International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Explaining Urban-Rural Differences in Utilization of Skilled Delivery Care Services in Kenya

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Received: 06/07/2016 *Revised: 21/07/2016* *Accepted: 30/07/2016*

ABSTRACT

Kenya's maternal mortality ratio remains high. A key intervention in reducing maternal mortality is increased use of skilled delivery care services. While good progress has been made in promoting skilled delivery care services in Kenya, a huge gap in utilization remain between urban and rural areas. This study sought to quantify the urban -rural gap in utilization of skilled delivery care services and identify the determinants of this gap. Data used was drawn from the 2014 Kenya Demographic and Health Survey. First, a probit model of determinants of skilled delivery care services was estimated for the full sample, rural sample and urban sample. The results indicated that education, wealth, use of antenatal care services and age of the woman were some of the factors associated with increased probability of using skilled delivery care services. Secondly, Fairlie decomposition technique was used to quantify differences in predicted probability of use of skilled delivery care services between rural and urban areas and to identify individual characteristics that contribute to this gap. Rural utilization probability was estimated at 53% and urban probability at 81%, a gap of 28%. Differences in education, wealth and use of antenatal care services between urban and rural areas explained 71% of this gap. Policies that promote secondary and tertiary education, increased use of antenatal care services and economic empowerment of rural women should be promoted to reduce urban- rural gap in utilization of skilled delivery care services.

Key words: Skilled, delivery, care, rural, urban, decomposition.

INTRODUCTION

Reducing maternal mortality has long been and continues to be a global health agenda. In 2000, countries through the United Nations Millennium Declaration set out to reduce their maternal mortality ratio (MMR) by 75 percent between 1990 and 2015. Remarkable progress has been made in achieving this target, although the actual decline in MMR of 44 percent fell short of what was targeted. [1] Developing countries bear almost all the burden of maternal mortality with 99 percent of maternal deaths occurring in these countries. Maternal deaths are also heavily concentrated in Sub Saharan African (SSA) countries which account for 66 percent of all maternal deaths. Kenya is one of the 18 countries in SSA that were estimated to have very high MMR in 2015. [1] Like many other SSA countries, Kenya did not meet the MDG target on MMR. Its maternal mortality ratio declined from 590 in 1998 to 362 in 2014, which implied a 39 percent reduction in the MMR. [2] WHO estimates suggest even a smaller decline in maternal mortality ratio for Kenya of 26 percent, from 687 in 1990 to 510 in 2015. [1] Figure 1 shows that while Kenya's MMR has been declining overtime, it still lies far above the average for developed and developing countries.

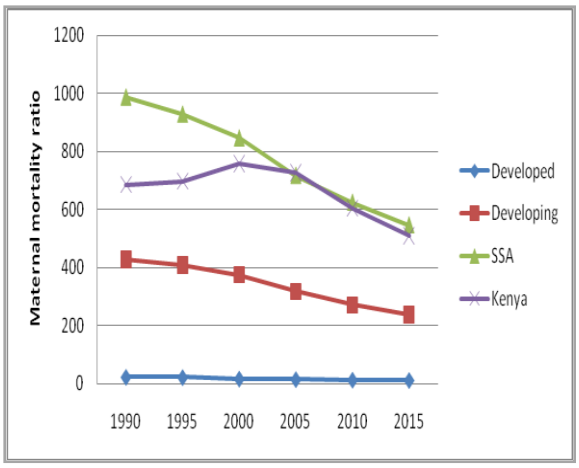

Figure 1: Trends in maternal mortality ratio
Source: WHO, 2015

A new transformation agenda for maternal health was laid down in the Sustainable Development Goals (SDG) which now targets that by 2030 global MMR should be reduced to less than 70 per 1,000 live births. Most maternal deaths can be avoided if women had access to skilled care during pregnancy, childbirth and postpartum period. [3] Every day about 800 women die from causes that can be prevented during pregnancy and child birth and almost 90 percent of these preventable deaths occur in developing countries. [3] It is estimated that about 16 to 33 percent of maternal death can be avoided through use of skilled delivery care at birth to prevent obstetric hemorrhage, obstructed labor, eclampsia and puerperal sepsis. [4] In Sub-Saharan Africa, haemorrhage, hypertension, and sepsis were said to be the leading causes of maternal deaths accounting for 25, 16 and 10 percent of deaths respectively. [5]

Skilled delivery care also referred to skilled birth assistance refers to care a woman receives during labor, childbirth and early postpartum from a skilled attendant. [6] A skilled attendant is accredited health personnel with midwifery skills (such as doctors, nurses and midwifes) with capacity to identify complications and manage or make appropriate referrals during pregnancy, childbirth and early post partum period. [6]

Kenya has made good progress in increasing the proportion of women using skilled delivery care. In 1993, 45 percent of women reported using skilled delivery care, increasing to 62 percent in 2014. [3,7] The largest increase was experienced between 2008/9 and 2014. Despite these improvements, rural-urban disparities in the use of skilled delivery care have persisted. While 80 percent of women in urban area reported using skilled delivery care services in 1993, only 40 percent of women in rural areas reported using these services. Similarly, in 2014, while 82 percent of women in urban areas utilized skilled delivery care services, only 52 percent of women in rural areas used these services. As shown in Figure 2, the percentage of rural women utilizing skilled delivery care services has almost always remained half that of urban women using skilled delivery care services over time. This means if the newly set targets on maternal health envisioned in the SDG are to be met, there is need to promote use of skilled delivery care in rural areas to match if not bypass that of urban areas.

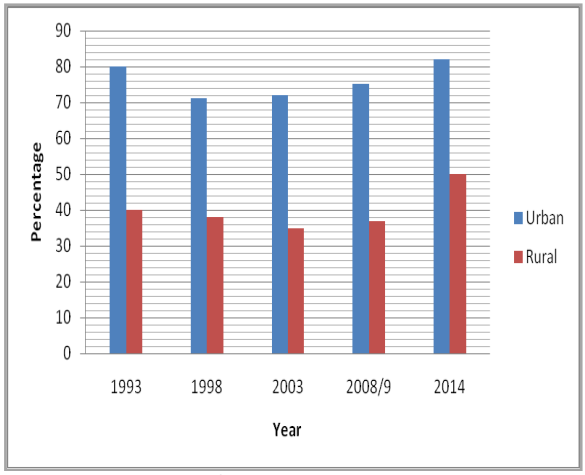

Figure 2: Percentage of women using skilled delivery care by area of residence

Many studies in Africa have investigated the determinants of various aspects of maternal health care utilization. [8-21] A gap however exists in quantifying urban-rural gap in utilization of maternal health care services and identifying the factors that explain the gap. This paper sought to investigate urban-rural differences in utilization of skilled delivery care services in Kenya. Particularly, this study had two objectives: The first was to identify

the determinants of skilled delivery care utilization in Kenya. The second was to decompose the urban-rural gap in utilization of skilled delivery care services and to identify factors that explain this gap. Findings in this study will help policy makers design appropriate policies to promote use of skilled delivery care services in rural areas hence narrow the gap in utilization between urban and rural areas.

METHODOLOGY

Theoretical model

A mother is assumed to maximize the following utility function: [22,23]

$$U = U(X, H)$$

Where H is health of a child and X refers to goods and services consumed by the mother that have no effect on the health of a child. Health can be treated as a consumption good that makes people feel better and hence enters directly into the utility function. [24] Health is therefore not inactively purchased from the market but is produced by combination of time and market purchased inputs such as skilled delivery care. The child health production function can therefore be specified as follows;

$$H = F(Z, Y, \mu)$$

Child health is a function of market purchased inputs, Z, such as skilled delivery care, other factors that affect child health, Y and unobserved child's biological endowments, μ.

A mother maximizes her utility function subject to the child health production function and budget constraint given as:

$$I = P_X X + P_Y Y + P_Z Z$$

Where P_X the price of is X, P_Z is the price of Z and P_Y is the price of Y and I is mother's income. Demand functions for X, Y and Z can be obtained by setting up a lagrangian function and solving for first order conditions.

$$X = D_X(P_X, P_Y, P_M, I, \mu)$$
$$M = D_M(P_X, P_Y, P_M, I, \mu)$$
$$Y = D_Y(P_X, P_Y, P_M, I, \mu)$$

Demand for skilled delivery care therefore depends on own price, price of health related goods, price of health neutral goods and income.

Conceptual framework

Anderson and Newman, 1973 developed a framework for analyzing health care utilization. [25] He identified three sets of factors that influence an individual's decision to seek health care. The first set is the predisposing factors that include: age, sex, marital status, education, occupation, family size, ethnicity and religion. The second set of factors refer to factors that have to do with the logistics of obtaining health care such as income, health insurance, prices of services, area of residence and general service availability factors. The final set refers to how illness is perceived and evaluated. This involves how people perceive illness generally, their level of tolerance to symptoms of illness and associated pain and their judgment on whether or not to seek health care given their evaluation of the illness

Model specification

The probability of an individual using or not using skilled delivery care was assumed to be determined by an underlying latent variable which was linearly related to the set of explanatory variables as follows:

$$y_i^* = \mathbf{x\beta} + \varepsilon$$

The latent variable was linked to the binary variable as,

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

A binary response model was then by transforming $\mathbf{x\beta}$ into a probability such that;

$$prob(y_i = 1) = F(\mathbf{x\beta})$$

By choosing F to be the standard normal, we get the probit model given by the cumulative density function of the standard normal distribution

$$prob(y_i = 1) = \phi(\mathbf{x\beta})$$

Probit regressions were estimated for the rural sample, urban sample and pooled sample.

In order to identify and quantify how measurable factors contribute to differences between groups, Blinder-Oaxaca decomposition technique attributed to Blinder [26] and Oaxaca [27] has been widely used in literature. This study sought to investigate the extent to which differences in observable individual characteristics between urban and rural areas explained differences in utilization of skilled delivery care between urban and rural areas. Since the outcome variable was binary the Blinder-Oaxaca decomposition technique was problematic to apply since the technique required the coefficient estimates for the dependent variable from linear regressions.

Fairlie, 1993 suggested an approach that can be used to decompose when the dependent variable is binary, such as a probit model. [28] The decomposition for equation (4) was given as

$$y_U^* - y_R^* = \phi(\mathbf{x_U}\hat{\boldsymbol{\beta}}_U) - \phi(\mathbf{x_R}\hat{\boldsymbol{\beta}}_\mathbf{R})$$

Where, y_U^* and y_R^* were the predicted utilization probabilities for urban and rural areas respectively and x_U and x_R were a vector of individual characteristics of urban and rural women respectively.

The urban-rural gap in utilization of skilled delivery care could be decomposed into two parts. The first part was due to differences between rural and urban areas in the distribution of individual characteristics. The second part was urban-rural differences in the distribution of factors that determine utilization of skilled delivery care services. This difference could include both urban - rural differences in importance of certain factors in determining utilization as well as urban-rural differences that cannot be explained due to some unobservable factors that have not been included. Equation (5) was decomposed into:

$$y_U^* - y_R^* = \phi(\mathbf{x_U}\hat{\boldsymbol{\beta}}_U) - \phi(\mathbf{x_R}\hat{\boldsymbol{\beta}}_\mathbf{R})$$
$$= [\phi(\mathbf{x_U}\hat{\boldsymbol{\beta}}_U) - \phi(\mathbf{x}_R\hat{\boldsymbol{\beta}}_U)] + [\phi(\mathbf{x}_R\hat{\boldsymbol{\beta}}_U) - \phi(\mathbf{x}_R\hat{\boldsymbol{\beta}}_R)$$

Data sources and variable definitions

This study used data from the 2014 Kenya Demographic and Health Survey (KDHS). This is a nationally representative survey that is carried out after every five years by the Kenya National Bureau of Statistics. The survey mainly collects information on demographic and health indicators. A total of 40,300 households were interviewed. The survey collected information on about 31,079 women aged between 15 and 49 years. Focus was on sample of women who had a child in the previous five years preceding the survey. The survey had 14,949 such women.

The dependent variable in this study was a dummy variable indicating utilization of skilled delivery care services. It took value 1 if a woman reported to have used skilled delivery care services and 0 otherwise. The explanatory variables were: education level, age, wealth index, employment status, area of residence and marital status. Education level was measured as a dummy variable. Five dummy variables were created: No education dummy; primary education dummy; secondary education dummy and tertiary education dummy with no education dummy acting as the reference category. Age was measured in years. Wealth index was measured in quintile with 1 indicating poorest, 2 indicating poorer, 3 indicating middle, 4 indicating richer and 5 indicating richest. Area of residence was measured as a dummy variable taking value 1 if a woman resided in a rural area and 0 otherwise. Marital status was measured as a dummy which took value 1 if a woman was married and 0 if otherwise. Employment status was measured as a dummy variable that took value 1 if a woman was employed and 0 if otherwise.

RESULTS

The descriptive statistics are presented in Table 1 below. There was wide disparity in utilization of skilled delivery care services by area of residence. While 81% of urban women reported using skilled delivery care services only about half (53%) of rural women reported using skilled delivery care services. Overall 62% of the

women reported using skilled delivery care services. Disparities were also observed in educational attainment between rural and urban women. While majority of rural women had lower levels of education (no education and primary education levels), majority of urban women had higher levels of education (secondary and tertiary education levels). The proportion of urban and rural women reporting to have no education was 11% and 23% respectively while the proportion of urban and rural women reporting to have tertiary education was 14% and 4% respectively. Urban households were on average richer than their rural counterparts. The average age of women in this sample was 29 years. While many women (93%) reported to have made at least one antenatal visit, only about half (54%) made four or more antenatal visits as recommended by the World Health Organization (WHO). [29] A higher proportion of urban women (63%) than rural women (50%) reported to have made four or more antenatal visits. Majority of the women (82%) were married and employed (61%). Also the sample was majorly (65%) rural.

Table 1: Descriptive statistics by area of residence

Variables	Full sample		Urban sample		Rural sample	
	Mean	SD	Mean	SD	Mean	SD
Use of skilled delivery care	0.62	0.39	0.81	0.39	0.53	0.50
No education	0.19	0.39	0.11	0.31	0.23	0.42
Primary education	0.52	0.50	0.46	0.50	0.56	0.50
Secondary education	0.21	0.41	0.29	0.45	0.17	0.38
Tertiary education	0.07	0.26	0.14	0.35	0.04	0.20
Wealth index	2.66	1.44	3.64	1.41	2.15	1.17
Married dummy (reference not married)	0.82	0.38	0.81	0.39	0.83	0.37
Rural dummy	0.65	0.48				
Age	29	6.80	28	6.32	29	7.02
At least 1 antenatal visit dummy	0.93	0.25	0.97	0.17	0.91	0.28
Four or more antenatal visits dummy	0.54	0.50	0.63	0.48	0.50	0.50
Employment dummy	0.61	0.49	0.62	0.48	0.60	0.49
Sample size	14,949		5164(35 %)		9786(65%)	

Table 2 presents results on the determinants of skilled delivery care services (average marginal effects). Both the full sample results as well as the disaggregated results by area of residence are presented. A woman's level of education significantly affected the probability of seeking skilled delivery care services. In the full sample and the rural sample models, primary, secondary and tertiary education significantly and positively influenced the probability of using skilled delivery care services. In the urban sample however, only secondary and tertiary education significantly influenced the probability of skilled delivery care utilization. Wealth index was also significantly and positively associated with probability of using skilled delivery care services in all the three models. Age was significant but negatively associated with probability of skilled delivery care use. Employment status was insignificant though was positively associated with use of skilled delivery care services. There was also a significant positive association between use of antenatal care services and probability of utilizing skilled delivery care services. The coefficient of marital status was positive and significant in the full sample and urban model but is insignificant and negative in the rural sample model.

Fairlie decomposition technique was used to decompose the gap in utilization of skilled delivery care services between urban and rural areas. The approach computed differences in predicted probabilities of the dependent variable between urban and rural groups and then quantified the differences in individual characteristics between urban and rural areas that contributed to this gap. The explanatory variables in the decomposition were limited to education, wealth index and antenatal care utilization. The results are presented in Table 3 based on urban coefficients.

Table 2: Determinants of skilled delivery care services, Z statistic in brackets

Variables	Probit estimates (average marginal effects)		
	Full sample	Rural sample	Urban sample
Education level (No education is reference)			
Primary education	0.136	0.195	0.02
	[10.050]	[10.810]	[0.880]
Secondary education	0.249	0.342	0.09
	[14.441]	[14.273]	[3.565]
Tertiary education	0.354	0.473	0.177
	[11.121]	[9.401]	[4.791]
Wealth index	0.081	0.081	0.067
	[19.332]	[12.615]	[13.740]
Age	-0.006	-0.007	-0.004
	[-7.718]	[-7.110]	[-3.107]
Rural dummy	-0.078		
	[-6.642]		
Employed status (1 if employed)	0.001	0.02	-0.022
	[0.134]	[1.395]	[-1.386]
Antenatal visit (1 if made at least 1 visit)	0.216	0.214	0.2
	[8.849]	[7.097]	[4.654]
Number of antenatal visits(1 if 4 or more visits)	0.077	0.079	0.075
	[7.782]	[6.116]	[5.153]
Marital status (1 if married)	0.022	-0.002	0.059
	[1.689]	[-0.102]	[3.376]
Observations	7,138	4,640	2,498

Table 3: Urban-rural skilled delivery care utilization gap

Variables	Urban coefficients
Primary education	0.027
	[15.03]
Secondary education	-0.05
	[-21.74]
Tertiary education	-0.043
	[-18.17]
Wealth index	-0.113
	[-18.69]
Antenatal visit (1 if made at least 1 visit)	-0.01
	[-13.33]
Number of antenatal visits(1 if 4 or more visits)	-0.012
	[-9.06]
Total explained	0.19994
Gap in probability (G=1-G=0)	0.28415
Probability (G=1)	0.80998
Probability (G=0)	0.52582

DISCUSSION

Probit results

Women's education increased the probability of using skilled delivery care services. The effect of education on probability of seeking delivery care increased with level of education. Compared to women with no formal education, women with primary and tertiary education were 14 and 35 percentage points respectively more likely to seek skilled delivery care services. The education effects on probability of seeking skilled delivery care services were much stronger for rural women than urban women. A woman with tertiary education in rural areas was 47 percentage points more likely to seek skilled delivery care services compared to a woman in the rural area with no formal education. In urban area however, a woman with tertiary education was only 18 percentage points more likely to seek skilled delivery care services compared to a women in the urban area with no formal education. The positive effect of education on probability of seeking skilled delivery care services may be because education is thought to make women more knowledgeable and to be better able to appreciate value of modern medicine. Previous studies support this finding of positive significant effects of education on probability of seeking skilled delivery care services. [11,19,20,30]

Women from wealthier households were more likely to seek skilled delivery care services than those from poorer households. A woman from a wealthy household was 8 percentage points more likely to seek skilled delivery care services than that from poorer households. Wealth played a slightly bigger role in promoting use of skilled delivery care services in rural areas than in urban areas. The positive effect of wealth on probability of seeking skilled delivery care services may be because wealth enables women to meet the direct and indirect costs associated with seeking the services. Wealth was also found to significantly influence the probability of

seeking skilled delivery care services in Ethiopia. [11]

Increase in age reduced the probability of a woman seeking skilled delivery care services. Older women were less likely to seek skilled delivery care services compared to their younger counterparts. One year increase in age reduced the likelihood of seeking skilled delivery care services by 0.6 percentage points. This may be because older women may feel more confident due to experience from previous child births. Similarly, older women may be able to have a say in decision making compared to their younger counterparts. In previous studies older women were found to be less likely to seek skilled delivery care services. [30] Other previous studies found no association between maternal age and probability of seeking skilled delivery care services. [11]

Use of antenatal care services during pregnancy was significantly associated with increased probability of using skilled delivery care services during child birth. Women who made at least 1 antenatal visit were 21 percentage points more likely to seek skilled delivery care services compared to those who never initiated antenatal care services. Even after controlling for initiation of antenatal care services, women who made 4 or more antenatal visits were more likely to seek skilled delivery care services compared to those who did not. This may be because skilled delivery care services can be promoted during antenatal visits. Women can be educated on importance of such services. Previous studies also find a significantly positive association between use of antenatal care services and probability of using skilled delivery care services. [11,19,20]

Rural women were less likely to seek skilled delivery care services compared to their urban counterparts even after controlling for education and wealth. Rural women were 8 percentage points less likely to use skilled delivery care services compared to their urban counterparts. This could be picking out factors that have not been controlled for in this study such as distance. Rural women are likely to live further away from health facilities compared to their urban counterparts. Studies have related long distance to reduced use of maternal health care services. [19,31]

Decomposition results

Urban women had a higher skilled delivery care utilization probability of 0.81 compared to the rural one of 0.53. The gap in predicted probability of utilizing skilled delivery care services between urban and rural areas was 0.28. Of this gap, 0.20 could be explained by differences in education, wealth and use of antenatal care services between urban and rural areas. This meant that 71% of the gap in utilization of skilled delivery care services between urban and rural areas could be explained by differences in education, wealth and use of antenatal care between the two areas. The results further show that secondary education, tertiary education, wealth and use of antenatal care services reduced the gap in utilization of skilled delivery care services while primary education increased the gap in utilization of skilled delivery care services.

CONCLUSION

This study sought to quantify the gap in utilization of skilled delivery care services between rural and urban areas and to determine the extent to which differences in individual characteristics between rural and urban areas explain the gap. Data used was drawn from the 2014 Kenya Demographic and Health Survey. Probit models were first estimated for the full sample, rural sample and urban sample. The results revealed that education, wealth index, use of antenatal care services and maternal age were significant determinants of use of skilled delivery care services. The effects of education and wealth on utilization were higher for urban women than rural ones. Decompositions were done using the Fairlie approach. Total gap in probability of using skilled delivery care services was estimated at 0.28. Of this 71

percent was explained by differences in education, wealth and use of antenatal care services between urban and rural areas. Secondary and tertiary education, wealth and use antenatal care services increased the gap in utilization of skilled delivery care services while primary education increased the gap.

The decomposition results suggested that secondary education and tertiary education reduced the skilled delivery care utilization gap while primary education increases the gap. There is therefore need for the government to promote female education at secondary and tertiary level. Direct provision of bursaries to girls is one way of promoting girl education. Sanitary facilities in schools also need to be improved and be well managed. There is need for awareness creation on importance of girl child education. This is to encourage parents and guardians to send girls to school and to motivate girls themselves to pursue higher education. Policies to discourage teenage pregnancies and early marriages that curtail girl education should also be pursued.

Differences in wealth between urban and rural women also explained the gap in utilization of skilled delivery care services between urban and rural areas. Empowering rural women economically will reduce the gap in utilization. The government should strengthen the women enterprise fund especially in the rural areas. Constraints in accessing credit should also be relaxed. Rural women should also be encouraged to attend antenatal clinics. This is because use of antenatal services increases probability of using skilled delivery care services. Policies that promote use of antenatal care services in rural areas should be perceived. One way to promote use of antenatal care services is reducing distance to health facilities. [31]

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How to cite this article: Machio PM. Explaining urban-rural differences in utilization of skilled delivery care services in Kenya. Int J Health Sci Res. 2016; 6(8):282-290.

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