



Original Article

Differential Effects of Household Characteristics on Uptake of Skilled Birth Attendance among Women of Reproductive Age in Western Kenya

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Maternal health remains a challenge in developing countries. The number of women dying every year from maternal-related causes has remained high in developing countries despite various efforts to bring them down. Such deaths occur due to complications during pregnancy, childbirth and the postpartum period. Approximately 16–33% of maternal deaths can be averted if supervised by skilled professionals. WHO describes skilled birth attendance (SBA) as skilled care at birth. Great Lakes University of Kisumu (GLUK) supported the strengthening of Community Health Strategy implementation (CHS) in the Western region of Kenya for a period of five years aiming at reducing poor reproductive health indicators among young people and women. The overall aim of this study was to determine the contribution of CHS implementation to maternal and child health, specifically on uptake of SBA. This was an embedded study in a larger study. It was an analytical study utilizing secondary quantitative data drawn from a descriptive cross-sectional study done during the period of GLUK's intervention. The main objective of this study therefore, was to establish the differential effects of household characteristics on the uptake of SBA among women of reproductive age in the Western region of Kenya. Descriptive statistics were used to determine the uptake level of SBA. Cross-tabulations were done to determine the association between household characteristics and uptake of SBA, where Chi-square was used to test for significance of association at a 5% confidence level. Logistic regression analysis was done to test the strength of association between the variables of interest. Analysis was done using STATA version 14. Findings showed that uptake of SBA was 70%. Trend analysis across ages

of the U5-year-old children showed a steady annual increase of 3% in the uptake of SBA over the five-year period from 69% to 77%. Results from Chi-square tests showed that four out of seven Socio-demographic and economic household characteristics had a significant influence on the uptake of SBA (Housing type-P-value=0.000); Age of the Household head-P-value=0.002); Disability-P-value 0.004) and Availability of staple food -P-value=0.000). Gender, education level of the Household head and presence of a latrine had no association. Logistic regression analysis showed that out of the 4 variables with association, only 2 (housing type-P-value= 0.000 and availability of staple food-P-value=0.000) showed significant strength of association.

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INTRODUCTION

Skilled birth attendance (SBA) is a term used to describe skilled care at birth, attended by professionally trained and skilled personnel/attendants (midwife, nurse, or doctor) (WHO, 2008). Skilled and competent care provided to women before, during and after childbirth by skilled health personnel is critical in saving women and newborn lives (WHO, 2014). To ensure optimal pregnancy outcomes, all women and babies need access to appropriate maternity care in pregnancy, childbirth, and after delivery, including skilled delivery and provision of basic and emergency obstetric care for women with complications during pregnancy, childbirth, or postpartum period (WHO 2009).

WHO recommends skilled care at every birth to reduce the global burden of maternal deaths, stillbirths, and newborn deaths (WHO 2015a). Skilled attendance is a term used to describe skilled care at birth. The type of health workers that provide such care varies widely between countries. Generally, a skilled birth attendant is an accredited health professional such as a midwife, doctor, or nurse who has been educated and trained to proficiency in the skills needed to manage women during normal (uncomplicated) childbirth and the immediate postnatal period as well as in the identification, management, or referral of complications in women and newborn (WHO, 2018). They also monitor the pregnancy, develop birth and emergency plans with women and their families and advise women on health, lifestyle, and

nutrition during pregnancy. They provide such services at health facilities and at home.

During childbirth, skilled birth attendants monitor the progress of labour and women in many ways; they manage abnormalities such as breech delivery and in a team of various professionals, they deal with complications as severe as eclampsia or obstructed labour. On the other hand, traditional birth attendants are not formally trained and do not meet the definition of skilled birth attendants as provided above (WHO, 2008). Historical and observational evidence indicates that skilled care at birth reduces the risk of maternal mortality and that industrialized countries halved their maternal mortality ratios in the early 20th century by providing professional midwifery care and childbirth and improving access to hospitals after the Second World War (WHO, 2006). Malaysia, Sri Lanka, and Thailand also halved their maternal mortality ratios within 10 years by increasing the number of midwives in the 1950s to 1960s and over a further 15 years period. Thailand reduced its maternal mortality ratio from 200 to 50 maternal deaths per 100,000 live births by deploying even more midwives and increasing the capacity of hospitals at the district levels (WHO, 2008). Thus, the use of skilled birth attendance has an inverse correlation to maternal and child mortalities in different countries. Despite the progress made globally, WHO (2008) points out that the current number of skilled birth attendants is insufficient, and some 700,000 midwives (50% shortfall) are still needed worldwide to ensure universal coverage of maternity care.

Skilled attendance at delivery has been shown to be a surrogate marker for maternal mortality, as approximately 16–33% of maternal deaths can be averted if supervised by a skilled professional (Ross *et al.*, 2013).

Maternal mortality remains one of the most important Global public health concerns more than twenty years after the international safe motherhood initiative was launched. The number of women dying every year from maternal-related causes has remained high in developing countries despite various efforts to bring them down (Gwamaka, 2012).

Maternal health refers to the health of a woman during pregnancy, childbirth, and postnatal periods (WHO Regional Office for Europe; 2017). The provision of safe motherhood, which encompasses increasing the proportion of babies that are delivered through skilled attendance, is of utmost importance in the reduction of health risks to the mother and the baby as well as maternal and neonatal mortality. Maternal death, without any doubt is associated with considerable grief and depression. It also directly affects a child's survival as it increases the chances of newborn death by 2-4 times. The loss of a woman in the prime and productive part of her life also adversely affects family income and increases the socio-economic burden on the man and children (UNFPA, 2010). Maternal mortality is a health indicator that shows very wide gaps between the rich and poor in urban and rural areas, both between and within countries (WHO, 2015b).

Globally, the proportion of births attended by skilled health personnel has increased from 59% in 1990 to 71% in 2015 and up to 80% in 2017 (WHO, 2019; WHO, 2019b). In Africa, the key problem is that coverage of births attended by skilled health personnel is still low in most Sub-Saharan African countries, while it is the region accounting for 66% of Global maternal deaths (WHO, 2019). In Sub-Saharan Africa, only 59% of births were assisted by skilled health personnel in 2017, compared to 90–95% in South America and 99% in high-income countries (WHO, 2019b). Women in Sub-Saharan Africa have the highest rate of maternal mortality in the world, with 550 maternal deaths per 100,000 live births, mostly from preventable causes. Skilled attendance at birth is low, especially among the poor, who suffer the greatest impact of maternal and neonatal morbidity and mortality-related complications (Lawn 2016). The risk of a woman in a developing country dying of maternal-related causes during her lifetime is about 33 times higher than those living in developed countries (WHO, 2015). In West and Central Africa, only 4% of women who give birth are attended to at delivery by skilled personnel (WHO, 2012). A range of factors prevents women in sub-Saharan Africa from obtaining quality health care from the formal sector. These factors include; long distance from health facilities, poor infrastructure and lack of transport,

poverty, and low-quality health services. Access to health is one of the key human rights.

In Kenya, poor sexual reproductive health is manifested in the high number of deaths and illnesses resulting from HIV/AIDS and other STIs, early childbirths, unskilled deliveries, and unsafe abortion. For instance, out of every 100,000 Kenyan women giving birth, 362 die from complications associated with pregnancy, childbirth, and postnatal period making maternal deaths the leading (27%) cause of death among women of reproductive age (KDHS, 2014). Although there has been a decline in the proportion of births occurring at home from 59% in 2003 to 56% in 2008-2009, the current national average of skilled birth attendance still stands at 62% (KDHS, 2014). Although in Kenya, 88% of women attend an antenatal clinic at least once during each pregnancy, the utilization of skilled attendance is still averagely low, and pregnancy-related deaths are high (WHO, 2012). According to the UN (2012), one in every 19 children born in Kenya dies each year. WHO (1999) has pointed out that these deaths can be prevented if women access skilled birth services.

In the Western province, traditional birth attendants still attend to over 34% of deliveries, and skilled birth attendants assist 28% of women. This is contrary in Central province, where traditional birth attendants assist only 6% of deliveries while 60% deliver through skilled attendance (KNBS 2010). Since it is estimated that 15% of all pregnant mothers will experience problems during childbirth, access to essential obstetric care is necessary for every expectant mother (WHO, 2008). But while efforts are underway to improve access, the contrast is that few facilities and resources available are not exhaustively used; thus, the problem is not really with the resources per se, but also with the intended users but partly to their cultural and social background.

According to the latest KDHS (2014), the proportion of skilled birth attendance in Kakamega County is 48.6%, Kisumu County is 69.2%, and Siaya County at 70.4%. The World Health Organization, however, recommends 100% skilled birth attendance.

Globally, nearly 287,000 women die annually from complications arising from pregnancy and

childbirth, with almost 99% of deaths occurring in developing countries and more than 50% in Sub-Saharan Africa, where there is a prevalence of high fertility rate, shortage of skilled birth attendants, and weak health systems (WHO, 2014). Only 64% of pregnant women receive the recommended minimum of four antenatal care visits or more, suggesting that a large expansion in antenatal care coverage is still needed (WHO, 2015b).

The estimated burden of stillbirth Globally is 2.6 million per year, out of which 1.2 million occur during labour (i.e., intrapartum deaths), primarily due to complications such as prolonged or obstructed labour or umbilical cords accident during labour and childbirth (Lawn 2016). In addition, approximately 2.7 million newborns do not survive the first month of life worldwide. About 2.5 Neonatal deaths occurred worldwide in 2018 (WHO, 2019).

Because of high maternal mortalities resulting from unskilled birth attendance, among other causes, the National and County Governments have rolled up several interventions to address the problem (Ndavi and Otieno 1997). In 1994, Kenya was one of the countries that endorsed the resolution of the International Conference on Population and Development (ICPD) in Cairo, Egypt. As a follow-up to those recommendations, the Government drew up the National Reproductive Health Strategy (NRHS) 1997-2010. The NRHS identified the following as priorities: access to quality maternal and child care services; utilization of quality and cost-effective mother/child health (MCH) services (Ndavi and Otieno 1997). The Government has also inaugurated the safe motherhood and child survival initiative. The Government also adopted and rolled out the Community Health Strategy (CHS) in 2007, with the aim of expanding the coverage of community health services, including Maternal and Child Health, prevention, and control of communicable diseases at the community level. Devolution, through the County governments, has also played a vital role in improving maternal health. For example, motivational initiatives such as the 'Oparanya care' where 'a mama pack', which include incentives given to mothers upon delivery at the health facilities (Bungei, 2017).

GLUK worked in partnerships with various counties in the Western region of Kenya to strengthen the implementation of the Community Health Strategy. The partnership was done in the western region of Kenya, where poor SRHR outcomes were noted. The region had high rates of almost 5 births per woman. According to the latest 2014 Kenya Demographic and Health Survey, the Total Fertility Rate (TFR) in the Western province is 4.7, while that of Nyanza is 4.3 (KDHS, 2014).

The partnership program aimed to improve Sexual and Reproductive Health Services uptake among young people, women, and men, including the underserved groups by strengthening the community health strategy implementation. The program strengthened the functionality of the various CHUs and health systems through various strategies (including; training of community health volunteers, technical and material support to strengthen community-based health information system, integration of sexual and reproductive health in the primary health care package at the community level, among others) in the realization of the following objectives: building Sexual Reproductive Health and Rights (SRHR) capacity of civil society organizations; Strengthening Sexual and Reproductive Health and Rights Education; Strengthening Sexual and Reproductive Health Services and working towards an enabling environment for SRHR.

Under the program, household updates were conducted bi-annually to assess the uptake level of various SRHR services, including skilled birth attendance, which would therefore, provide a platform for a joint stakeholders' community dialogue, re-planning, and further improvements from both the community, service providers and the health system at large.

It is in this regard that GLUK recognized that strengthening the implementation of the Community Health Strategy (CHS) intervention has positive energy to reach and influence the key target audiences including communities, policymakers, program implementers, service providers and other key stakeholders regarding maternal health issues. CHS is a policy that was adopted by the Government in 2007.

However, GLUK found a gap in the functionality of Community Health Units (CHUs). Most community health workers and CHC members lacked the adequate capacity to perform their roles toward CHS implementation. There was a challenge with the Community Based Health Information System (CBHIS) as most CHUs did not maintain to date information system. GLUK therefore resorted to partnering and building the capacity of the communities and health systems as a modality of strengthening CHS implementation.

The engagement by GLUK and Health systems on various CHS activities over the years led to notable successes, which provided a rich case study to learn from, and hence this study aimed at looking at the differential effects of household characteristics on the uptake level of skilled attendance among women of reproductive age in western Kenya.

Purpose of the Study

The purpose of this study was to determine whether the Community Health Strategy interventions and initiatives that had been carried out in the communities over a period of five years (2013-2017) had an effect on the uptake of skilled birth attendance between the four counties of the Western region of Kenya.

Research Objectives

To determine the differential effects of household characteristics on uptake of skilled birth attendance among women of reproductive age in the Western region of Kenya. The specific objectives were as follows:

- To determine the uptake level of skilled birth attendance among women of reproductive age in the Western region of Kenya.
- To determine skilled birth attendance trends by years in the Western region of Kenya.
- To determine the association of skilled birth attendance by Socio-Demographic household characteristics among women of reproductive age in the Western region of Kenya.
- To determine the association of skilled birth attendance by Socio-Economic household

characteristics among women of reproductive age in the Western region of Kenya.

METHODS/ MATERIALS

This was an embedded study in a larger study that was a descriptive cross-sectional study targeting all the households in four counties where GLUK implemented an intervention to support the strengthening of CHS implementation. The design of this study was an analytical study design, utilizing quantitative data from the larger study focusing on the uptake of skilled birth attendance. The study utilized analytic methods in analysing its objectives.

The larger study was conducted in five sub-counties within four Counties in the Western regions of Kenya, namely: Nyakach (Kisumu County); Butere (Kakamega County); Kabondo Kasipul and Kasipul (Homabay County); and Alego Usonga (Siaya County) because these were the sites where GLUK partnered with Ministry of Health to strengthen implementation of the Community Health Strategy.

Table 1 illustrate the distribution of households by Counties.

Table 1: List of Counties and CHUs

County	Sub-County	CHU name
Kakamega	Butere	Bubala
		Mutoma
		Ituti
		Bukhoko
Kisumu	Nyakach	Gem Rae
		Andingo Opanga
		Jimo west
		Kajimbo
Siaya	Alego Usonga	Sigoma Uranga
		Mahola Ulawe
		Kabura Uhuyi
TOTAL	3	11

The study employed a complete coverage of all the under-five-year-old children from all the households in the 11 Community Health Units bringing to a total of 5792, which were therefore used to draw the findings of this study.

A purposive sampling method was used to select the Community Health Units (CHUs) and the Households. Purposiveness for selection of CHUs

These areas are predominantly rural areas, exhibiting a high poverty level (67% and 61% for Nyanza and Western provinces, respectively) compared to 47% at the national level. The areas are known to experience a slow change in economic trends partly attributed to historic political marginalization, low literacy levels, and unfavourable cultural practices. Kisumu, Homabay, and Siaya Counties are mainly inhabited by the Nilotic ethnic group, predominately the Luo tribe, while Kakamega County is mainly inhabited by the Luhya people who are from the Bantu ethnic group.

To determine trends in skilled birth attendance, the study used the proxy of under 5-year-old children to denote years. The population for the study, therefore, encompassed all the under-five years old children from households in 11 Community Health Units (CHUs) in Kakamega, Kisumu, and Siaya Counties. The three Counties were selected since they had complete data sets. These Community Health Units met the following criteria; they were in partnership with GLUK and were implementing Community Health Strategy.

was based on criteria that were GLUK supported and that they must have submitted Community Based Health Information System (CBHIS) data from 2013-2017. The purposiveness for selecting the Households was based on the criteria that they had under five-year-old children.

The primary data (larger study) was collected by the use of a structured tool called a Household Register,

which is a government tool, also known as MOH 513. The tool is developed in the English language and has indicators by MOH on a Household's social-demographic, socio-economic and health information. The tool has 24 indicators, out of which 7 were of focus for this study. These include education level of household head; the age of household head, gender of the household head; housing type; disability; latrine availability, availability of staple food in the household and skilled birth attendance.

The data was collected by Community Health Volunteers (CHVs) bi-annually from 2013-2017 from Community Health Units, where GLUK supported the strengthening of the implementation of CHS. Raw data were collected through face-to-face interviews with the Household Heads. CHVs are people chosen during a Chief's baraza by community members and are accepted, trusted, and well conversant with the households in the villages. After being selected, the CHVs were trained using a CHS curriculum for two weeks by MOH and other partners such as GLUK and APHIA Plus before being certified. They were also undertaken through refresher training every six months by GLUK before data collection. The household updates data was collected bi-annually by the CHVs as required by the CHS guideline (MOH, 2007). A 10% validation sample was conducted by experienced Research Assistants from GLUK to ensure the quality of data collected by the CHVs. The data was entered and processed by trained GLUK data clerks. Further data quality control checks were performed to ensure completeness and consistency before the final data set that was used in this study.

It was on this basis that the study extracted utilizable data for 2017 for the three Counties to draw findings of its main objective, which was to determine the differential effects of household characteristics on uptake of skilled birth attendance among women of reproductive age in the Western region of Kenya. To do this, data for households which did not have under five-year-old children were first dropped. The data was then separated into two sets; for the Household Heads and for the under-five-years old children; this was because each member of the household, including the children and the Household Head had independent entries in the data set. Some households had more than one under-five-

year-old child. The third step was to merge the two data sets and link all the under-five-years old children to their respective Household Heads. This then provided a complete analysable data set for the objectives of the study.

The unit of analysis was under five-year-old children. Data were analysed per objective. Descriptive statistics were used to answer the first two objectives. Frequencies were run to describe the socio-demographic characteristics of Households to determine the level of uptake and trends of skilled birth attendance. Analytic methods were used to answer the third and fourth objectives, where cross-tabulations were used to determine the association between the main variables (Household characteristics) and uptake level of skilled birth attendance. The Pearson's Chi-square test at a significance of 5 % was used to test the significant association between socio-demographic and economic household characteristics and uptake of skilled birth attendance. Binary Logistic Regression analysis was done where the odds ratio was used to ascertain the strength of association among the variables of interest. Pearson's Chi-Square test was used because of the following reasons: the variables used were all independent of each other (there was no co-dependence). Binary Logistics Regression was used because the Y-variable (skilled birth attendance) is a binary variable (either Yes or No). Data were analysed using STATA version 14, where quantitative analysis was provided

The Ethical approval for the study was obtained from the Great Lakes University of Kisumu Ethical Review Committee (GREC). The consent to use secondary data was obtained from the GLUK-CHS strengthening program. The primary data was collected in areas in which GLUK worked in partnership and relevant permissions had been obtained from the relevant authorities.

The findings from this study will be utilized by GLUK to assess the impact that the intervention brought to the communities. Finally, it will be used by the County Governments where the intervention was implemented as well as any other interested partners as a model worth cascading to others areas. The information will be disseminated in the following ways; during scientific conferences, in workshops, seminars, stakeholders' meetings and

publication in a peer review journal through the consent of GLUK and with the help of the supervisors. A copy will also be available in the GLUK library as required by the University.

RESULTS

Demographic Characteristics of Households in the Western Region of Kenya

Table 2 is a summary of the Demographic characteristics of households in Western Kenya.

Table 2: Demographic characteristics of the households

Household characteristics		N	%
Housing type	Temporary	1,015	17.52
	Semi-permanent	4,318	74.55
	Permanent	459	7.92
Education level of HHH	None	996	17.2
	Primary	3,565	61.55
	High school and above	1,231	21.25
Latrine availability	Yes	5,397	93.18
	No	395	6.82
Gender of HHH	Male	4,052	69.96
	Female	1,740	30.04
Age category of HHH	10-14	2	0.04
	15-19	24	0.42
	20-24	193	3.39
	25-29	542	9.53
	30-34	666	11.71
	35-39	701	12.32
	40-44	505	8.88
	45-49	565	9.93
	50-54	582	10.23
	55-59	435	7.65
	60-64	455	8
	65-69	307	5.4
	70-74	306	5.38
	75-79	153	2.69
	80-84	139	2.44
	Disability of HHH	85-89	66
90-94		33	0.58
95-99		12	0.21
100-104		3	0.05
	Mental	37	0.91
	Physical	104	2.55
Household characteristics		N	%
Stable food availability	None	3930	96.54
	Yes	2572	63
	No	1499	37

Out of the total sample, many Households were semi-permanent, 4,318 (75%). More Household heads had a primary level of education (3,565, 62 %). The majority of the Households had latrines n=5,397 (93.18%). Many Households were headed by males n=4,052 (70%). Regarding the age of the Household head, more Household heads were in the age categories of 35-39(12%), 30-34(12%) and 50-54(10%). The majority of Households did not have disability cases 4071(97%), while 63% of Households had availability of staple food.

Uptake Level of Skilled Birth Attendance

The uptake of skilled delivery was 5792 (70%), as shown in

Table 3 below. However, 30 % still did not utilize skilled birth attendance during childbirth, as illustrated in

Table 3.

Table 3: uptake of skilled birth attendance

Variable	Attribute	Freq.	Percentage
Skilled attendance	Yes	4,071	70.29
	No	1,721	29.71

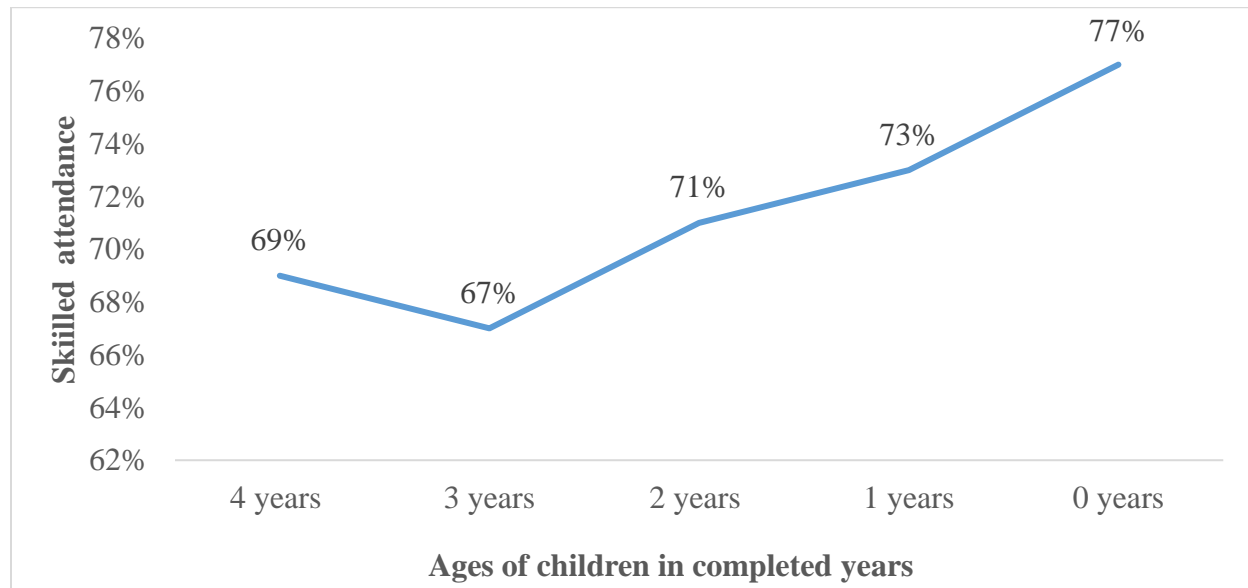
Skilled Birth Attendance Trends by Years in the Western Region of Kenya

The steady increase in uptake of skilled birth attendance was recorded over the five-year period

from 69% (mothers with four-year-old children) to 77% (for mothers with under-one-year-old children), as illustrated in

Figure 1.

Figure 1: Trends of skilled birth attendance



Annual increment of skilled birth attendance: $-(67-69) = -2/67 = -0.01$; $(71-67) = 4/71 = 0.06$; $(73-71) = 2/73 = 0.03$; $(77-73) = 4/77 = 0.05$. Therefore: $(-0.01+0.06+0.03+0.05) = 1.13$; $(0.13/4) * 100 = 3.25$

$= 3\%$. Cochran Armitage test of trends showed a statistically significant improvement trend in rates of skilled birth attendance across the years, as shown in Table 4 (P-value=0.000).

Table 4: Cochran's Armitage test of trend

Year	Scores	Obs	sum of ranks
2013	69%	1572	3606954
2014	67%	1508	1137786
2015	71%	1434	5445615
2016	73%	1162	5920971
2017	77%	62	353865

$z = 58.19$
 $\text{Prob} > |z| = 0.000$

Socio-Demographic Household Characteristics and Uptake of Skilled Birth Attendance

Cross tabulations using Pearson’s Chi-square tests at a confidence level of 95% showed that 2 out of 4 Socio-Demographic household characteristics had a

significant influence on the uptake of skilled birth attendance (P-value=0.005). The two include: Age of the HHH (P-value= 0.002) and Disability (P-value= 0.004). Gender (P-value =0.103) and Education level (P-value =0.235) of Household Head had no association, as illustrated in *Table 5*.

Table 5: Association of Socio-Demographic household characteristics on uptake of skilled birth attendance

Socio-Demographic household characteristics		Skilled Birth Attendance				Total		Chi ²
		Yes N	%	No N	%	N	%	
HHH Gender	Male	2822	70%	1230	30%	4052	100%	0.103
	Female	1249	72%	491	28%	1740	100%	
HHH Education	None	699	70%	297	30%	996	100%	0.235
	Primary	2483	70%	1082	30%	3565	100%	
Age Category	Secondary and above	889	72%	342	28%	1231	100%	0.002
	10-14	2	100%	0	0%	2	100%	
	15-19	16	67%	8	33%	24	100%	
	20-24	137	71%	56	29%	193	100%	
	25-29	367	68%	175	32%	542	100%	
	30-34	478	72%	188	28%	666	100%	
	35-39	484	69%	217	31%	701	100%	
	40-44	347	69%	158	31%	505	100%	
	45-49	391	69%	174	31%	565	100%	
	50-54	436	75%	146	25%	582	100%	
	55-59	308	71%	127	29%	435	100%	
	60-64	310	68%	145	32%	455	100%	
	65-69	200	65%	107	35%	307	100%	
	70-74	218	71%	88	29%	306	100%	
	75-79	125	82%	28	18%	153	100%	
	80-84	103	74%	36	26%	139	100%	
	85-89	48	73%	18	27%	66	100%	
90-94	27	82%	6	18%	33	100%		
95-99	5	42%	7	58%	12	100%		
100-104	0	0%	3	100%	3	100%		
Disability	Mental	37	73%	14	27%	51	100%	0.004
	Physical	104	82%	23	18%	127	100%	
	None	3930	70%	1682	30%	5612	100%	

Socio-Economic Household Characteristics on Uptake of Skilled Birth Attendance

Cross tabulations using Pearson’s Chi-square tests at a confidence level of 95% showed that 2 out of 3. Socio-Economic household characteristics had a

significant influence on the uptake of skilled birth attendance (P-value=0.005). The two include; Availability of staple food (P-value= 0.000) and Housing type (P-value=0.000). Latrine availability (P-value =0.237) had no association, as illustrated in

Table 6.

Table 6: Association of Socio-Economic household characteristics on uptake of skilled birth attendance

Socio-Economic household characteristics		Skilled Birth Attendance				Total		Chi ²
		Yes		No		N	%	
		N	%	N	%	N	%	
House Type	Temporary	763	75%	252	25%	1015	100%	0.000
	Semi-Permanent	2976	69%	1342	31%	4318	100%	
	Permanent	332	72%	127	28%	459	100%	
Latrine Availability	Yes	3783	70%	1614	30%	5397	100%	0.237
	No	288	73%	107	27%	395	100%	
Staple Food	Yes	2572	74%	905	26%	3477	100%	0.000
	No	1499	65%	808	35%	2307	100%	

Logistic Regression analysis showed that out of the 4 variables which showed a significant association, only 2 (housing type and availability of staple food) showed significant strength of association (P-value (0.000). Households with staple food were 0.613 times more likely to utilize skilled birth attendance

compared to those who did not have staple food when all factors held constant. Those with temporary housing types were 0.2903 times more likely to utilize skilled birth attendance compared to those from semi-permanent housing types. This is illustrated in

Table 7.

Table 7: Logistic Regression analysis of variables which showed a significant association

Skilled Birth	Odds Ratio	Std. Err.	Z	P>z	[95% Conf.	Interval]
Age Cat	0.985986	0.008919	-1.56	0.119	0.968659	1.003623
Disability	1.218329	0.160997	1.49	0.135	0.940334	1.578509
S Food	1.613077	0.096996	7.95	0.000	1.433743	1.814842
H Type	1.290343	0.079698	4.13	0.000	1.143223	1.456395
_cons	0.082428	0.035574	-5.78	0	0.035376	0.192057

DISCUSSIONS

Over the five-year period, just about ¾ of deliveries took place under skilled attendance. However, a sizable number of births still occurred without skilled attendance and this could mean that they

were either assisted by self, relatives, friends, or Traditional Birth Attendants.

The five-year period recorded a steady annual increase of 3% in skilled birth attendance. This means that the health system in the region has been improving with regard to skilled birth attendance. This study is consistent with other studies which

have shown a remarkable increase in the rate of skilled birth attendance over time (Abebe *et al.*, 2021; Fagbamigbe *et al.*, 2017; Atahigwa *et al.*, 2020; Joharifard *et al.*, 2012; Mwangi *et al.*, 2018). The findings imply that efforts such as strengthening the quality of care, motivation for women to use services and concerted awareness creation through community dialogue days (MOH, 2007), are important in improving maternal health services uptake.

Household characteristics such as gender and education level of the Household Head and the presence of a latrine had no association with skilled birth attendance. This means that not all household characteristics are significantly associated with skilled birth attendance. However, some studies have also shown inconsistency with the results of this study; for example, Omondi *et al.* (2015); Vallieres (2013); Sakeah *et al.* (2014); Gitimu *et al.* (2015) found that the education level of the household head is significantly associated with skilled birth attendance. Therefore, this study shows that differentials in access to skilled birth attendance due to education can indeed be addressed through innovations such as motivational initiatives (Oparanya care and formation of pregnant mother's support groups (pot system) in Kakamega and current initiatives being undertaken in the sites where the study was conducted.

Housing type and availability of staple food showed significant strength of association. Uptake of skilled birth Attendance is inequitably affected by differential socio-economic characteristics of households, housing type, and staple food availability being the most inequity-causing factors. This means that the economic status of the household is a driver of the choice of whether a mother delivers through skilled attendance or not. This study is consistent with other studies, which have also found that the standard of living index is associated with skilled birth attendance (Ravi *et al.*, 2014; Rahman *et al.*, 2021). Therefore, this study identifies housing type and availability of staple food as important skilled birth attendance differential causing household characteristics in the type of context where the study was conducted.

Women living in temporary housing type were more likely to utilize skilled birth attendance compared to

a semi-permanent house. In addition, also more women living in permanent houses would utilize skilled birth attendance compared to semi-permanent housing types. This, therefore, means that women living in semi-permanent housing types had fewer chances of utilizing skilled birth attendance compared to those in temporary and permanent housing types. Although there is no scientific paper which has looked at the association between household type and skilled birth attendance, a study done in Bangladesh indicates that more women from the urban setting, which had more permanent houses, had sought skilled birth attendance at 53% compared to their counterpart who lived in a rural setting who sought for skilled birth attendance at 46% (Rahman *et al.*, 2021).

In the same study by Rahman *et al.* (2021), findings in Nepal showed that women who had a job were more likely to go for skilled delivery (59.1%) compared to their counterparts who had no job (41.9%). Using those who had jobs as a proxy for the ability to access staple food, then the study, therefore, confirms the findings of this paper, which shows clearly that 74% of women with staple food in their household accessed skilled birth attendance compared to 65% of women who had no staple food.

CONCLUSION

The uptake of skilled birth attendance in the study sites is above the national average of 62%. There has been a steady improvement in the uptake of skilled birth attendance with an annual increment of 3% across the period of five years (2013-2017-intervention years).

Two Household characteristics (housing type and availability of staple food) still show a strong association for differentials in the uptake of skilled birth attendance. However, the gender and education level of the Household Head and the presence of a latrine did not show a strong association in the uptake of skilled birth attendance.

Strengthening implementation of Community Health Strategy (CHS) and Health systems innovations such as Oparanya care and the formation of support groups for pregnant mothers appear to have triggered an improvement in skilled birth attendance.

Recommendation

Efforts and initiatives injected into the health system from 2013-2017 in the study site appeared to have triggered an improvement in skilled birth attendance; therefore, initiatives such as Oparanya care and the formation of support groups for pregnant women (pot system) should be reinforced

Housing type and availability of staple food appear to be factors that are still responsible for differential uptake of skilled birth attendance, therefore should form a critical focus in targeting households with awareness creation activities for skilled birth attendance.

Further research should be done on the effects of other Household characteristics on uptake of skilled birth attendance, with more focus on the Household Head.

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