

Improving Skilled
Birthing: Determinants
And Role Of A Maternal-
Neonatal Health
Intervention Programme
In Migori County,
Kenya

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ABSTRACT

Introduction: Skilled care during pregnancy and delivery is important for the health of both mother and newborn. Integrated maternal health interventions have been found to contribute to improvement in uptake of skilled care during delivery.

Methods: An *Ex post* quasi-experimental design was applied. Among 590 reproductive age women, we assessed the determinants and role of a maternal-neonatal health intervention programme in improving skilled birth attendance (SBA). Tabulation and multivariate logistic analyses was done.

Results: The intervention increased SBA (OR= 1.56[95% CI 1.01 to 2.43]).SBA increased from 53.3% to 80.5%. Attending ante-natal care(ANC) and the number of ANC visits were significantly associated with SBA($p=0.000$).Having ones' mother as a birth companion increased the likelihood of SBA(OR= 4.97[95% CI 2.74 to 9.00] $p=0.000$) as was possession of a mobile phone number (OR= 2.82[95% CI 1.33 to 5.96] $p=0.007$) while those who had not had any of their under five year olds die in the last two years or referred by a health worker were more likely to take up skilled delivery (OR= 2.76[95% CI 1.25 to 6.08] $p=0.012$) and (OR= 2.50[95% CI 1.03 to 6.11] $p=0.044$) respectively. Being married and contact with a traditional birth attendant (TBA) reduced likelihood of SBA (OR= 0.33[95% CI 0.148 to 0.727]), (OR= 0.055[95% CI 0.005 to 0.595]) respectively.

Conclusion: ANC attendances, health education to clients are critical aspects that can enhance uptake of SBA. Policy makers should re-strategize the involvement of TBAs in efforts towards scaling up SBA.

Keywords: Improving; birthing; *Ex post*; quasi-trial; maternal-neonatal; health; intervention; Kenya

1. BACKGROUND

Most of the maternal and neonatal mortalities occur at the community level due to lack of good quality care during labour and birth(Lassi, Das, Salam, & Bhutta, 2014). Skilled care during pregnancy, delivery and postnatal is thus important for the health of both mother and newborn.

Worldwide the maternal mortality ratio has fallen since 1990– probably related to improved access to skilled care and to antenatal care (WHO. UNICEF. UNFPA. World Bank, 2012). Nonetheless, in 2010, approximately 287,000 women died in childbirth or from pregnancy complications, most of them in poorer countries(WHO. UNICEF. UNFPA. World Bank, 2012). Better access to skilled health personnel for childbirth is a priority strategy and a key indicator for Millennium Development Goal (MDG) 5a to improve maternal health, reflected in Sustainable Development Goal 3.1 vide; by 2030 reduce the global maternal mortality ratio to less than 70 per 100,000 live births(WHO. UNICEF. UNFPA. World Bank, 2012).

There is growing evidence for effective low cost interventions to reduce the rate of maternal and newborn deaths (Darmstadt, 2010 ; Darmstadt GL, 2010 ; Kirkwood, 2008; Lewycka et al., 2013; Nair, Tripathy, Prost, Costello, & Osrin, 2010; Tyllesor T, 2011). Reducing deliveries with an unskilled birth attendant combined with early identification of danger signs in a mother or newborn form an indispensable part of many of these evidenced based interventions. Community Health Volunteers (CHVs) and Community Health Workers (CHWs) form broad categories of non-professional health workers often the first point of contact in these interventions and provide essential link to clinical services(Kok et al., 2015).

Research to date on the drivers and barriers to facility delivery in sub-Saharan Africa has been dominated by analysis of cross-sectional household survey data. More research is needed that explores regional variability, examines longitudinal trends, and studies the impact of interventions to boost rates of facility delivery in sub-Saharan Africa(Moyer & Mustafa, 2013). Maternal and neonatal deaths in Kenya are attributed to limited utilization and availability of SBA, low coverage of basic and normal delivery services and poor quality of existing services(KDHS, 2008-2009). The government of Kenya and partners has rolled out nation-wide maternal-child health programs. These programs play key role in the improvement of maternal-child health indicators. Despite the efforts, huge disparities are notable across the counties. This implies presence of unique determinants and barriers to uptake of SBA for these counties. This study describes the outcomes and determinants of uptake of SBA after an integrated maternal health intervention in Migori County, Kenya.

2. MATERIALS AND METHODS

2.1 STUDY SETTING, DESIGN AND POPULATION

This study was carried out in Migori County, Kenya, with the intervention arm in Migori sub-County and the control group being Rongo sub-County. An *Ex post* (retrospective non-equivalent control group design) type of quasi-experimental study was conducted. We evaluated the effectiveness of a 'grass-roots' approach Maternal-Infant program – dubbed Maternal And Infant Survival and Health care Advancement (MAISHA) in Migori . The study population were women of reproductive age who delivered after January 2014 in both Sub-Counties.

2.2 THE INTERVENTION

The interventional five year maternal – infant health (The MAISHA Project 2012-2017) project's primary objective was to improve access to and attitudes towards quality health care services for women and children living in rural communities within Migori County. Through the project, health workers' (SBA) training and refreshers on emergency obstetric and neonatal care was initiated in year 2013. Further, assessment and supplementation of basic delivery kit in the health centres, as well as training of CHEWs and community

volunteers on maternal infant health issues was instituted. Community units were reactivated and new ones established. These interventions were informed by findings (gaps) from a baseline survey of March 2013.

2.3 IMPLEMENTATION OF THE INTERVENTION

Operating within the Ministry of Health's policy on Community Strategy, Community Health Extension Workers (CHEWs) were trained on various relevant aspects of maternal -neonatal and child health (MNCH) and were aided in establishment and activation of community units. The CHEWs then embarked on sensitizing and training Community Volunteers in their community units on MNCH.

The community volunteers then sensitize and educate respective households served on MNCH with special effort towards reaching all unskilled birth attendants, urging them to advise, refer and act as birth companions during SBA. In all instances of sensitization, the single overriding objective and message was to encourage pregnant mothers to always seek skilled care services during and after delivery.

Clinical health personnel assisting in skilled deliveries within this County were trained on emergency obstetric and neonatal care (EMONC) and the link health facilities facilitated to have essential obstetric care kits.

2.4 SAMPLE SIZE, SAMPLING PROCEDURE AND DATA COLLECTION

The sample size was computed using the method described in Kelsey et. al. in 1996(Kelsey JL, 1996). The Percent of Controls with Outcome being 53.3% (births assisted by trained professional in Migori, MAISHA baseline,2013) and Percent of intervention group with Outcome targeted to be 65% (KDHS 2014, Nyanza region SBA 65%). We hypothesize that the intervention will have contributed to an 11.7% positive difference in favor of the intervention.

$$N_{Kelsey} = \frac{(z_{\alpha/2} + z_{\beta})^2 p(1-p)(r+1)}{r(p_0 - p_1)^2} \quad \text{Where: } P_0 = 53.3\%, P_1 = 65\% \text{ and } P = 59.15\%$$

Taking a Ratio of Controls to Treatment in sample to be 1, a minimum of 582 women of reproductive age (15 – 49 years), would be selected in the two Sub-Counties (Migori (291) and Rongo (291)).

Women of reproductive age who delivered after January 2014 in Migori and Rongo Sub-Counties and met the inclusion criteria were selected during the household survey. A sampling frame was established for each sub-location in the two Sub-Counties. Utilizing the already existing community strategy framework by GOK, community volunteers-who handle defined households and the provincial administration we enumerated all women meeting the eligibility criteria.

Computer generated random numbers from Open Epi were used. Once enumerated, the positions generated randomly by use of computer were arranged in ascending order by use of Microsoft Excel.

Migori Sub-County has 30, while Rongo has 22 sub-locations (Source: Migori County Development profile (2013)). A simple random sample of 11 and 15 respondents in each sub-location in Migori and Rongo Sub-

County respectively were selected. Aided by the community volunteers, locator information was established. The research assistants then visited these selected households and conducted the interviews. A questionnaire was used to elicit the outcomes of the integrated maternal health intervention and determinants of utilization.

2.5 DATA ANALYSIS

The coded data was entered into a computer database using STATA 11.2 data editor. Statistical analysis was both analytical and descriptive. Chi-square test of significance and multivariate logistic regression analysis was done. The results are described and presented in tables.

2.6 ETHICAL CONSIDERATIONS

The protocol was submitted to the Jomo Kenyatta University of Agriculture and Technology board of postgraduate studies for review and approval. Scientific and ethical approval to conduct this study was obtained from the Kenyatta University Ethical Review Committee (KUERC) - Application number PKU/487/E41. A research permit was applied for and granted by NACOSTI. Permission was also obtained from the Migori County Health executive before visiting the health facilities. Written informed consent was sought from the participants, participation was fully voluntary and confidentiality was observed at all times.

3. RESULTS

Socio-Demographics Characteristics

Key demographic characteristics of the study women in the two Sub-Counties were generally comparable. The age of the respondents ranged between 15 to 49 years. Most of the women were aged between 20 to 29 years. The median age was 24 and 25 years in Migori and Rongo Sub-county respectively. Majority 286(96.0%) and 265(90.8%) in Migori and Rongo sub-County respectively have a mobile phone, but notably, only a few have registered with the National Hospital Insurance Fund(NHIF), 37 (12.4%) and 22(7.5%) in Migori and Rongo sub-County respectively (**Table 1**).

Factors associated with uptake of facility delivery in the intervention arm

Respondent's sub-County was found to be significantly associated with the delivery place (9.0232, Pr = 0.003). Time taken to facility, partner's occupation, woman's occupation, woman's educational level, being in polygamous marriage, marital status and being registered with NHIF were not significantly associated with facility based delivery($P>0.05$) (**Table 2**).

Factors associated with the uptake of skilled care during delivery among women in the control arm.

Possessing a mobile phone, live births, marital status, woman's educational level, number of ANC visits, having a birth companion, the individual accompanying and mode of transport used were found to be significantly associated with health facility delivery. Antenatal clinic attendance, partner's occupation, woman's occupation,

being in a polygamous marriage, received health education and person educating, referred and person referring and being registered with NHIF were not significantly associated with facility based delivery (**Table 3**).

Determinants for the uptake of skilled care during delivery

On average, women in the intervention arm of the study were 1.56 times more likely to deliver in a health facility than their counterparts in the control (OR= 1.56[95% CI 1.01 to 2.43] p=0.048), those who used motorbike as a means of transport were 4.62 times more likely to utilize SBA (OR= 4.62[95% CI 2.96 to 7.19] p=0.000) while those utilizing 'matatus' had a 4.29 times greater likelihood (OR= 4.29[95% CI 1.05 to 17.55] p=0.043). These point to transport means, nature of roads and distance to health facility to be key factors in determining utilization of SBA.

Having ones' mother as a birth companion increased the likelihood of SBA by 4.97 times (OR= 4.97[95% CI 2.74 to 9.00] p=0.000) and 2.82 times if one possessed a mobile phone number (OR= 2.82[95% CI 1.33 to 5.96] p=0.007) while those who had not had any of their under five year olds die in the last two years were 2.76 times likely to take up skilled delivery (OR= 2.76[95% CI 1.25 to 6.08] p=0.012). Those Referred by a health worker were 2.5 times likely to seek SBA (OR= 2.50[95% CI 1.03 to 6.11] p=0.044).

Being married decreased the likelihood of seeking for SBA by 3.05 times (OR= 0.33[95% CI 0.148 to 0.727] p=0.006) and surprisingly despite efforts persuading the Traditional Birth Attendants to support facility delivery by educating and referring pregnant women as appropriate, being educated by a TBA reduced the likelihood of taking up SBA by a whopping 18.2 times (OR= 0.055[95% CI 0.005 to 0.595] p=0.017) (**Table 4**).

4. DISCUSSION

This interventional study realized a 27.2% increase in uptake of SBA for the intervention arm. Similar findings were found in a study assessing the impact of free delivery policy on utilization of maternal health services in county referral hospitals in Kenya, where the number of deliveries and antenatal attendance increased by 26.8% and 16.2% in county referral hospitals and decreased by 11.9% and 5.4% respectively in low cost private hospitals (Njuguna, Kamau, & Muruka, 2017).

Our intervention was largely effective due to adoption of a grassroots approach, utilizing CHWs/CHEWs and CHVs in their community units. Similarly in a study assessing the effectiveness of a Community Health Worker Program in Rural Kenya in improving Maternal and Newborn Health, the number of women delivering under skilled attendance was higher for those mothers who reported exposure to one or more health messages, compared to those who did not. The delivery of health messages by CHWs increased knowledge of maternal and newborn care among women in the local community and encouraged deliveries under skilled attendance (Adam MB, 2014).

Majority of the women in the intervention arm attended ANC four or more times. An analysis by Stanton et al in 2007 (Stanton, 2007) of available data from 54 countries found that women's likelihood of delivering under care of skilled providers was associated with the number of ANC visits women made, the more ANC visits women made, the more likely they were to deliver under care of skilled providers. In the analysis, the percentage of women delivering under skilled providers increased from 13% among women who had no ANC to 28% among those with one visit, 45% among those with 2-3 visits and 73% among those with four or more visits. Another study among married adolescent girls in Bangladesh (Shahabuddin, Delvaux, Utz, Bardaji, & De Brouwere, 2016) reported use of antenatal care (ANC) to be the most important predictor of health facility-based delivery (OR: 4.04; 95% CI 2.73 to 5.99). This finding was similar with our finding at bivariate analysis where attending ANC and the frequency of ANC visits was highly significant. However, contrary to this, at multivariate analysis, having attended ANC was not significant.

In our study, woman's educational level was found to be significantly associated with facility delivery in the control arm; however, in the interventional arm the contrary was true. In the logistic model, no statistically significant association was found. This compares with Shahabuddin et al. study among married adolescent girls where in the bivariate analysis, maternal education appeared to be associated with facility-based delivery while in the logistic model, no statistically significant association was found. However, a significant difference was observed between adolescent girls with no formal education and girls with higher than secondary level education. Adolescent girls having higher than secondary education were 2.2 times more likely to deliver in a health facility compared to those adolescents with no education (OR: 2.2; 95% CI 1.04 to 4.78) (Shahabuddin et al., 2016).

This present study found that being married decreased the likelihood of seeking SBA. This differed with a study conducted in Ethiopia about the determinants of utilization of antenatal care and skilled birth attendant at delivery involvement of the partner/family in decision making on delivery place increased the likelihood of SBA at delivery but being unmarried reduced this likelihood (Wilunda et al., 2015). Reduced probability of seeking SBA among married women could be a pointer to the influence of culture – with men in this region in Kenya having preference for TBAs, possibly due to cost issues or attitude. Contrary, studies have suggested that pregnant women whose partners were involved in their pregnancy and delivery care were more likely to use health facility care services than men who were not involved in this care (Mangeni JN, 2013; Story et al., 2012). Further, in studies that included fathers in examining men's function in the reproductive health experiences of their partners (Carter, 2002; Carter MW, 2005; Dudgeon & Inhorn, 2004; Gross K, 2013; Kululanga, Sundby, Malata, & Chirwa, 2011; Kwambai et al., 2013; Story et al., 2012). They found that fathers had an influential role in their wives' use of pregnancy and delivery care, such that their birth location preferences impacted the women's health-seeking behaviours. For instance, fathers who preferred health facility

births perceived the need to send their wives to a facility to receive treatment for pregnancy and labour -related complications. These men did not consider facility care as their last resort.

Minority of women in our study had registered with the National Hospital Insurance Fund. Mutual health services uptake, despite known benefits is quite low in this Migori, Kenya. A cross-sectional study assessing the role of health insurance among rural women in china utilization of delivery care found that total hospital costs and women's costs for delivery services were lower in the New Cooperative Medical Scheme (NCMS) group, subsequently alleviation on women's perceived financial affordability. Indeed, the total hospital costs for delivery services in the NCMS group was significantly smaller and after being reimbursed, the out-of-pocket payment in the NCMS group was less than a half of that in the Non-NCMS group. Fewer women in the NCMS group than in the Non-NCMS group considered their payment for delivery services expensive (Xiao et al., 2010). In Kenya, women from wealthier households and those with health insurance are more likely to deliver in a health facility compared to women from poorer households and those without insurance (Kitui, Lewis, & Davey, 2013). Low enrollment with NHIF is thus a key issue of concern in this County. Since most of the women possess a mobile phone 286(96.0%) and 265(90.8%) in Migori and Rongo Sub-county respectively have a mobile phone), this could hold the key to strategies exploiting ownership of phone to ensure registration with health insurance.

In Migori Sub-County, Number of pregnancies, having attended ANC, Received health education, mode of transport used were significantly associated with facility delivery, however, Time taken to facility, occupation, Woman's educational level, Marital status and being Registered with NHIF were not significantly associated with facility based delivery. These findings largely agree, though with some variation with findings in a systematic review on the drivers and deterrents of facility delivery in sub-Saharan Africa, it was shown that in the region, maternal education, parity, rural/urban residence, household wealth, distance to health facility are strongly associated with facility based deliveries (Moyer & Mustafa, 2013).

Kenya's Ministry of Health encourages that TBAs should be community resource persons who would advise women and refer them in to health facilities for SBA. Surprisingly despite efforts persuading the Traditional Birth Attendants in Migori County to support facility delivery by educating and referring pregnant women as appropriate, being educated by a TBA greatly reduced the likelihood of taking up SBA. This is a key area that needs further evaluation in an effort to change strategy. In the mid-2000s, deliveries by traditional birth attendants (TBA) in Malawi were banned by the Malawian president, with the support of the Ministry of Health (MOH). TBA's roles were refocused from being birth attendants to being community resources who would advise women and refer them in to health facilities. The TBA ban was effective and popular, however in 2010; the then-president of Malawi made a proclamation that effectively reversed the ban (due to international pressure). This was done without consultation with the MOH and was contrary to their program and work plan.

In 2012, the subsequent president launched an initiative called the Presidential Initiative for Safe Motherhood which had three pillars, the expansion of maternity waiting homes, training and employing a new cadre of community midwives and reinstatement of the ban on TBAs, which was implemented through mobilization of community members (mainly chiefs)(Butrick, 2014).

5. CONCLUSION

The intervention was largely successful. Health education and quality service to clients are two critical aspects that can enhance uptake of SBA and postnatal care. Notably, for this study, there was a higher proportion of mothers in the intervention arm who reportedly chose health facility delivery because of having had received health education and good service from health providers than in the control arm. Further, women in the control arm reported a higher proportion of complications which needed health worker attention than in the intervention arm. Complications could probably arise out of poor client education, not adhering to FANC follow ups and poor skills of providers. Having a birth companion, possessing a mobile phone, being referred by a health worker or Community Health Worker increased likelihood of seeking for skilled care. Accessibility to a health facility and distribution of the same in a region was found vital in determining uptake of services.

It is known that skilled care during pregnancy and delivery is important for the health of both mother and newborn as is integrated maternal health interventions in contributing to improvement in uptake of skilled care during delivery. Further, research to date on the drivers and barriers to facility delivery in sub-Saharan Africa has been dominated by analysis of cross-sectional household survey data.

This study explores regional variability and studies the impact of interventions to boost rates of facility delivery adopting a quasi-experimental design as opposed to earlier studies that were cross-sectional and explores determinants at County/regional level. Integrated maternal health interventions with greater focus to community level intervention may have greater impact in increasing skilled birthing and are more sustainable. The inclusion of traditional birth attendants (TBAs) as partners in encouraging birth at a health facility may be counterproductive.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

Moses Gitonga: conceptualized the study, analyzed the data and wrote the manuscript. Elizabeth Echoka and Kenneth Nguire: participated in study design and manuscript review. All authors read and approved the final draft of the manuscript.

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7. TABLES

Table 1: Participants Socio-demographic characteristics

Factor		MIGORI(N=298)	RONGO(N=292)
Age	Median	24	25
	Mean	25.7	26
	Standard deviation	6.6	6.2
	Range	15 - 46	15 - 49
		Freq. (Percent)	Freq. (Percent)
Age category	15-19	53(17.8)	34(11.6)
	20-24	98(32.9)	109(37.3)
	25-29	67(22.5)	75(25.7)
	30-34	49(16.4)	46(15.8)
	35-39	19(6.4)	18(6.2)
	40-44	8(2.7)	7(2.4)
	45-49	4(1.3)	3(1.03)
	Total	298(100)	292(100)
Has mobile No.	Yes	286(96.0)	265(90.8)
	No	12(4.0)	27(9.3)
	Yes	37 (12.4)	22(7.5)

Registered with NHIF	No	261 (87.6)	270(92.5)
In polygamous marriage	Yes	79 (26.5)	44(15.1)
	No	219 (73.5)	248(84.9)
Marital status	Single	32 (10.7)	25(8.6)
	Widowed	11 (3.7)	6(2.1)
	Married	255 (85.6)	261(89.4)

Table 2: Factors associated with uptake of facility delivery in the intervention arm

Factor		Facility delivery(n=240)	Chi - square	p-value
Possess mobile phone	Yes	233	3.9325	0.047
	No	7		
Number of pregnancies			22.6630	0.020
Live births			21.5129	0.018
Living children			25.8360	0.002
Marital status	Single	29	2.6460	0.266
	Widowed	8		
	Married	203		
In polygamous marriage	Yes	59	2.3497	0.125
	No	181		
Registered with NHIF	Yes	30	0.0080	0.929
	No	210		
Woman's educational level	None	1	5.3506	0.148
	Primary	186		
	Secondary	41		
	College/university	12		
Woman's occupation			6.0709	0.299
Partner's education level			9.3252	0.053
Partner's occupation			9.4752	0.149
Attended ANC			12.5400	0.000
Number of ANC visits			32.1745	0.000
Received health education	Yes	231	6.3625	0.012
	No	9		
Person health educating			10.2132	0.069
Referred to facility	Yes	26	7.1151	0.008
	No	214		
Referring person			12.2771	0.092
Had birth companion	Yes	19	32.1698	0.000
	No	221		
Person accompanying			52.4817	0.000
Mode of transport used			69.1742	0.000
Time taken to facility			2.0038	0.572

Table 3: Factors associated with uptake of facility delivery in the control arm

Factor		Facility delivery(n=204)	Chi - square	p-value
Possess mobile phone	Yes	190	4.5839	0.032
	No	14		
Number of pregnancies			15.6503	0.110
Live births			24.4749	0.004
Living children			18.2131	0.051
Marital status	Single	23	6.3673	0.041
	Widowed	4		
	Married	177		
In polygamous marriage	Yes	27	1.7775	0.182
	No	177		

Registered with NHIF	Yes	16	0.0927	0.761
	No	188		
Woman's educational level	Primary	152	8.2330	0.041
	Secondary	49		
	College/university	3		
Woman's occupation			4.3599	0.499
Partner's education level			9.7050	0.046
Partner's occupation			11.2830	0.046
Attended ANC		202	0.0147	0.903
		2		
Number of ANC visits			16.3449	0.003
Received health education	Yes	198	0.1031	0.748
	No	6		
Person health educating			7.5611	0.182
Referred to facility	Yes	36	2.0882	0.148
	No	168		
Referring person			7.1701	0.127
Had birth companion	Yes	12	17.8776	0.000
	No	192		
Person accompanying			30.5459	0.001
Mode of transport used			13.6575	0.003
Time taken to facility			3.1843	0.364

Table 4: Determinants for the uptake of skilled care during delivery

Factor		Odds ratio	95% Confidence Interval	p-value
Allotted arm	Intervention	1.56	1.01-2.43	0.048
	Control			
Mode of transport	Motorbike	4.62	2.96-7.19	0.000
	Matatu	4.29	1.05-17.55	0.043
Birth companion	Mother	4.97	2.74-9.00	0.000
Marital status	Married	0.33	0.148-0.727	0.006
Person health educating	TBA	0.055	0.005-0.595	0.017
Referring person	Health worker	2.50	1.03-6.11	0.044
Possessed a mobile phone number	Yes	2.82	1.33-5.96	0.007
Had an under five year old die in the last two years	No	2.76	1.25-6.08	0.012