V, each of the 47 counties was stratified into urban and rural strata, since Nairobi and Mombasa counties have only urban areas, giving a total of 92 sampling strata.

The 2014 KDHS sample was designed to have 40,300 households from 1,612 clusters (enumeration areas (EAs)) spread across the country, 995 clusters in rural areas, and 617 in urban areas. Using a two - stage sample design, representative samples were selected independently in each of the 92 sampling strata. In the first stage, the 1,612 EAs were selected with equal probability from the NASSEP V frame.

In the second stage, 25 households were randomly selected from each of the selected EAs. The interviewers visited only the preselected households, and no replacements of the preselected households were allowed during the data collection. The details of the sampling methodology, as well as an assessment of the quality of the data, are presented and discussed extensively in the first country report of the Survey [12].

The 2014 KDHS interviewed a total of 31,000 women aged 15-49 years in the whole country. Out of these 31,000 women, a nationwide sample of only 14,398 women aged 15-49 years were selected for this study using the SPSS command select cases if a certain criterion or condition is satisfied. The criterion used was whether or not a woman had a live birth during the five years preceding the 2014 KDHS.

Only the women who had a live birth during the five years preceding the survey were automatically selected from the data set. As indicated in *Table 1*, the selected 14,398 women were from the whole country. The study considered the health-seeking behaviour of these women during the most recent pregnancy and live birth (last birth). The unit of analysis is the individual woman.

Conceptual Framework and Explanatory Variables

This study is based on Andersen's behavioural model14. The model has been widely used in health sciences-based research. The model examines the influence of an individual's demographic and socioeconomic characteristics and health delivery system variables on utilization patterns. It hypothesizes that the decision to use maternal health services is a function of three sets of variables:

1. **Predisposing Factors:**

   These are the social and cultural attributes of individuals before the need for care that characterizes their propensity to use health services.

   In Andersen's model, predisposing factors consist of demographic characteristics such as age, sex, marital status, and prior illness, as well as factors capturing social structure like education, ethnicity, occupation, family size, religion, and health attitudes and beliefs [14]. In this study, we include maternal age, parity, marital status, education, and religion as predisposing factors.

2. **Enabling Factors:**

   These refer to the characteristics, generally related to the family or community that contextualize an individual's ability to secure services. Variables corresponding to this component of the model refer to an individual's means to seek health care, including wealth or income, health insurance coverage, distance to and accessibility of services, price structure of services, provider-to-population ratio, rural or urban residence, or region of the country [13].
   We have included in this study household wealth index, type of place of residence, region of residence as enabling factors.

3. **Need Factors to use Service Factors.**

   These consist of both perceived needs and

evaluated needs [13]. These embrace how people view their general health and functional state, as well as how they experience symptoms of illness, pain, and worries about their health and whether or not they judge their problems to be of sufficient importance and magnitude to warrant seeking care. Since during the 2014 KDHS these issues were not directly canvassed from the women interviewed, we do not have appropriate data on these variables. Hence no need factors are included in this study.

Since the 2014 KDHS did not collect data on the actual need or perceived need of maternal health care and the delivery system variables, we considered only the first two clusters of factors identified in the model. In this study, we assumed that all the women considered in the study required health care during their most recent pregnancy and delivery. Some of the predisposing factors or enabling factors or both of them could have hindered those women who did not utilize the service. Furthermore, no health delivery system variables, such as the quality of care, are examined in this study because no data was collected during the KDHS survey.

Methods of Data Analysis

Analysis of data entails the use of cross-tabulation (percentages) and logistic regression. The bivariate analysis included estimation of the level and differentials in the uptake of the selected maternal health services, as defined in the preceding section. The calculations include percentage distributions of the women according to whether they used a particular service during pregnancy or delivery classified by the various socio- economic and demographic characteristics. Logistic regression analysis is used to establish the effects of the study variables on the uptake of each of the services since the three dependent variables are dichotomous.

The three dependent variables are whether or not a woman initiated antenatal visits during the first trimester, whether or not a woman made at least four antenatal visits, and whether or not a woman delivered in a health facility, which is dichotomous. Logistic regression is the most appropriate analytical tool since the dependent variables are dichotomous (yes/ no nature) [15]. This is an efficient way to introduce the necessary controls when the dependent variable is a dichotomous one and the explanatory variables are categorical as in the case of this study. All the analyses will be carried out using the appropriate Statistical Package for Social Science (SPSS).

Ethical Considerations

For this study, ethical permission was not required since the 2014 KDHS dataset, as part of the DHS program datasets, is already publicly available and used. Institutions that commissioned, funded or managed the 2014 KDHS were responsible for ensuring ethical considerations and procedures during data collection.

The DHS Program, ICF International, Kenya National Bureau of Statistics (KNBS), Ministry of Health (MOH) and the Kenya Medical Research Institute (KEMRI) and partners, as well as KEMRI Institutional Review Board (IRB), approved the 2014 KDHS survey in line with the U.S. Department of Health and Human Services regulations for the protection of human subjects. The data for this study can be accessed on https://dhsprogram.com/data/available-datasets.c

Results

Profile of the Study Population

Table 1 presents the profile of the study population. The majority of the respondents had at least primary education, lived in rural areas and about a half of them were from poor households. The majority of the women were residents of the expansive Rift Valley province and Nairobi had the least number of women. In addition, the majority of the respondents were Christians, currently married, and in the prime reproductive age (20-34 years).

Table 1: *Socio-Demographic Characteristics Of Women Who Had At Least One Birth In The Five Years Preceding The Survey*

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Characteristic	Number	Percentage (%)
Education		
None	2747	19.1
Primary	7530	52.3
Secondary	3064	21.3
Higher	1057	7.3
Type of place of residence		
Urban	4919	34.2
Rural	9479	65.8
Region of residence		
Coast	1805	12.5
North Eastern	916	6.4
Eastern	2172	15.1
Central	1131	7.9
Rift Valley	4625	32.1
Western	1341	9.3
Nyanza	2002	13.9
Nairobi	406	2.8
Wealth Index		
Poor	7362	51.1
Middle	2506	17.4
Rich	4530	31.5
Religion		
Catholic	2752	19.1
Protestants	9092	63.1
Muslims	2144	14.9
Other	384	2.7

Maternal age		
< 20	1550	10.8
20-34	10562	73.4
35+	2286	15.9
Marital Status		
Single	1120	7.8
Married	11,869	82.4
Formerly married	1409	9.8
Decision making		
Herself	1996	13.9
With partner	2270	15.9
Partner alone	1430	10.0
Other/Stated	8702	60.2
Total	14,398	100

Source: Primary Analysis of the Subset of 2014 KDHS data

Uptake of Maternal Services

Antenatal Care

During data collection, the respondents were asked questions on antenatal care, who the service provider was, the timing of their antenatal care visits, the number of the visits they made, and the place of delivery of their most recent birth/child. *Table 2* presents the results of the analysis of the responses to these questions. The results indicate that majority (94%) of the women sought antenatal care during their most recent pregnancy. Only 6.3% of them reported that they did not seek antenatal services from any health facility during their most recent pregnancy. These results are more or less the same as those obtained for the whole country in 201412.

The timing of antenatal care is important for the realization of the full benefits of antenatal care. Expectant mothers are advised to start the antenatal care visits as soon as they realized that they are pregnant. The results obtained regarding the timing of antenatal care indicate that, on average, women initiated antenatal visits 4.90 months into their pregnancy with a median of 5 months and a mode of 5 months. This means that, on average, women initiated antenatal care clinic visits during the second trimester of their pregnancy. Indeed, the results shown in *Table 2* indicate that the majority (67%) of the expectant mothers made their visit to antenatal care during the second trimester. Eighteen per cent of the women made the first antenatal visits at the recommended time i.e. during the first three months of the pregnancy. The results also show that 14% of the women made their first antenatal visit during the last trimester of their pregnancy.

Regarding the number of antenatal visits made, the results obtained indicate that, on average, the women made four visits with the median of four and a mode of three visits. Fifty-four per cent of the women made at least four antenatal visits. The World Health Organization recommends at least four antenatal

visits during a woman's pregnancy. Therefore, these results indicate 54 per cent of the women made the recommended number of antenatal visits. However, it is important to note that about 40 per cent of the women made less than 4 antenatal visits and 6.3% per cent of the women did not visit antenatal clinics at all *(Table 2).*

Delivery Care

As indicated earlier, proper medical attention and hygienic conditions during delivery are important for obtaining favourable birth outcomes for both the mother and the newborn baby. *Table 2* shows that 59 per cent of all the women delivered at a health facility, the majority (77%) of whom delivered in a public health facility. About 41 per cent of all the women reported delivering at home. Further analysis of the data found that 54% of the women who delivered at home were attended to by TBAs, 34% by relatives and friends, 10% delivered on their own, and only 2% were delivered by nurse /midwife.

Table 2: *Percentage of distribution of the women who had at least one live in the five years preceding the survey according their uptake of maternal health care services and by the selected socio-demographic variables: Kenya, KDHS 2014*

Maternal Health Care Services

Variable	Initiation of ante natal visits (in months of pregnancy)			Number of ante natal visits			Place of delivery		
	1-3	4-6	7-9	None	1-3	4+	Home or other	Public facility	Private facility
Education	**P < 0.000**			**P < 0.000**			**P < 0.000**		
None	16.3	67.3	40.8	19.7	39.4	40.8	76.1	20.3	3.6
Primary	16.8	68.3	51.9	4.1	44.1	51.9	41.8	47.2	11.0
Secondary	20.7	68.1	62.2	1.8	36.0	62.2	17.9	63.3	18.9
Higher	35.4	59.7	81.2	0.4	18.4	81.2	5.2	54.6	40.2
Place of residence	**P < 0.000**			**P < 0.000**			**P < 0.000**		
Urban	22.7	65.6	11.7	2.7	34.4	62.9	21.1	57.2	21.8
Rural	16.2	68.4	15.4	8.2	42.3	49.6	50.7	40.2	9.1
Region	**P < 0.000**			**P < 0.000**			**P < 0.000**		
Coast	16.1	68.5	15.4	3.4	36.2	60.3	44.2	47.9	7.9
N. Eastern	15.7	70.7	13.6	26.3	36.4	37.3	63.5	31.7	4.8
Eastern	16.8	69.0	14.1	5.2	41.2	53.6	40.3	42.0	17.7
Central	22.9	63.3	13.8	2.9	34.7	62.3	9.5	66.4	24.1
Rift Valley	16.7	67.2	16.1	7.7	42.7	49.7	49.5	38.8	11.7

Place of residence	**P < 0.000**			**P < 0.000**			**P < 0.000**		
Western	20.1	66.8	13.1	3.1	43.3	53.7	44.0	47.0	9.0
Nyanza	21.5	67.7	10.8	2.7	38.9	58.3	28.2	58.9	12.9
Nairobi	30.6	62.4	7.0	1.7	23.2	75.1	8.1	50.0	41.9
Wealth Index	**P < 0.000**			**P < 0.000**			**P < 0.000**		
Poorest	14.6	68.9	16.6	14.7	43.5	41.8	71.2	25.1	3.8
Poorer	16.1	66.9	17.0	3.7	45.5	50.7	44.0	47.1	8.6
Middle	17.2	68.4	14.4	2.8	4.1	56.2	32.7	54.3	13.0
Richer	19.6	68.6	11.8	2.3	36.0	61.7	17.7	63.2	19.1
Richest	28.9	63.1	8.0	1.1	25.9	73.0	40.6	58.6	33.8
Religion	**P < 0.000**			**P < 0.000**			**P < 0.000**		
Catholic	20.1	66.5	13.4	7.0	38.0	55.0	39.8	45.2	14.9
Protestants	18.9	67.5	13.6	3.8	40.1	56.1	35.5	49.8	14.7
Muslims	14.9	68.2	18.2	14.2	38.6	47.2	58.0	34,6	7.4
Other	13.1	66.0	19.1	16.4	44.5	39.1	69.3	24.7	6.0
Maternal age	**P < 0.000**			**P < 0.000**			**P < 0.000**		
< 20	20.1	66.5	13.4	6.6	43.5	49.9	35.5	53.7	10.8
20-34	18.9	67.5	13.6	5.8	38.8	55.4	39.3	46.7	14.0
35+	14.9	68.2	18.2	8.4	40.6	51.1	49.8	37.8	12.4
Marital Status	**P > 0.05**			**P < 0.000**			**P < 0.000**		
Single	17.3	68.7	14.0	5.4	39.0	55,5	38.6	47.2	14.2
Married	18.5	67.4	14.1	6.4	39.7	53.9	40.6	46,1	13.3
Formerly married	19.5	66.6	13.9	6.1	39.5	54.4	41.9	44.0	13.3
Total	18.5	67.4	14.1	6.3	39.6	54.1	40.6	46.0	13.4
No. of cases (N)	2471	9091	1928	908	5700	7790	5841	6625	1932

Source: *Primary Analysis of the Subset of 2014 KDHS data*

Differentials in the Uptake of Maternal Health Services

Use of Antenatal Service

Table 2 also presents the results of the univariate analysis on the differentials in the uptake of maternal health care services according to the study variables.

The results show that, there were statistically significant socio -economic and demographic differentials in the uptake of maternal care services. Women with at least secondary education, those residing in Nairobi, Central, and Nyanza region, and those coming from wealthy households were more likely to initiate antenatal visits during the first trimester of their pregnancy.

Similarly, young women were more likely to initiate antenatal visits early. There are no statistically significant differences in the timing of antenatal visits according to the women's marital status.

As in the case of antenatal visits, women with at least secondary education, those residing in Nairobi, Central, and Nyanza region, and those coming from wealthy households were more likely to make at least four antenatal visits during their pregnancy.

For instance, the percentage of women who made at least four antenatal visits rose from 41 per cent among those with no education to 81 per cent among those with at least secondary education.

Similarly, the percentage of women who made at least four antenatal visits rose from 42 among women belonging to poor households to 73 among women from rich households.

Similarly, urban women were slightly more likely to make the recommended four antenatal visits.

Delivery Care

The last column of Table 2 shows the results on the differentials in the type of place of delivery. As in the case of antenatal visits, more educated women, those belonging to wealthy households and those living in urban areas and women residing in Nairobi, Central, Nyanza were more likely to deliver in a health facility, particularly in a private facility. However, women in North Eastern, Rift Valley, and those aged at least 35 years were more likely to deliver at home. In addition, Muslim women and those belonging to non-mainstream faiths were more likely to deliver at home.

Results of Multivariate Analysis

The purpose of conducting multivariate analysis was to establish the explanatory variables with statistical significance, at the 95% level of significance, the net effect on the uptake of the selected maternal health care services.

The multivariate analysis had three dichotomous dependent variables;-

1. whether or not the woman initiated antenatal visits during the first trimester.
2. made at least four antenatal visits,
3. whether or not the woman delivered at a health facility.

Each of the explanatory variable had a reference category and a 95% confidence interval (CI) was calculated for each of the Odds ratios (OR) indicating the net effect of each of the explanatory variables. The results of the multivariate analysis are presented in *Table 3.*

Model 1 shows the results (ORs) on the timing of the antenatal visits, Model 2 on making at least 4 antenatal visits, and Model 3 on delivering in a health facility. [Table 3] ***Next page.....***

Table 3: *Logistic Analysis results [OR] of the Uptake of Maternal Health care Services: Kenya, KDHS 2014*

Variables	Model 1		Model 2		Model 3	
	Initiating ante natal visits during the first 1-3 months of pregnancy		At least 4 ante natal visits		Delivering at a health facility	
	EX(B) (OR	**95% CI for EX(B) (OR)**	**EX(B) (OR)**	**95% CI for EX(B) (OR)**	**EX(B) (OR)**	**95% CI for EX(B) (OR)**
Education						
None (Ref Cat.)	1.00.	Ref Cat.	1.00.	Ref Cat.	1.00	Ref Cat.
Primary	0.804	0.682 - .949	0.992	0.866 - 1.141	2.505***	2.175– 2.885
Secondary	0.967	0.800 – .169	1.152*	0.977 –1.359	4.983***	4.192 –5.922
Higher	1.798***	1.445 2.237	2.075***	1.647 –2.615	12.355***	8.941–7.072
Place of Residence						
Urban (Ref Cat.)	1.00	1.00	1.00	1.00	1.00	Ref Cat.
Rural	0.851*	0.762 0.949	0.934	0.848 –1.032	0.578***	0.539 – .663
Region						
Nairobi (Ref Cat.)	1.00.	Ref Cat.	1.00.	Ref Cat.	1.00.	Ref Cat.
Coast	0.758*	0.580 – .992	1.142	0.842 - 1.542	0.882	0.582 – .338
N. Eastern	0.629*	0.440 0.898	0.599**	0.418 – 0.83	1.095	0.956 –2.418
Central	0.927	0.711 – .208	0.813*	0.598 –1.106	3.090***	1.963 – 4.866
Rift Valley	0.693**	0.544 – .883	0.78**	0.511 –0.900	0.570***	0.382 0.782
Western	0.960	0.733 1.256	0.620***	0.451 –0.827	0.518**	0.343 0.782
Nyanza	1.026	0.795 -1.324	0.734	0.547 –0.986	1.113	0.739 –1.677
Wealth Index						
Poorest (Ref Cat.)	1.00.	Ref Cat.	1.00.	Ref Cat.	1.00	Ref Cat.
Poorer	1.141*	0.981 -1.328	1.205**	1.065 –1.361	1.713***	1.526 –1.923
Middle	1.182*	1.010 –1.384	1.389***	1.218 – 1.583	2.356***	2.078 2.670
Richer	1.260**	1.070 1.484	1.490***	1.304 - 1.728	4.121***	3.556 –4.775
Richest	1.774***	1.479 2.128	1.773***	1.501 –2.105	7.188***	5.845 –.841

Antenatal Visits

As shown in *Model 1*, education, type, place of residence, region of residence, household wealth index, religion, and maternal age have each a statistically significant net effect on the initiation of antenatal visits during the first trimester.

For instance, comparatively women with no education and women with higher education were 1.8 more likely to initiate antenatal visits during the first trimester. Rural women were less likely to initiate antenatal visits early compared to their urban counterparts. Similarly, women belonging to wealthy households (middle and rich) were significantly more likely to initiate antenatal visits earlier than the women belonging to poor households. Relatively, women belonging to wealthy households were 1.77 times more likely to initiate antenatal visits early.

Model 2 shows the results of a woman making at least four antenatal visits. The results indicated that education, region of residence, household wealth index, and maternal are statistically strong predictors of a woman making at least four antenatal visits. Women with higher education, those residing in Nairobi, those belonging to wealthy households and older women were more likely to make at least four antenatal visits. For instance, compared to women belonging to the poorest households, women belonging to wealthy households were 1.80 times more likely to make at least four antenatal visits.

We also investigated the effect of the timing of initiation of antenatal visits on the number of antenatal visits made. The results obtained show that women who initiated antenatal visits after the first trimester were significantly less likely to make the recommended four antenatal visits. For instance, women who initiated antenatal visits during the third trimester were 99 per cent less likely to make at least four antenatal visits. These results indicate that women who initiate antenatal visits early in their pregnancy are more likely to make the recommended number of visits than the women who initiate the visits late in their pregnancy.

Place of Delivery

It is evident in Model 3 that out of the 9 explanatory variables included in the analysis only seven variables are found to have statistically significant net effects on whether or not a woman delivered in a health facility. These are education, type of place (rural-urban) of residence, region of residence, household wealth index, religion, maternal age, and whether or not a woman made at least 4 antenatal visits. The results show that the likelihood of delivering in a health facility increased with the level of education. For instance, comparing women with no education, women with higher education were almost 12 times more likely to deliver in a health facility. Rural women were to be significantly less likely, to deliver in a health facility compared with their urban counterparts. Rural women were 0.6 times less likely to deliver in a health facility.

Women residing in the Central region were significantly 3 times more likely to deliver in a health facility compared to women in Nairobi. Women in Rift Valley and the Western regions were significantly less likely to deliver in a health facility compared to women in Nairobi. Women in Coast, North Eastern, Eastern and Nyanza, though less likely to deliver a health facility, the differences in a multivariate analysis were not statistically significant at the 95% level of significance. The results show that young women were significantly more likely to deliver in a health facility. Similarly, women who had a least four antenatal visits were significantly more likely to deliver in a health facility compared to those who had less than four antenatal visits; they were 1.51 times more likely to deliver in a health facility.

Discussion

This study sought to establish how the various socioeconomic and demographic factors are associated with the uptake of maternal health care services in Kenya. The study used the Andersen behavioural model as a guide. The study has established that the uptake of antenatal care services is near-universal in the country: 94 per cent of the women reported partaking in antenatal care services during their most recent pregnancy. However, most of the women did not initiate antenatal visits during the first trimester as recommended but later during their pregnancy. The study found that only 18 per cent of the women-initiated antenatal visits during the first trimester of their pregnancy as recommended, 67 per cent initiated the visits during the second trimester and 14 per cent did so during the third trimester. The study showed that a majority of the pregnant women attended late for the first antenatal care.

Slightly over half (54%) of the women made at least

4 antenatal visits as recommended. However, 46 per cent of the women made less than 4 antenatal visits. These results imply that the majority of the women in the country do not get the full benefits of antenatal care since they do not initiate the visits early enough in their pregnancy and also many of them do not make the recommended minimum number of at least four antenatal visits.

The results obtained indicated that although 94% of all the women sought antenatal care during the pregnancy, only 59 % of them were delivered in health facilities. The rest were delivered at home with the majority of them being attended to by traditional birth attendants. These results imply that a sizeable proportion (41%) of the expectant women in the country do not receive skilled attendance during their delivery since they deliver their babies outside the health facilities, mostly at home. These results are comparable with those previously found in Kenya [12] [16-24] For instance, in Ghana, a study found that 67.9% of the women attended antenatal care at least four times before delivery, yet 61.9% of them delivered in a health facility with a skilled attendant [24].

In the multivariate analysis, we found statistically significant socioeconomic and demographic differentials in the uptake of maternal care services among women in the country. Except for the marital status variable, all the socioeconomic and demographic factors included in the study were each found to be closely associated with the early initiation of antenatal visits, making at least four antenatal visits and delivering in a health facility. The socio- economic and demographic differentials in the uptake of maternal care services remained statistically significant even in the multivariate analysis.

In terms of variables, education (predisposing), household wealth index, type of place of residence, region of residence, maternal age and religion (enabling variables) each had a statistically significant net effect on the initiation of antenatal visits during the first trimester and also on making at least 4 antenatal visits. For example, in the multivariate analysis, it was found that when comparing with women's education, women with higher education were twice more likely to make at least four antenatal visits than those with no education. Similarly, women belonging to rich households were 1.77 times more likely to initiate antenatal visits early and also make at least four antenatal visits. Furthermore, the results of multivariate analysis showed that women who initiated antenatal visits after the first trimester were significantly less likely to make the recommended four antenatal visits. For instance, women who initiated antenatal visits during the third trimester were 99 per cent less likely to make at least four antenatal visits compared to women who initiated antenatal visits during the first trimester.

These results are similar to the results found in other studies conducted elsewhere [25-28] Again, as in the case of uptake of antenatal services, the results of the multivariate analysis indicate that both predisposing and enabling variables influence whether or not a woman delivers in a health facility. The multivariate analysis results indicate that the woman's age, education (predisposing), household wealth index, type of place (rural-urban) of residence, region of residence (enabling) and whether or not a woman made at least four antenatal visits had each a statistically significant net effect on whether or not a woman delivers in a health facility.

Older women were found to be significantly less likely to deliver in a health facility compared to young women. As expected, educated women and those in well-to- do households were significantly more likely to deliver in a health facility. The results show that compared with women with no education, women with higher education were 12 times more likely to deliver in a health facility. Urban women were more likely, compared to their rural counterparts, to deliver in a health facility. Rural women were about 0.6 times less likely to deliver in a health facility. These results are not unique. Studies carried out in Kenya and elsewhere in sub-Saharan Africa have found similar results [16-20, 29-31].

This study also found statistically significant regional variation in the uptake of delivery services. Women residents in Central province were significantly more likely to deliver in a health facility compared to women in Nairobi. Women in Rift Valley and Western were significantly less likely to deliver in a health facility compared to women in Nairobi. Although the women in Coast, Eastern and Nyanza were less likely to deliver in a health facility compared to women in Nairobi, the differences were not statistically significant in the multivariate analysis.

Furthermore, the study found that women who had at least four antenatal visits were significantly more likely to deliver in a health facility compared to those

who had less than four antenatal visits; they were 1.5 times more likely to deliver in a health facility. Thus, the number of antenatal visits made is a statistically strong predictor of delivery in a health facility. These results are yet another empirical evidence of the influence of the number of antenatal visits on the chances of delivering at a health facility. Similar results were found in some other studies in Kenya [31-33].

Study Limitations

Some of the recent studies in Kenya indicate that distance to nearest health facilities, travel costs and medical costs are some of the barriers to uptake of maternal health care, particularly among the poor and some rural women [31-33]. The effects of these factors were not examined in this study due to a lack of data. The free maternity policy that the Kenya Government has been implementing since 2013 is aimed at addressing the barriers relating to only the direct cost of maternal care at the health facility but not barriers such as transport cost and the opportunity cost of accessing health care. A recent study shows that the policy has led to an increase in the uptake of maternal health services in the county referral hospitals [34].

This study was cross-sectional and therefore the data cannot show causality other than association. Furthermore, the study does not include variables denoting the service environment such as the quality of care, availability of amenities such as water supply and meals for in -patients, and the reasons for use or non-use of maternal services by the sampled women.

Conclusion

The study has established that the uptake of antenatal services is universal in the country: 97 per cent of the women reported partaking in antenatal care services during their most recent pregnancy. However, the majority of the women do not start antenatal visits during the first trimester of their pregnancy as recommended. The study showed that the majority of the pregnant women attended late for first antenatal care. Therefore, providing health education on the timing of antenatal care is important.

Similarly, a sizeable percentage of the women do not make at least four antenatal visits as recommended. There is therefore the need for providing education on the importance of making at least four antenatal care visits as recommended by WHO. About half of the expectant women receive skilled attendance at delivery and about the same percentage deliver in health facilities. These results show a large percentage of expectant women do not receive skilled attendance during delivery since they deliver at home under the care of traditional birth attendants.

Thus, there is a need to educate all expectant mothers on the importance of delivering their babies in health facilities and to remove any barriers that might be preventing mothers from delivering in health facilities. We, therefore, recommend that concerted efforts be made by all stakeholders to enable all expectant women in the country to initiate antenatal visits early in the pregnancy, to make at least four antenatal visits and to deliver their babies in a health facility. Since the provision of health care services in the country has been devolved to the counties, the county governments should spearhead these efforts. These actions may entail mounting public health and communication campaigns using various channels and approaches to educate mothers on the benefits of early initiation of antenatal visits, making at least four antenatal visits and delivery in a health facility and also removing any barriers that might be preventing some women from utilizing maternal health services.

At the same time, efforts should be made to improve the conditions of the public maternity facilities and services in the whole country and especially in the Rift Valley and Western region. Furthermore, the free maternity programme should be fully implemented across the country. The full implementation of the programme and the timely reimbursements of the funds to the health facilities will enable the facilities to have the requisite medical supplies and equipment which are essential for them to function optimally and offer quality services.

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Author contribution

The author conceptualized, carried out the study and prepared the paper

Conflict of Interest

There is no conflict of interest

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