

Journal of
Health, Medicine and Nursing
(JHMN)

**INDIVIDUAL FACTORS INFLUENCING MATERNAL AND
FETAL OUTCOMES AMONG MOTHERS REFERRED WITH
OBSTETRIC EMERGENCIES IN BARINGO COUNTY
REFERRAL HOSPITAL.**

Kandie, P, Kipmerewo M., Mukabana, B and Arudo J



**INDIVIDUAL FACTORS INFLUENCING MATERNAL AND FETAL OUTCOMES
AMONG MOTHERS REFERRED WITH OBSTETRIC EMERGENCIES IN
BARINGO COUNTY REFERRAL HOSPITAL.**

¹Kandie, P

Graduate student: School of Nursing, Midwifery and Paramedical Sciences: Masinde Muliro
University of Science and Technology, Kenya
Corresponding Author's E-mail: phylkandie@gmail.com

² Kipmerewo, M.

Department of Reproductive Health, Midwifery and Child Health, Masinde Muliro
University of Science and Technology, Kenya.

³Mukabana, B

Department of Reproductive health, Midwifery and Child Health, Masinde Muliro University
of Science and Technology, Kenya

⁴Arudo, J

Department of Nursing Research, Education and Management, Masinde Muliro University of
Science and Technology, Kenya

Abstract

Purpose: To determine the association between individual factors and maternal and fetal outcomes among mothers referred with obstetric emergencies.

Methodology: A descriptive cross-sectional study which employed a mixed method approach of data collection was adopted. Simple Random technique was used in selecting 284 respondents into the study. The study population also included nurses, gynaecologist and medical officers who were purposively sampled. Qualitative data collection was analysed through content analysis while descriptive and inferential statistics were used to analysed quantitative data.

Findings: The odds were lower for Neonates of mothers who did not have complications immediately post-delivery (OR:0.2;95% CI: 0.1-.8; P=0.01) compared with mothers who had complications. Neonates whose mothers received haematinics and IPT had 50% lower rate of complications than those who did not(OR:0.5;95% CI:0.2-1.0;P=0.04).The odds of abnormal births were higher for mothers without any income compared to those with some income (OR:1.7;95% CI 1.0-2.7;P=0.04).Moreover, neonates of mothers with no or with primary education were 1.7 times more likely to have had abnormal outcome (OR:1.7;95% CI 1.0-2.9;P=0.03)than those cases where the mother had secondary education and above. Further results show that women who decided by themselves to attend ANC were 95.5% less likely to have had complications (OR:0.4;95%CI:0.1; -1.0P=0.07). Gestational age of less than 39 weeks was associated with an increase in the odds of having maternal complications with up to 10.4 times likelihood of having complications (OR:0.4;95% CI:0.1; P=0.07)

Unique contribution to theory, practice and policy: This study has identified individual factors influencing maternal and fetal outcomes of obstetric emergencies in a marginalized county. The findings will provide insight to policy makers at the county level hence informed interventions will be made. The study will also form a basis for other researchers because no literature review has been published on this topic at the study site.

Keywords: *Obstetric emergencies, individual factors, Maternal outcomes, Fetal outcomes*

1.0 INTRODUCTION

Globally it has been estimated that approximately 15% of all pregnant women experience obstetric complications which is likely to result in maternal and neonatal death if they fail to receive rapid obstetric interventions (Thorsen, Meguid, Sundby & Malata, 2014). According to Banker-Thomas *et al.*, (2017), improving maternal and newborn health has been the forefront of global health agenda for more than two decades. Nearly 300,000 women die each year due to obstetric complications despite the 44% drop in maternal mortality between year 2000-2015. It is estimated that 2.6 million babies are stillbirths and 2.7 million newborn die within the first 28 days of life. Majority of these perinatal morbidity and mortality could be prevented by emergency obstetric care (WHO, 2015).

Poornima and Rekha, (2018) stated that, individual factors like lack of education, low status of women in society, poor families, financial dependency of women and delay in seeking medical emergency are the key factors contributing towards the adverse maternal and perinatal outcomes in obstetric emergencies. Gestation of women with advanced maternal age has also been considered a big risk factor, mainly for the growing incidence of hypertensive syndromes, premature rupture of membranes, diabetes, and a higher risk for a five-minute Apgar core of less than seven (Gage & calixte, 2016)

In the United States of America between 1990 and 2013, the maternal mortality ratio increased from an estimate of 12 to 28 maternal deaths per 100,000 births (Agrawal, 2015). On the other hand, Main and Menard (2013) contends that about half of all these maternal deaths are preventable. Lack of standard approach in managing obstetric emergencies is one of the factors contributing to the upward trend of maternal mortality and morbidity in the U.S.A. Developing countries accounted for 99% of the 10.7 million women who died between 1990 and 2015 due to obstetric complications (WHO, 2015).

Sub-Saharan Africa (SSA) has the highest adverse maternal health outcomes (Kyei, 2015). According to (Geleto, Chojenta, Mussa & Loxon, 2018) 66% of the maternal deaths occur in Sub-Saharan Africa. Bhuinean *et al.*, (2015) states that Sub-Saharan Africa continues to report high estimate of maternal mortality of 500 per 1000 live births despite some successes. It has the slowest rates of decline in maternal mortality.

Kenya has made progress in improving maternal health care programs for instance in January 2014, the Beyond zero campaign was launched by the government of Kenya to promote maternal health, however more work remains to be done to address underlying insufficiencies and inequalities to achieve better outcomes (Wamalwa, 2015). The 2014 Kenya Demographic and Health Survey estimated a lower MMR of 362 per 100,000 live births and NMR of 22 per 1000 live births, respectively and concluded that the decline of MMR and NMR between year 2008-09 and 2014 was not significant.

According to the labour ward records, Baringo County Referral Hospital receives obstetric complications like; ante-partum hemorrhage, Eclampsia, obstructed labour, postpartum hemorrhage, ruptured uterus and obstructed labour from the periphery facilities as referrals. Plenty of studies on Maternal mortality have been done in Kenya but not much has been published on individual factors and its effects on maternal and fetal outcomes particularly in a marginalized County. According to Baringo county records office, the current MMR is 374/100,000 live births. This study therefore sought to determine the individual factors influencing maternal and fetal outcomes among mothers referred with obstetric emergencies.

1.1 Statement of the Problem

Over a quarter of a million of women die every year owing to complications of pregnancy and childbirth. Between years 1990-2015 an estimated 10.7 million women died due to obstetric complications (WHO, 2015). In 2013 Sub Saharan Africa alone accounted for 62% of global maternal deaths. Baringo county referral hospital admits mothers with obstetric emergencies from near and far counties. According to the county records office (2018) the maternal mortality in the county is at 374/100,000 live births which is higher compared to the national MMR of 362/100,000 live births (KDHS, 2014).

More specifically, the referral hospital contributes to 80.8% of the total perinatal deaths reported in all the facilities in Baringo County (Serech, Githuku, Gura, Warfa and Ochieng, 2018). It has been confirmed by Thaddeus and Maine (1994) 3 delay model that, low status of women, low level of education and lack of income influences obstetric outcomes. This study therefore sought to determine individual factors influencing maternal and fetal outcomes among mothers referred with obstetric emergencies in Baringo County Referral hospital.

1.2 Objective

To determine the individual factors influencing maternal and fetal outcomes among mothers referred with obstetric emergencies in Baringo county referral hospital.

1.3 Research Hypothesis

H₀: There is no association between individual factors and maternal and fetal outcomes

2.0 LITERATURE AND THEORITICAL REVIEW

2.1 Theoretical Framework

This study was based on Three delay model (Thaddeus and maine,1994). This model identifies three groups of factors which may stop women and girls from accessing the maternal health care they need. It proposes that maternal mortality is associated in delays in: deciding to seek care; reaching the health facility; and receiving care. The study focused on the first delay; which is delay in decision to seek care, due to individual factors like low status of women, education status and income level. Which would then delay or limit access to obstetric care and subsequently influence the maternal and fetal outcomes.

2.2 Empirical Review

2.2.1 Individual factors and Maternal and Fetal Outcomes

Evidence from past researches indicates that a mother's education has a positive effect on maternal health. For instance, a research done by Sari (2009), in an Indonesian study, posits that educated mothers have a greater awareness of the existence of maternal healthcare services and benefit in using such services. They are also likely to have better knowledge and information on modern medical treatment and have greater capacity to recognize specific illnesses. Some researchers, however, question the strong independent effects of formal education on maternal healthcare utilization. Gage and Calixte (2016) argue that other factors such as childhood place of residence and socio-economic environment interact to dilute this strong association.

According to Strully, Rehkopf & Xuan (2010) low income may limit access to health necessities. Gwamaka (2012), in a Tanzanian study to explore factors that affect utilization of maternal health facility among 59,987 women of reproductive age, concluded that women who are employed may be able to save and so will have money to spend on a health facility.

Those with more income are able to deliver in a health facility compared to women with low income.

Nyakato and Charles (2013) examined how couples' relations and decision-making hierarchy determine maternal health in Uganda. They posit that in the context of maternal healthcare access, family relations play a key role since women after marriage depend on their marital families for their wellbeing and access to resources. Women healthcare decisions depend on their husbands mainly because of the hierarchical control of family social and economic resources. Women reproductive health decisions are limited by their reliance on their husbands' control of household assets.

Various studies have been done on maternal and fetal pregnancy outcomes in Kenya for instance; Cheptum, (2012) examined the factors contributing to adverse pregnancy outcomes in public health facilities in Keiyo District, Kenya, Njoroge (2012) did a study on the maternal and fetal outcomes among women with obstetric emergencies referred to Kenyatta National Hospital, Nairobi, Kenya. Ochieng'i (2016) did a study on relationship between place of referral and birth outcomes at Tenwek Hospital in Bomet county, Kenya. Despite the previous research done on maternal and fetal outcomes, no studies have been carried out on individual factors influencing maternal and fetal outcomes among mothers in a county hospital and in Baringo county referral hospital in particular.

3.0 METHODOLOGY

Study Design. A descriptive cross-sectional study, which employed a mixed method approach of data collection. The study took place between September 3rd and 15th October 2019.

Study Area. This study was conducted in Baringo County. The county is classified as arid and semi-arid. It has 30 Wards and 116 locations (KNBS, 2014). Kabarnet Town is the headquarters. It has an estimate population of 555,561 people with an area of 11,015 square kilometer. Baringo county hospital is the main referral hospital in the county. It has 180 bed capacity. It offers all the comprehensive emergency obstetric care (CEmOC) components.

The maternity unit contains 50 beds and 2 delivery couches and an operating room and diagnostic equipment including ultrasound and cardiotocography (CTG). The newborn unit attends to an average of 30 new born per day. The unit conducts over 2800 spontaneous vaginal deliveries and over 600 caesarian sections per year. In the year 2018, the hospital attended to 750 obstetric emergencies that presented as referrals. Baringo county hospital was chosen for the study because it had a higher MMR of 374/100,000 live births compared to the national MMR of 362/100,000 live births (KDHS, 2014).

Study Population. The study population were mothers with obstetric emergencies admitted in Baringo county Referral Hospital. According to the hospital records, the hospital receives an average of 63 women with obstetric emergencies monthly and an average of 750 yearly. The study also targeted nurses, clinical officers and medical officers at maternity section Baringo county referral hospital

Inclusion criteria and exclusion criteria. Inclusion criteria included All referred mothers with obstetric emergencies from the lower-level hospitals with a written referral letter or self-referred and willing to participate in the study, Nurses/midwives, clinical officers and medical officers who will be on duty during the study period. Exclusion criteria Included Women admitted with obstetric emergencies not willing to participate in the study and women meeting the inclusion criteria but mentally unstable.

Sampling Procedure. Simple random sampling technique was used in selecting respondents in to the study. Women with obstetric complications during the study period and have fulfilled the inclusion criteria were randomly sampled until a sample size of 284 subjects are achieved. Purposive sampling technique was used to select midwives/ nurses, medical officers and clinical officers working in the maternity unit for qualitative interviews.

Sample Size calculation. The desired sample size was arrived at using Solvin's formula. The final sample size being 284 after adding a 10% loading population to cater for possible non-response

Development of Research Instrument. The study used structured questionnaires to collect quantitative data from respondents. Qualitative data was collected using semi structured interview guide. Key informants selected consisted of midwives/ Nurses, clinical officers and medical doctors working in the obstetric unit.

Data collection procedure. The research assistants were trained for two days on how to collect the data. A pilot test was done before embarking on actual data collection activity to test the feasibility of the study. It was done at Iten county referral hospital because the study population has the same characteristics

Data Analysis. Data was cleaned coded, entered and analyzed using SPSS version 24. Descriptive and inferential statistics were used for *quantitative* data analysis. Descriptive statistics consisted of the frequencies, means and standard deviation. This was used to describe the distribution of data. In addition, inferential statistics using Chi Square was used to test the association between independent and dependent variables and odds ratio used to assess the strength of the relationship between the explanatory and outcome variables. A $p \leq 0.05$ was used to reject null hypothesis where significant association exists.

Qualitative information collected through key informant interviews was analyzed through content analysis using emerging themes and issues highlighted by different key stakeholders to generate a detailed report. It was transcribed, summarized and thematically analyzed according to the specific objectives. Key analytic findings were linked to factors that influence maternal and fetal outcomes.

Ethical considerations. Ethical clearance was obtained from Institutional Ethical Review Committee. A research permit was obtained from the National commission for science, Technology and innovations (NACOSTI). Permission was also sought from the hospital authorities for data collection.

4.0 FINDINGS AND DISCUSSIONS

4.1 Socio-Demographic factors influencing Maternal Outcomes

Table 1 shows results of bivariate analysis with maternal condition as the outcome variable and socio-demographic factors as possible determinants. None of the independent socio-demographic characteristics were statistically associated with maternal complications. However, from the results, the proportion of women aged less than 25 years with complications was lower (4.1%) than those who were older (7.4%). Women whose age at first birth was less than 20 years were up to 2.7 times more likely to have had complications albeit results not being significant.

Likewise, a higher proportion of women with no or with primary education (9.1%) compared with those who had attained secondary education and above (4.6%) experienced

complications during delivery. Women who were unemployed were up to 4.4 times more likely to have had complications (6.9%) in comparison to those employed (4.6%).

This finding was supported by a key informant who stated that *“Most of the women who are unemployed report to the hospital when their cases are complicated because they complain that they depend on their husbands to give them money for transport and that they have to wait until money is available”* (Key informant 1)

Equally, those whose husbands were unemployed had maximum 95% CI odds of 5.1 the likelihood of having complications in contrast to their counterparts with husbands who were employed. By extension, women without income were upto 4.3 times more likely to have had complications (7.8%) unlike those with some income (5%). Analysis was also done on sub-counties that are far away from the referral hospital to determine the influence of distance on maternal outcome. Again, the results were not significant but it could be seen that a higher proportion of mothers from Baringo East, Baringo North and Tiaty sub-counties (8.6%) had complications as opposed to those from neighboring sub-counties (4.2%). Being resident in urban setting favored maternal outcome with fewer (2.4%) mothers having complications as opposed to those from rural areas (6.6%).

Table 1 Socio-Demographic factors influencing Maternal Outcomes

Variable	Categories	N	Complications		OR	95%CI	p value
			Yes (%)	No(%)			
Age group in years	<25	121	4.1	95.9	0.5	0.2 – 1.6	0.2
	≥25	162	7.4	92.6			
Age group at first birth in years	<20	148	6.1	93.9	1.0	0.4 – 2.7	0.9
	≥20	135	5.9	94.1			
Level of education	None or primary	88	9.1	90.9	2.1	0.8 – 5.5	0.1
	Secondary or tertiary	195	4.6	95.4			
Religion	Protestant	220	5.9	6.4	0.9	0.3 – 2.9	1.0
	Others	63	94.1	93.6			
Employment	Unemployed	175	6.9	93.1	1.5	0.5 – 4.4	0.4
	Employed	108	4.6	95.4			
Husband or Partner’s employment status	Unemployed	92	8.7	91.3	1.9	0.7 – 5.1	0.2
	Employed	191	4.7	95.3			
Income	No income	103	7.8	92.2	1.6	0.6 – 4.3	0.3
	Has income	180	5.0	95.0			
Sub-counties	Baringo	116	8.6	91.4	2.2	0.8 – 5.8	0.1
	East/North, Tiaty						
	Others	167	4.2	95.8			
Place of residence	Urban	41	2.4	97.6	0.3	0.05 – 2.74	0.5
	Rural	242	6.6	93.4			

4.2 Past Pregnancy history factors influencing Maternal Outcomes

Table 2 presents past pregnancy history factors associated with maternal delivery outcome. None of the past pregnancy history factors bore statistically significant results. That notwithstanding, a smaller proportion of women with less than four number of previous pregnancies had complications (6.4%) while a higher proportion (17.4%) of those with more than four previous pregnancies had complications. Results also show that a relatively smaller proportion of women with interval between previous and current birth of index child of at least two years or more (7.2%) had complications unlike those with shorter intervals (15%). A comparatively smaller proportion of mothers with complications during the past pregnancy (7.8%) and those who developed complications immediately after delivery during the past pregnancy (8.1%) experienced complications when compared with their counterparts (11.1%).

Table 2 Past pregnancy history factors influencing Maternal Outcomes

Variable	Categories	N	Complications		OR	95%CI	p value
			Yes (%)	No (%)			
Number of previous pregnancies	≤4	94	6.4	93.6	0.3	0.1 – 1.3	0.1
	>4	23	17.4	82.6			
Interval between previous delivery and current birth of index child	≥ 2 years	97	7.2	92.8	0.4	0.1 – 1.9	0.4
	<2 years	20	15.0	85.0			
Mode of delivery	SVD	80	7.5	92.5	0.7	0.2 – 2.5	0.7
	Others	37	10.8	89.2			
Pregnancy outcome	Live birth	104	8.6	91.4	1.1	0.1 – 9.8	1.0
	Others	13	7.7	92.3			
Complications during past pregnancy	No	90	7.8	92.2	0.7	0.2 – 2.8	0.7
	Yes	27	11.1	88.9			
Complications developed immediately post-delivery	No	99	8.1	91.9	0.7	0.1 – 3.6	0.6
	Yes	18	11.1	88.9			

4.3 Current pregnancy history factors influencing Maternal Outcomes

Bivariate logistic regression analysis on current pregnancy history factors influencing maternal outcome identified one factor that was significantly associated with maternal complications. Gestational age of less than 39 weeks was associated with an increase in the odds of having maternal complications with up to 10.4 times likelihood of having complications (OR: 3.6; 95%CI: 1.3 – 10.4; p = 0.02). A marginal significant association was found between who decided when to attend ANC and maternal complications during delivery. Women who decided by themselves to attend ANC were 60% less likely to have

had complications (OR: 0.4; 95%CI: 0.1 – 1.0; $p = 0.07$). A considerably smaller proportion of mothers who attended ANC (5.3%) had complications compared with those who did not attend (15.8%).

Table 3 Current Pregnancy history factors influencing Maternal Outcomes

Variable	Categories	N	Complications		OR	95%CI	p value
			Yes (%)	No(%)			
Gestational age in weeks	<39	41	14.6	85.4	3.6	1.3 – 10.4	0.02
	≥39	242	4.6	95.6			
Attended ANC	Yes	264	5.3	94.7	0.3	0.1 – 1.1	0.09
	No	19	15.8	84.2			
Attend health centre for ANC	Yes	231	5.6	94.4	0.7	0.2 – 2.3	0.5
	No	52	7.7	92.3			
Gestational age when started ANC in weeks	≥28	41	7.3	92.7	1.3	0.4 – 4.7	0.7
	<28	242	5.8	94.2			
Who decided when to attend ANC	Self	221	4.5	95.5	0.4	0.1 – 1.0	0.07
	Others	62	11.3	88.7			
Number of times attended ANC	≥4	177	5.6	94.4	0.8	0.3 – 2.3	0.7
	<4	106	6.6	93.4			
Had IPT and haematenics	Yes	248	5.6	94.4	0.6	0.2 – 2.3	0.4
	No	35	8.6	91.4			
Mode of payment	Cash	166	6.0	94.0	1.0	0.4 – 2.7	1.0
	Insurance	117	6.0	94.0			
Amount paid for lab services in KSh.	<200	68	7.3	92.7	1.3	0.4 – 3.9	0.6
	≥200	215	5.6	94.4			
Amount paid for all the services in KSh.	<200	67	7.5	92.5	1.4	0.5 – 4.0	0.6
	≥200	216	5.6	94.4			

4.4 Socio-Demographic factors influencing Foetal Outcomes

Table 4 presents bivariate logistic regression analysis on socio-demographic factors influencing fetal outcome. Level of education, income and sub-counties where mothers came from were significant risk factors for abnormal fetal outcome. Neonates of mothers with no or primary education were 1.7 times more likely to have had abnormal outcome (OR: 1.7; 95% CI: 1.0 – 2.9; $p = 0.03$) than cases where the mother had secondary education and above. This was supported by a key respondent who stated that;

“Uneducated mothers tend to forget or do not understand during education sessions. They also lack modern medical treatment and do not have the capacity to recognize specific illnesses” (key informant 2).

The odds of abnormal births were higher for mothers without any income compared to those with some income (OR: 1.7; 95% CI: 1.0 – 2.7; $p = 0.04$). The same was the case for births of mothers who were coming from sub-counties that were far from the referral hospital (OR: 1.6; 95% CI: 1.0 – 2.6; $p = 0.04$) compared to those who were near the facility. Although not statistically significant, neonates of mothers whose husbands were unemployed were up to 2.5 fold more likely to have had abnormal outcome compared with mothers whose husbands were employed ($p = 0.1$). On the contrary, a relatively smaller proportion (36.6%) of neonates whose mothers were urban residents had abnormal outcome unlike those whose mothers were rural dwellers (47.9%) but the result was not statistically significant ($p = 0.2$)

Table 4 Socio-demographic factors influencing Foetal Outcome

Variable	Categories	N	Abnormal		OR	95%CI	p value
			Yes (%)	No (%)			
Age group in years	<25	121	46.3	53.7	1.0	0.6 – 1.6	1.0
	≥25	162	46.3	53.7			
Age group at first birth in years	<20	148	43.9	56.1	0.8	0.5 – 1.3	0.4
	≥20	135	48.9	51.1			
Level of education	None or primary	88	55.7	44.3	1.7	1.0 – 2.9	0.03
	Secondary or tertiary	195	42.1	57.9			
Religion	Protestant	220	46.4	53.6	1.0	0.6 – 1.8	1.0
	Others	63	46.0	54.0			
Employment	Unemployed	175	46.9	53.1	1.1	0.6 – 1.7	0.8
	Employed	108	45.4	54.6			
Husband or Partner's employment status	Unemployed	92	53.3	46.7	1.5	0.9 – 2.5	0.1
	Employed	191	42.9	57.1			
Income	No income	103	54.4	45.6	1.7	1.0 – 2.7	0.04
	Has income	180	41.7	58.3			
Sub-counties	Baringo East/North, Tiaty	116	53.4	46.6	1.6	1.0 – 2.6	0.04
	Others	167	41.3	58.7			
Place of residence	Urban	41	36.6	63.4	0.6	0.3 – 1.2	0.2
	Rural	242	47.9	52.1			

4.5 Past pregnancy history factors influencing Foetal Outcome

Table 5 shows past pregnancy history factors influencing foetal outcome. Results show significant association between complications developed immediately post-delivery by the mother and complications experienced by the mother during previous pregnancy. While the odds were lower for neonates of mothers who did not have complications immediately post-delivery (OR: 0.2; 95% CI: 0.1 – 0.8; $p = 0.01$) compared with mothers who had complications, the odds were higher for neonates of mothers who did not experience complications during past pregnancy (OR: 2.5; 95% CI: 1.0 – 6.2; $p = 0.04$). Mothers with past complications could be more careful and may seek care early compared to those who had not had such experience who may report late. Though not statistically significant, neonates of mothers who had at least most four previous pregnancies were up to 4.5 more likely to have had abnormal outcome unlike those whose mothers had more than four previous pregnancies. Equally, a higher proportion of neonates (53.6%) whose mothers had had at least two years or more interval between previous delivery and current birth had abnormal outcome compared to neonates whose mothers had shorter intervals (35%).

Table 5 Past Pregnancy History factors influencing Foetal Outcome

Variable	Categories	N	Abnormal		OR	95%CI	p value
			Yes (%)	No (%)			
Number of previous pregnancies	≤4	94	53.2	46.8	1.8	0.7 – 4.5	0.2
	>4	23	39.1	60.9			
Interval between previous delivery and current birth of index child	≥ 2 years	97	53.6	46.4	2.1	0.8 – 5.8	0.1
	<2 years	20	35.0	65.0			
Mode of delivery	SVD	80	55.0	45.0	1.8	0.8 – 3.9	0.1
	Others	37	40.5	59.5			
Complications during past pregnancy	No	90	55.6	44.4	2.5	1.0 – 6.2	0.04
	Yes	27	33.3	66.7			
Complications developed immediately post-delivery	No	99	45.5	54.6	0.2	0.1 – 0.8	0.01
	Yes	18	77.8	22.2			

4.6 Current Pregnancy History factors influencing Foetal Outcome

Table 6 shows current pregnancy factors associated with foetal outcome. Three factors of significance are gestational age of foetus at the time of birth, number of times the mother attended ANC and mother receiving IPT and hematinic. Neonates born at gestational age less than 39 weeks were 2.6 times at higher risk of having abnormal outcome than those born at the age at least 39 weeks or more (OR: 2.6; 95% CI: 1.3 – 5.1; $p = 0.007$). The risk was lower for neonates whose mothers met the minimum FANC requirement with 50% of such

neonates being less likely to have had abnormal outcome than those whose mothers did not meet the threshold (OR: 0.5; 95% CI: 0.3 – 0.8; $p = 0.007$). The same was true of neonates whose mothers received haematenics and IPT with the risk of having abnormal outcome being 50% lower than those who mothers did not (OR: 0.5; 95% CI: 0.2 – 1.0; $p = 0.04$). A comparatively smaller proportion of neonates whose mothers attended health centre for ANC (43.7%) or whose mothers decided on their own to attend ANC (43.4%) had normal outcome ($p = 0.07$). On the contrary, a higher proportion of neonates whose mothers started ANC at 28 weeks or more (56.1%) had abnormal outcome ($p = 0.2$).

Table 6 Current pregnancy history factors influencing Foetal Outcome

Variable	Categories	N	Abnormal		OR	95%CI	p value
			Yes (%)	No (%)			
Gestational age in weeks	<39	41	65.9	34.1	2.6	1.3 – 5.1	0.007
	≥39	242	43.0	57.0			
Attended ANC	Yes	264	45.1	54.9	0.5	0.2 – 1.2	0.1
	No	19	63.2	36.8			
Attend health centre for ANC	Yes	231	43.7	56.3	0.6	0.3 – 1.0	0.07
	No	52	57.7	42.3			
Gestational age when started ANC in weeks	≥28	41	56.1	43.9	1.6	0.8 – 3.1	0.2
	<28	242	44.6	55.4			
Who decided when to attend ANC	Self	221	43.4	56.6	0.6	0.3 – 1.0	0.07
	Others	62	56.4	43.6			
Number of times attended ANC	≥4	177	40.1	59.9	0.5	0.3 – 0.8	0.007
	<4	106	56.6	43.4			
Had IPT and haematenics	Yes	248	43.9	56.1	0.5	0.2 – 1.0	0.04
	No	35	62.9	37.1			
Mode of payment	Cash	166	48.8	51.2	1.3	0.8 – 2.1	0.3
	Insurance	117	42.7	57.3			
Amount paid for lab services in KSh.	<200	68	54.4	45.6	1.5	0.9 – 2.7	0.1
	≥200	215	43.7	56.3			
Amount paid for all the services in KSh.	<200	67	53.7	46.3	1.5	0.9 – 2.6	0.2
	≥200	216	44.0	56.0			

5.0 DISCUSSION

5.1 Association between individual factors and Maternal outcomes

According to the current study findings mother's gestational age was significantly associated with adverse maternal outcomes. Notably, a significantly higher proportion of mothers whose gestational age was less than 39 weeks had increased odds of having complications. This was in contrary to a study by (Sotiriadis, Petousis, Thilaganathan, Figueras, Martins, Odibo, & Hyett, 2019) who reported that the rate of maternal complication increases after 39 weeks gestation and reduces when less than 39 weeks. At the same time, a marginal significant association was found between who decides when to Attend ANC and maternal complications during delivery. Women who decided by themselves to attend ANC were 95.5% less likely to have had complications.

This finding is supported by a study by Sumankuuro, Mahama, Crockett, Wang and Young (2019) with similar results. A pregnant woman's ability to act on her preference and to take the lead in deciding on reproductive and pregnancy care had significant impact on service utilization outcome. The mothers were less likely to have had complications as evidenced in our current study results probably because early detection of high-risk pregnancy was done during the ANC visits. In the present study, 68.9% and 63.6% of the mothers had either attained secondary education and above or had some form of income and hence, socio-economically empowered and were able to decide on their own to Attend ANC on time which could have also contributed to reduction on the proportion of cases with complications

5.2 Association between individual factors and Fetal Outcomes

The results showed that mothers with none or with primary education were at a higher risk of experiencing abnormal fetal outcomes compared to mothers who had attained at least secondary level education. This finding was in line with a research done by (Cantarutti, Franchi, Compagnoni, Merlino, & Corrao, 2017) on mother's education and the risk of several neonatal outcomes where low level of education was associated with adverse neonatal outcomes. Educated mothers have better knowledge and information on modern medical treatment and have greater capacity to recognize specific illnesses. Some researchers however argue that factors such as childhood place of residence and socio-economic environment interact to dilute this strong association (Gage & Calixte, 2016).

This study also noted a significant finding that mothers who were coming from sub counties that were far from the hospital had adverse birth outcomes compared to those who were near the facility ($p=0.04$). This finding was supported by (Hanson and schellenberg, 2015) who stated that long distance to hospital contributes to high levels of direct obstetric complications. Poor road networks in our study area could have also led to delays in reaching the health facility on time. Income was also negatively associated with abnormal fetal outcome with a higher proportion of mothers with no income reporting higher proportion of cases of abnormal fetal outcomes.

The results concurred with a study done in Tanzania by Gwamaka (2012) which explored factors that affect utilization of maternal health facility among 59,987 women of reproductive age. It concluded that women who are employed may be able to save and so will have income hence are able to deliver in a well-equipped health facility compared to unemployed women. Aftab et al., (2012) also found out that poverty is a key hindrance to women's wellbeing especially during pregnancy resulting in malnutrition, anemia, low birth babies and fetal loss.

Our study found a significant association between complications developed immediately post-delivery by the mother and higher proportion of neonate abnormality. The odds were lower for neonates of mothers who had complications immediately post-delivery compared with mothers who did not have complications. Our study's finding is in contrary to a study by

Singh, Goli & parsuraman (2014) who found out that having stillbirths were significantly higher among women who had experienced obstetric complications compared to women who had not experienced obstetric complications in the past pregnancy. The mothers in our current study who had experienced past complications could be more careful and might have sought care early compared to those who had not experienced complications.

In the current study neonates born at a gestation less than 39 weeks were 2.6 times at a higher risk of having abnormal outcomes than those born at the age at least 39 weeks or more. The results agree with findings by Pirjani, Afrakhteh, Sepidarkish, Nariman, Shirazi, Moini & Hosseini (2018) who noted that higher incidence of Neonatal Intensive Care Unit (NICU) admissions for neonates born less than 39 gestational weeks than those who were born after 39 gestational weeks or more. These study findings also noted a significant factor that neonates whose mothers received Ionized Preventive Therapy (IPT) and haematinics have the risk of having abnormal outcome 50% lower compared to mothers who had not received the two preventive treatments.

This finding was supported, by Kaur Chauhan, Manzar, and Rajput (2015) who concluded that maternal hemoglobin has a positive relationship with the neonatal measures of weight, length and head circumference. According to WHO (2019) Ionized Preventive Therapy reduces fetal anemia, placental parasitemia, low birth weight, and neonatal mortality.

Significant finding was reported on the association between number of times a mother attended ANC and neonatal outcome. A significantly lower proportion of mothers who met the minimum requirement of FANC had fewer cases of abnormal neonates in contrast to those who did not meet this requirement. According to WHO (2018) more ANC visits is associated with greater maternal satisfaction than less ANC visits. Increased frequency of maternal and fetal assessment to detect problems reduces adverse fetal outcomes.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Gestation less than 39 weeks was associated with an increase in the odds of having maternal complications while neonates of mothers born at gestation less than 39 weeks were at a higher risk of having abnormal outcome. A smaller proportion of mothers who had attended Antenatal clinic (ANC) had complications compared with those who did not attend ANC, the risk of complication was lower for neonates whose mothers met the minimum Focused Antenatal Care FANC requirements, those who decided on their own to attend ANC and for those who received IPT and hematinic. Neonates of mothers with no or primary education were more likely to have adverse outcomes, the odds of abnormal births were higher for mothers without income compared to those with income.

6.2 Recommendations

The study recommends that improving female education, health education and awareness at community level by mass media organized by the county ministry of health can improve the health and social status of women in the rural areas. Educating women on early ANC registration, iron supplementation, use of contraception and birth spacing should be reinforced by the county hospital health care workers.

REFERENCES

- Agrawal, P. (2015). *Maternal mortality and morbidity in the United States of America*. (2015): 135-135

- Aftab, S., Ara, J., Kazi, S., & Deeba, F. (2012). Effects of Poverty on Pregnant Women. *Pakistan Journal of Medical Research*, 51(1).
- Banker Thomas et al. *BMC pregnancy and Childbirth* (2017) 17:403 DOI 10.1186/s 12884-017-1586-z
- Baringo County Government, “County Integrated Development Plan 2018-2022” (Kabarnet, Kenya: Office of the Governor, County Government of Baringo, 2018).
- Bhuinean and McATHY (2015) A systematic review of essential obstetric and newborn care capacity building in rural Sub-Saharan Africa. *An international journal of obstetrics and gynecology*.
- Cantarutti, A., Franchi, M., Compagnoni, M. M., Merlino, L., & Corrao, G. (2017). Mother’s Education and the Risk of Several Neonatal Outcomes: An Evidence from an Italian population-based study. *BMC pregnancy and childbirth*, 17(1), 221.
- Cheptum, J. (2012). Factors contributing to adverse pregnancy outcomes in public health facilities in Keiyo District, Kenya. *Unpublished thesis, Kenyatta University*
- Gage, A.J., & Calixte, M.G., (2016) *Effects of the physical accessibility of maternal health services on their use in rural Haiti*. Population Studies
- Geleto A, Chojenta, C, Mussa , & Loxton D, (2018) Barriers to access and utilization of emergency obstetric care at health facilities in sub-Saharan Africa-a systematic review protocol. *US National Library of Medicine National Institutes of Health*, 6;7(1):60.
- Gwamaka, S. (2012). *Utilization and factors affecting delivery in health facility among recent delivered women in Nkasi District* (Doctoral dissertation, Muhimbili University of Health and Allied Sciences).
- Hanson, C., Cox, J., Mbaruku, G., Manzi, F., Gabrysch, S., Schellenberg, D., & Schellenberg, J. (2015). Maternal mortality and distance to facility-based obstetric care in rural southern Tanzania: a secondary analysis of cross-sectional census data in 226 000 households. *The Lancet Global Health*, 3(7), e387-e395.
- Kyei, S, (2015) Barriers to obstetric care at health facilities in sub-Saharan Africa - a systematic review protocol. *ystematic Reviews* 20154:54
- KDHS (2014) *Kenya Demographic and Health Survey*. Nairobi: Kenya National Bureau of statistics
- Njoroge, E. W. (2012). The maternal and fetal outcomes among women with obstetric emergencies referred to the Kenyatta National Hospital, Nairobi, Kenya. *Unpublished MMED thesis*.
- Nyakato, V. I. O. L. A., & Charles, V. (2013). Couple relations, decision-making hierarchy and use of maternal health care in rural Uganda. *European Academic Research*, 1, 1216-1248.
- Ochieng’i, J, V, (2016) Relationship between Place of Referral and Birth Outcomes among Women with Obstetric Emergencies at Tenwek Hospital in Bomet County, Kenya. *Unpublished Thesis Moi University*
- Pirjani, R., Afrakhteh, M., Sepidarkish, M., Nariman, S., Shirazi, M., Moini, A., & Hosseini, L. (2018). ‘Elective caesarean section at 38–39 weeks gestation compared to > 39 weeks on neonatal outcomes: a prospective cohort study. *BMC pregnancy and childbirth*, 18(1), 1-5
- Poornima M, Daver R, (2018) Maternal and fetal outcome in obstetric referred cases. *Global J Res Analysis*. 2018;7(2):544-7.

- Sari K. (2009). Socio-Economic and Demographic Determinants of Maternal Health Care Utilization In Indonesia. The Flinders University of South Australia.
- Serech, Githuku, Gura, Warfa and Ochieng, (2018) Baringo County facility based perinatal Mortality. *DHS Futher Analysis Reports No.110*
- Singh, D., Goli, S., & Parsuraman, S. (2014). Association between obstetric complications & previous pregnancy outcomes with current pregnancy outcomes in Uttar Pradesh, India. *The Indian journal of medical research*, 139(1), 83.
- Sumankuuro, J., Mahama, M. Y., Crockett, J., Wang, S., & Young, J. (2019). Narratives on why pregnant women delay seeking maternal health care during delivery and obstetric complications in rural Ghana. *BMC pregnancy and childbirth*, 19(1), 260.
- Strully, K. W., Rehkopf, D. H., & Xuan, Z. (2010). Effects of Prenatal Poverty on Infant Health: State Earned Income Tax Credits and Birth weight. *American Sociological Review*, 75(4), 534-562.
- Thaddeus S, Maine D. (1994) Too far to walk: maternal mortality in context. *Soc Sci Med*. 1994;38(8):1091-10.
- Thorsen, V. C., Meguid, T., Sundby, J., & Malata, A. (2014). Components of maternal healthcare delivery system contributing to maternal deaths in Malawi: A descriptive cross-sectional study. *African Journal of Reproductive Health*, 18(1), 16-26. <http://doi.org/10.4314/ajrh.v18i1>
- Wamalwa, E.W. (2015). Implementation Challenges of Free Maternity Services Policy in Kenya: the health workers' perspective. *Pan Africa Medical Journal*, 22:375
- WHO, (2016) Standards for Improving Quality of Maternal and Newborn Care in Health Facilities
- WHO, (2018) Recommendation on Antenatal Care Contact Schedules. https://extranet.who.int/rhl/topic/improving_health_system_performance/who-recommendations-antenatal-care-contact-schedules
- WHO, (2019) Intermittent Preventive Treatment in pregnancy. https://www.who.int/malaria/areas/preventive_therapies/pregnancy/en/
- WHO, (2015). Trends in Maternal Mortality: 1990-2014- Estimates by WHO, UNFPA, UNICEF, The World Bank and the United Nations Population Division Geneva: World Health Organization; 2015.