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TARGETED HEALTH INTERVENTIONS TO SAVE MOTHERS, NEWBORNS, AND CHILDREN IN KENYA: A MULTI-FACETED APPROACH INFORMED BY BEHAVIORAL, DEMOGRAPHIC, AND CLINICAL RISK FACTORS

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Article Info

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Kenya, perinatal mortality, health interventions, maternal education, social support.

Abstract

This study examines the effectiveness of targeted health interventions aimed at reducing perinatal mortality in Kenya, with a focus on Lurambi and Butere sub-counties in Kakamega County. Using a community-based retrospective cross-sectional research design, mixed methods were employed to investigate the relationship between delays in making timely decisions to seek medical assistance and perinatal mortality. A total of 520 respondents were randomly selected from 40 villages, and data was collected through interviews from November 2017 to March 2018.The findings indicate that maternal education level and employment status significantly influenced perinatal mortality, highlighting the importance of socioeconomic factors in maternal and neonatal health. Factors such as wrong actions taken during antenatal complications, emergency unpreparedness, and lack of recognition of newborn danger signs were significantly associated with perinatal mortality. Birth preparedness and complication readiness during pregnancy and childbirth were identified as key components in reducing delays in obtaining care.This research underscores the critical role of strengthening maternal education and social support systems throughout the continuum of care, from pregnancy to postnatal periods, to ensure newborn survival. These findings contribute valuable insights into maternal and newborn healthcare practices and policy changes that, if implemented, could lead to a significant reduction in perinatal mortalities in Kenya and similar settings. Targeted interventions informed by behavioral, demographic, and clinical risk factors have the potential to transform the healthcare landscape and save the lives of mothers, newborns, and children in Kenya.

Introduction

Globally an estimate of 4.5 million perinatal deaths occurs annually from preventable causes (WHO, 2017; UNICEF, 2017). One million neonatal deaths occur on the day of birth, close to 1.9 million die in the first seven

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days of life (UNICEF, 2015; You, New, & Wardlaw, 2015;) and 2.6 million stillbirths occur annually (WHO, 2020). This translates to at least eight perinatal deaths occurring every minute resulting to almost 12,300 deaths daily.

The causes of perinatal deaths are largely related to pregnancy and birth complications (Vogel et al., 2014). The three main causes of early neonatal deaths are birth asphyxia, prematurity and infections (Kinney et al., 2010; Lawn et al., 2011). The high stillbirth rates accounting to 2.6 million globally could be attributed to inadequate access to appropriate maternal health care during the antenatal period and at the time of delivery with half (1.3 million) occurring during labor (Lawn & Kinney, 2016).Perinatal deaths are attributed to poor utilization of maternal and newborn care services (WHO, 2014; Blencowe, Cousen, Jassir, Say, Chou, Mathers et al., 2016). Untimely decision to seek both preventive and curative care is usually affected by, cultural beliefs and traditions, scarcity of emergency obstetric and newborn care services, bad previous experiences in health facilities, good outcome in previous pregnancies without health care, socioeconomic status and knowledge on danger signs (Pacagnella, Cecatti, Osis & Souza, 2012). These factors lead to delay in treatments that consequently result to neonatal deaths (Schmiegelow et al., 2012).

Previous studies are majorly facility based Waiswa et al., 2010; Memon, Khan, Soofi, Baig, & Bhutta, 2015; Nanyone et al., 2016) to the neglect of the community setting where there is increased mortality of stillbirths and early neonatal deaths. In addition, findings from hospitalbased studies cannot be generalized to population level unless every birth and death occurred in a hospital setting. Furthermore, the care-seeking process is mostly done late resulting to neonatal deaths. Determining factors that contribute to delay in care seeking is critical. This study sought to carry out a community based study to explore barriers to care-seeking using the three delays model developed by Thaddeus and Maine (1994) describing the root causes to both stillbirths and early neonatal deaths. The researcher adopted with modification the “three delays” model as a framework in assessing the barriers to timely decision making regarding maternal and newborn care services. These delays are: (1) delay in deciding to seek care, (2) delay in reaching appropriate health facility and (3) delay in receiving appropriate care once at the health facility. The model is critical in the identification of delays during antenatal, childbirth and postnatal periods that can result to delay in decision making and consequently, perinatal deaths.

Sub-Saharan Africa has the highest stillbirth rate of 28.3 per 1000 births and Neonatal Mortality Rate (NMR) of almost ten times higher than in the developed regions (Lawn & Kinney, 2016;

UNICEF, 2015). Kenya still experiences high perinatal mortality just like other countries in SubSaharan Africa. For instance, Perinatal Mortality Rate was estimated to be 29 per 1000 live births (Kenya Demographic Health Survey [KDHS], 2014) against the Sustainable Development Goal (SDG) 3 target 3.2 of 12 per1000 live births by 2030 (You, Hug, Ejdemyr, Beise & Idele, 2015).

High perinatal deaths have been linked to low accessibility and utilization of Emergency Obstetric and Neonatal Care (EmONC) services (WHO & UNICEF, 2012). Delay in deciding to utilize maternal and newborn care services could be related to complications that result in perinatal deaths. These factors which are associated with first delays are very important because once there is a delay in making decision to seek care at the household level, the subsequent care automatically gets delivered late resulting in perinatal deaths (Herbert, Lee, Chandran, Rudan, & Baqui, 2012).

Thaddeus and Mainne came up with Three Delays model with the first delay explaining the barriers linked to delays in make prompt decision-making in seek medical care (Thaddeus & Mainne, 1994). This model initially formulated for maternal mortality, provides a valuable conceptual framework for studying factors influencing perinatal mortalities in communities where data is limited. Kakamega County has been identified as one of the counties with poor maternal and neonatal outcomes (MOH, 2016). The Kenya Demographic and Health Survey reported poor accessibility and underutilization of maternal and newborn care services (KDHS, 2014) and that could be related to delay in making timely decision to seek medical assistance and underutilization of maternal and newborn evidence-based interventions which leads to perinatal deaths (Bhutta, et al., 2011).

During the year 2016, total perinatal deaths in Kakamega County were 1233 of which fresh stillbirths were 451 while early neonatal deaths were 397 and macerated stillbirths, 385 (District Health Information System [DHIS], 2016). While most of the sub-counties are on track, Lurambi and Butere sub-counties in Kakamega County were reported to be doing poorly in terms of Perinatal Mortality Rate of 57.2 and 40.5 per 1000 births, respectfully (DHIS, 2016). It is therefore vital to understand the contextual factors surrounding these perinatal deaths in Lurambi and Butere sub-counties in relation to delays in making timely decision to seek medical assistance.

1.1 Statement of the problem

In Kakamega County, perinatal mortality has remained high, despite the efforts by the county that aim to accelerate the reduction of PMR to 12 per 1000 births or less as recommended by the Sustainable Development Goals and Kenya's Vision 2030. PMR at the county level still remains high in spite of the innovative strategies by the county that include: Oparanya Care Ambulances that help in referrals during emergencies, Oparanya care programme 'Linda Afya ya Mama na Mtoto', that create demand for maternal and newborn care services, implementation of community midwives and community health volunteers (CHVs) that improve maternal and newborn services through enhancing community and health facility linkages.

The high rate of perinatal deaths are associated with poor accessibility to quality delivery of emergency obstetric and neonatal care (EmONC) and low use of available services (Friberg et al., 2010; Kinney et al., 2010). This study therefore sought to determine the underlying factors in Lurambi and Butere sub-counties, Kakamega County in Kenya that contribute to delays in deciding to seek maternal and newborn care services that are related to perinatal mortalities.

1.2 OBJECTIVES

1.2.1Broad Objective

The main objective was to determine the relationship between the delay in making a timely decision to seek medical assistance and perinatal mortality in Lurambi and Butere sub-counties, Kakamega County, Kenya.

1.2.2 Specific Objective

i) To investigate emergency preparedness and its associated factors among women residents of Lurambi and Butere sub-counties, Kakamega County, Kenya.

ii) To assess factors contributing to delays in making a timely decision to seek maternal and child health care services among women residents of Lurambi and Butere subcounties, Kakamega County, Kenya.

iii) To investigate the relationship between the delay in making a timely decision to seek medical assistance and perinatal mortality in Lurambi and Butere sub-counties, Kakamega County, Kenya.

2.0 MATERIALS AND METHODS

Study Design. A community based retrospective cross-sectional study where both quantitative and qualitative methods of data collection were used.

Study Setting. The study was carried out in Lurambi and Butere sub-counties in Kakamega County, Western Kenya. Lurambi Subcounty had the highest perinatal mortalities followed by Butere Subcounty with PMR of 57/1000 births and 40 per 1000 births respectfully (DHIS, 2016). The study area has approximate population of 300,000 and covers approximately 372.4 Km^2. The main economic activity of residents in the study area is small scale farming. Total fertility rate for Kakamega County was 4.4 children per woman and Contraceptive Prevalence Rate (CPR) stands at 60% for all family planning methods. Pregnant women who received 4+ ANC visits were 45 % while49% had births assisted by skilled birth attendants with 47% of the births delivered in a health facility (KDHS 2014).

Local inhabitants in the study area are Luhyas of Batsotso, Isukha, Marama and Kisa sub-tribes. Culturally, the social system perceives men as the heads of the family and the decision maker. Therefore, to uphold family honor, men strictly control women's movement, control finances and general resources which influence women's access to and utilization of health care services. The residents of this community also believe in the supernatural forces. In this regard, the mothers together with their newborns are kept indoors for some time after delivery to prevent newborn deaths that are perceived to be caused by 'the evil eyes'. Traditional birth attendants (TBA) are highly

recognized and appreciated as powerful actors in relation to pregnancy and childbirth which contributes to increased number of home deliveries and the attendant birth complications.

Study of Population: The study population were mothers who were residents of Lurambi and Butere sub-counties who delivered in the last two years preceding the study. The study was conducted between November 2017 and March 2018.

Sampling technique. A multistage sampling method was used. First, the two sub-counties in Kakamega County were purposively selected. Simple random sampling using lottery method was used to select 4 wards from each sub-county. In the second stage, five Community Units (CUs) were selected from each ward using simple random sampling. Random selection of 40 CUs was done and 19 and 21 CUs in Lurambi and Butere sub-counties, respectively selected. Third stage involved random selection of one village from each CU giving a total of 40 villages. Using table of random numbers, the researcher then randomly selected 13 mothers from each selected cluster giving a total of 520 study participants.

Sample size. The desired sample size was arrived at by using sample size formula for cluster sampling by Suresh and Chandrashekara (2012) for unknown populations with 95% confidence interval. Based on the PMR of 59/1000 for Butere and Lurambi Sub counties (DHIS 2016), the prevalence rate of 5.9% was used.

Inclusion criteria. Mothers who delivered in the last two years prior to the study and who were residents of the selected villages were included in the study.

Exclusion Criteria. Mothers who were mentally ill or who experienced perinatal deaths while residing in other sub-counties were excluded in this study.

Research Instruments. The researcher adapted and modified structured questionnaires used in similar study settings WHO Social Verbal Autopsy Instrument (WHO 2014), the Identifying Behavioral, Demographic and Clinical Risk Factors for Delayed Access to Emergency Obstetric Care in Pre-eclamptic women in Port Au Prince, Haiti survey Questionnaire (Hutchinson, 2016) and Newborn Services Rapid Health Facility Assessment Tool (Health Newborn Network, 2012). Interviewers administered questionnaire that had both open and closed ended questions that captured both quantitative and qualitative data. The open-ended questions required the respondents to give reasons and an explanation of the contributing factors related to specific variables. This tool included background and contextual information relevant to delays that contribute to stillbirths and neonatal deaths. The tool captured information on socio-demographic status, health status and care received relating to antenatal, intrapartum and postnatal care in addition to newborn care. The Three Delay Model was then used as a framework for categorizing contributing factors based on delay in decision making. The instruments were pre-tested in Malava Sub-County that shares similar characteristics with the sub-counties under study.

Qualitative data collection tool. In addition, the researcher used an interview guide to collect qualitative data from key informants who were the Maternity in-charges.The guided questions related to delay in provision of the signal functions and the contributing factors to the major causes of perinatal deaths. This gave supportive data that was triangulated with results from quantitative data.

Data collection procedures: Data was collected by 8 research assistants who were trained for two days and the third day used for pre-testing the tools. The principle investigator conducted key informant interviews (KII) with the maternity in-charges. The research assistants identified the households with the help of the CHVs who had mapped the households with the aid of the information in their Daily Activity Registers. The data collection process lasted five months (November 2017 to March 2018).

Data Analysis. All collected data were checked for quality, completeness, cleaned, coded and analyzed using the SPSS statistics version 21.0 The bivariate analysis was done followed by logistic regression. Qualitative data analysis employed integrative strategy (Young, 2009) that involved the turning of qualitative data into quantitative data. Quantitative transformation was achieved by the numerical coding of qualitative data to create variables in relation to the three delays model, allowing statements that could be quantified. The data were then combined and analyzed together with the quantitative dataset. The relationship between independent and dependent

variables was tested using the adjusted odds ratio and a p-value of ≤ 0.05 used to reject the null hypothesis. Analysis of qualitative data obtained from the KII, was done manually by coding the responses into themes. The themes were then categorized and summarized according to how they were discussed based on the three delays model.

3.0 RESULTS AND DISCUSSIONS

3.1 Findings

Maternal Socio-demographic Characteristics and Perinatal Mortality

Table 1 shows the socio-demographic characteristics associated with perinatal mortality. The socio-demographic factors included, age, marital status, level of education, employment, partner's employment status, religion, parity and birth order. Of these factors, mother's level of education and employment status had an effect on perinatal mortality. A higher proportion of mothers with none or primary education experienced perinatal mortality as compared to the respondents who had secondary and above level of education ($p<0.02$).

Employment influenced perinatal mortality whereby 58.6% of unemployed mothers experienced perinatal deaths as compared to the ones who were employed ($p<0.03$). Although majority (93.1%) of the respondents who experienced perinatal mortality were affiliated to other religions compared to Catholics, the relationship was marginally statistically significant ($p< 0.06$). The rest of the socio-demographic variables such as age group, marital status, among others posted nonstatistically significant relationship with perinatal mortality.

Table 1: Maternal socio-demographic characteristics and perinatal mortality Characteristics Response Perinatal death Alive p value

n		%	N	%		
Age group	15 - 24	14	48.3	158	35.0	0.15
	≥25	15	51.7	294	65.0	
Marital status	Married	25	86.2	406	89.8	0.53
	Others	4	13.8	46	10.2	
Level of education	None/Primary	17	58.6	167	37.0	**0.02**
	Secondary and above	12	41.4	285	63.0	
Employment	Unemployed	17	58.6	173	38.3	**0.03**
	Employed	12	41.4	279	61.7	
Employment status of partner	Unemployed	1	3.4	11	2.4	0.53
	Employed	28	96.6	441	97.6	
Religion	Catholic	2	6.9	98	21.7	**0.06**
	Others	27	93.1	354	78.3	
Parity	≤4	17	58.6	318	70.4	0.18
	5 or more	12	41.4	134	29.6	
Birth order	≤2	27	93.1	388	85.8	0.40
	3 or more	2	6.9	64	14.2	

3.2 Reasons for delay in utilizing antenatal care

Figure 1 presents reasons for delayed utilization of antenatal care services. There were 190 respondents who delayed to seek ANC services. The most frequent reason for not attending antenatal care was lack of social support (46.1%). Others were long distance to the health facility (23.1%), the perception that ANC services were not necessary (15.4%) and bad previous experience (7.7 %).

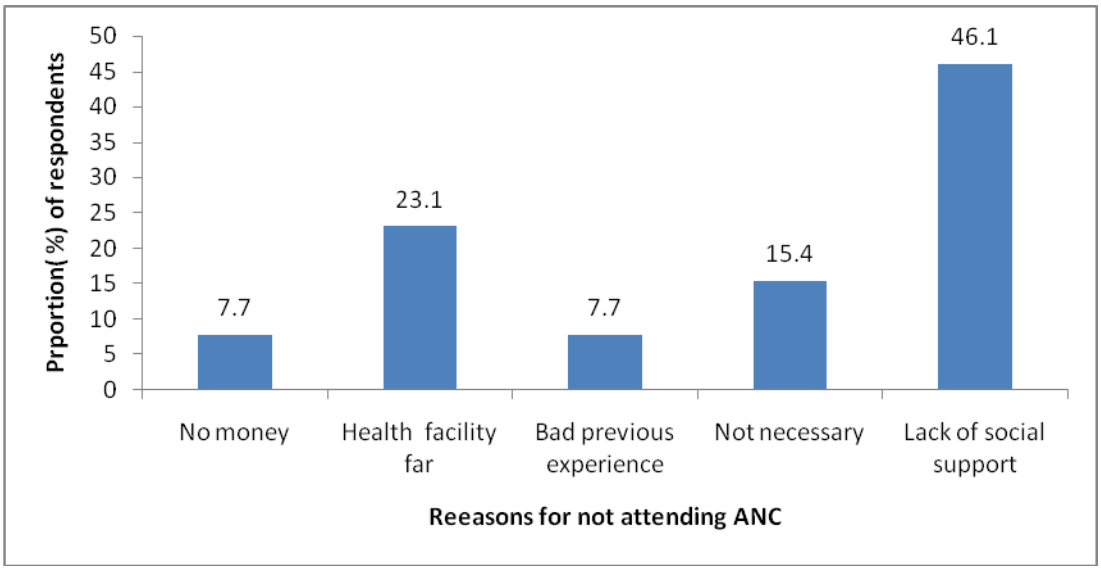

Figure 1: Reason for not attending antenatal care

3.3 Reasons for lack of emergency preparedness among the respondents

Figure 2 presents reasons for lack of emergency preparedness among the respondents. Different reasons were given by the mothers (n=130) who delayed to respond to complications in pregnancy. Not having a problem during pregnancy, was the major reason (27.3%). Culturally some (18.2%) mothers believed that, preparing for the unborn child could result in loss of the baby. Some of the mothers (17.3%) said that it was not easy to save money due to limited resources within their reach. Lack of knowledge regarding birth plan featured as a reason among 13.6% of the respondents while religion played a role as stated by 8.2% of the mothers who prayed to God to take care of them during pregnancy and trusted in God's will.

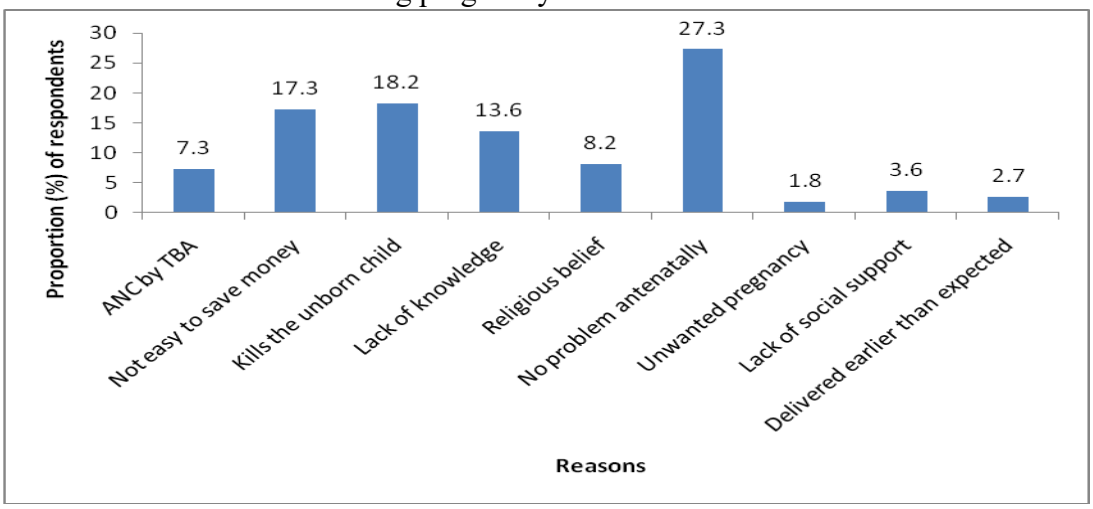

Figure 2: Reasons for lack of emergency preparedness

3.4 Reasons for delay in seeking labor and delivery services among the respondents Table 2 displays specific reasons described by the respondents who delayed to seek labor and delivery services from the health facility. Over a half of 481 respondents (266) delayed to seek labor and delivery services. Out of this total, 22.6% preferred to labor at home while 13.2% did not want to stay for long in the health facility. Care provided by the TBA care was preferred by 14.3 % of the respondents. It was also noted that transport issues (12%), husband not being at home when labor started (11.3%) and health facilities not operating on a 24 hour basis (10.2%) accounted for a significant proportion of delays at decision-making.

Table 2: Reasons for Delay in deciding to seek delivery services

Reason	n	%
Husband not at home	30	11.3
Preferred to be at home	60	22.6.
Preferred TBA	38	14..3
Lack of money	3	1.1
Lacked transport	32	12.0
Health facility far	11	4.1
Nearest health facility closed	27	10.2
Lack of knowledge	17	6.4
Avoid long stay in the health facility	35	13.2
No body to go with	13	4.9
Total	**266**	**100.0**

3.5 Causes of home delivery

Table 3 shows the main reasons for home delivery and related issues to bad previous experience. Out of the 481 respondents, 26.8% (n = 129) did not seek delivery services from health facilities. Among the reasons given were bad previous experience (21.7%), closed health facilities (19.4%), lack of delivery services (17.8%) from nearby health facilities, fear of caesarean section (16.3%), and transport issues at night (14.7%). The respondents who had bad previous experience (n=28) mentioned various incidences that contributed to not seeking delivery services from the health facility. These included fear of caesarean section (22.8%), lack of support during labor, harassment in while in labor (21.9%), lack of privacy (15.1%) and discharge of postnatal mother immediately after delivery.

Evidence gathered from the KII was also in agreement with this finding. KII # 18, a staff in one of the health facilities explained:

"We advise mothers who have scars due to caesarean sections to go to health facilities that can offer operation services. Surprisingly, some of these mothers will opt to labor at home and present to this health centre late in labor".

There was evidence indicating that mothers sought health care only when there was a complication. A maternity in-charge from a sub county hospital, KII # 1 commented:

"When you get a mother who normally delivers at home, this should quickly inform you that all is not fine! The fetal heart may be faint if not absent and mother's condition at that time is worrying. It takes time to get this mother to the appropriate health facility where she can be assisted because we have no theatre in our facility. By the time Red Cross ambulance arrives, the fetal heart may be absent and the mother may be in a critical condition".

A few mothers (7.9%) sought delivery services from TBAs because the TBAs use herbs that shorten duration of labor pains. However, one of the KII stated that herbal use during labor could have negative effect on birth outcome. KII # 13 from one of the hospitals explained:

"Mothers prefer TBAs because they are given 'shikutuli'. The mother chews the root of this herb once signs of labor are noted. The mothers say that, this herb shortens the process of labor and the mother delivers within few hours ……., less than six hours. Unfortunately, contractions may be so strong causing uterine rupture, intrauterine fetal death and maternal death if prompt action is not taken".

Table 3: Reasons for not delivering in the health facility and related bad experience

Reason for home delivery	n	%
Lack of delivery services (nearby health facility	23	17.8
Transport issues at night	19	14.7
Closed health facility	25	19.4
Bad previous experience	28	21.7

Born before arrival	13	10.1
Fear of C/S	21	16.3
Total	**129**	**100**
Explanation of the bad previous experience	**n**	**%**
Fear of C/S	5	22.8
lack of support during labor	7	16.0
Lack of skilled staff	2	5.5
Harassment in labor	5	21.9
Lack of privacy	3	15.1
discharge on delivery	6	19.2
Total	**28**	**100.0**

The picture of the herb was pinned on the noticeboard in labor ward, with a warning sign alerting maternity staff on the dangers of the herb. Complications of the herb were highlighted and they included: strong uterine contractions, uterine rupture, intra uterine fetal death, postpartum hemorrhage due to uterine atony and maternal death if prompt action is not taken. The figure below (Figure 3) shows a picture of the roots of the herb 'shikutuli' observed in one of the hospitals during this study.

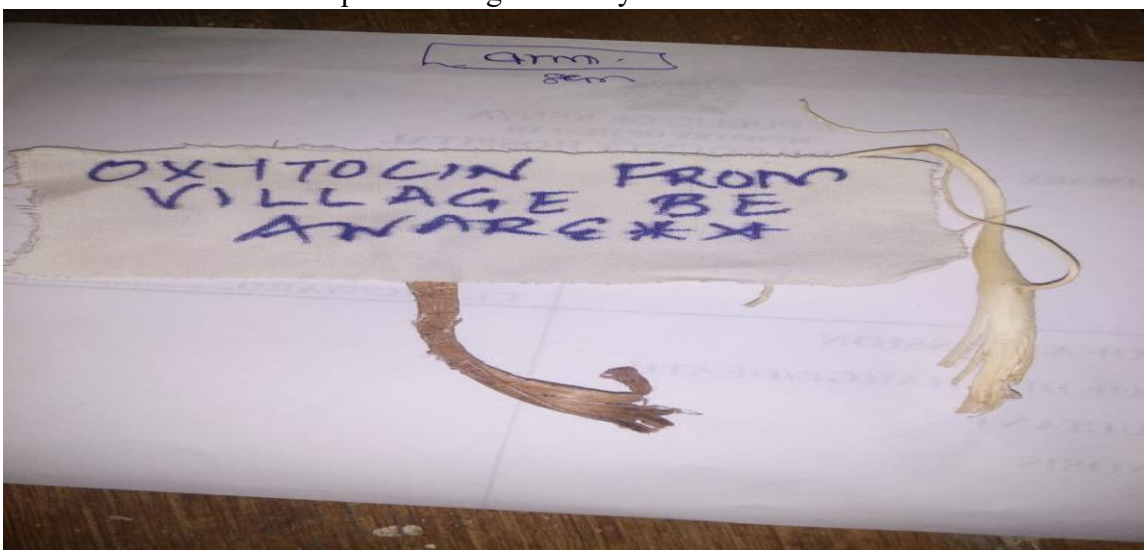

Figure 3: Shikutuli

3.6 Delay in seeking postnatal care

Table 4 shows various reasons that led to delayed postnatal care (PNC) by the respondents. Only 22.7% (n=109) received postnatal care within the first two days after birth. Out of the respondents who sought PNC late, one-half (50%) sought PNC within one to two weeks while 37% (n=178) sought PNC after 2 weeks of birth. The proportion of the respondents who never sought PNC at all was 3.3 % (n=16). Among the respondents who delayed to seek PNC, 24.7% stated that there was no health problem that warranted them to visit the health facility. Other frequently mentioned reasons were that the health care provider did not tell the mothers when to go back to the health facility (19.4%), lack of knowledge regarding postnatal care (13.5%) and baby being sick (8.8%) **Table 4: Reason for delays in seeking postnatal care services**

Reason for delays in Postnatal care	n	%
Initial PNC visit: Above 2 weeks	178	91.8
No PNC visit	16	8.2
Total	194	100
No health problem	52	26.8
Not recovered from child birth	15	7.7
Not informed by the health provider	35	18

Baby taken for immunization by someone else	3	1.5
Had not been prayed for	2	1.0
Baby died	6	3.0
Not allowed to mix with others	12	6.2
No reason	2	1.0
Baby was unwell	15	7.7
Too early to leave the house	13	6.7
Mother was unwell	3	1.5
Needed days to rest after birth	5	2.6
Lack of knowledge	23	11.9
Lack of money	8	4.1
Total	194	100

3.7 Delay in deciding to take sick newborn to the Health facility

Table 5 presents the main reasons that led to delay in deciding to take the sick newborn to the health facility. Delay was considered when the decision to seek health care was made after 12 hours, seeking care from other people other than health care provider, not seeking health care at all or perinatal death occurring out of the health facility. The proportion of the mothers who delayed to seek health care services when their newborn experienced danger signs was 7.5% (n=36). Out of this, 55.6% of the respondents with delay to seek newborn care were attributed to use of herbal treatment or local remedies. Other reasons included the perception that the disease could not be treated with hospital drugs (16.7%) and the feeling that the baby's condition was not so serious (19.4%).

Table 5: Reasons for delays in deciding to seek health care for the sick newborn

Reason	**n**	**%**
Perception that the disease could not be treated with hospital drugs	6	16.7
Herbal drugs used to treat the sick newborn	20	55.6
The perception that the baby's condition was not so serious	7	19.4
Transportation issues	3	8.3
Total	36	100

3.8 Intervention to prevent delays in decision making

Table 7 presents the relationship between Oparanya Care Programme and perinatal mortality in Lurambi and Butere sub-counties. Oparanya Care Programme supports enrolled mothers who are poor within Kakamega County through reminding them of when to seek care in health facilities. The mothers who seek health care promptly as per scheduled health visits benefit financially from the program. This study noted that 11.2% out of the 481 mothers interviewed had heard of Oparanya Care Programme and benefitted from the programme. The results show that Oparanya Care beneficiaries had never experienced perinatal deaths. There were 427 participants who had not heard and /or benefitted from the programme. Out of these, 6.8% (29) experienced perinatal deaths.

Table 7: Oparanya Care Progrmme by perinatal mortality in Lurambi and Butere sub- counties

Status of Oparanya Care Programme (OCP)	**Perinatal deaths**			
	Yes		**No**	
	N	**%**	**n**	%
Heard of OCP and Benefitted	0	0.0	54	11.9
Not heard/not benefitted	29	100.0	398	88.1

3.9 Relationship between delay in making a timely decision and perinatal mortality The three-delay model recognizes the first barrier to accessing care as the delay in making a timely decision to seek health care. Table 8 presents bivariate analysis of the relationship between delay in making a timely decision and perinatal mortality. Mothers who delayed to access antenatal care services, were 5.3 more likely to experience perinatal mortality than mothers who promptly accessed antenatal care services (OR=5.3; 95% CI: 2.2-12.7; $p < 0.0001$). Those mothers who delayed to take prompt action during an antenatal complication were 7.5 times more likely to experience perinatal mortality than mothers who took prompt action during an antenatal complication (OR: 7.5; 95%:3.4-16.5; $p < 0.0001$). Moreover, lack of emergency preparedness increased the risk of experiencing perinatal death to 15.7 times compared to those who were prepared to handle an emergency (OR=15.7; 95% CI: 5.8-42.1; $p < 0.0001$). Mothers who decided to seek labor and delivery services late were 2.7 times more likely to have perinatal death in contrast to women who decided to go to the health facility promptly on recognition of signs and symptoms of labor (OR=2.7; 95% CI:1.1-6.4; $p < 0.022$). Moreover, mothers who delayed to seek health care services for their sick newborns increased the risk of getting perinatal mortality 11fold in relation to the ones who made decisions to take their sick newborns to health facility promptly (OR=11.1; 95% CI:4.8-25.6; $p < 0.0001$).

Table 8: Bivariate analysis of the relationship between delay in making a timely decision and perinatal mortality

Characteristics	n	Perinatal death (%)	Alive (%)	OR	95%CI	p value
Delays in ANC	190	11.6	88.4	5.3	2.2 – 12.7	<0.0001
No ANC delays	291	2.4	97.6			
No action taken when had ANC complications	64	21.9	78.1	7.5	3.4 – 16.5	<0.0001
Prompt action taken	417	3.6	96.4			
Lack of emergency preparedness	130	18.5	81.5	15.7	5.8 – 42.1	<0.0001
Emergency prepared	351	1.4	98.6			
Delays in making decisions on labour and delivery	266	8.3	91.7	2.7	1.1 – 6.4	0.022
No delays	215	3.2	96.7			
Delays in making decision on PNC	170	3.5	96.5	0.4	0.2 – 1.1	0.89
No delays	311	7.4	92.6			
Delays in making decision on newborn care	39	30.8	69.2	11.1	4.8 – 25.6	<0.0001
No delays	442	3.9	96.2			

3.10 Predictors of perinatal Mortality

Table 9 below shows multivariate logistic regression of predictors of perinatal mortality in Lurambi and Butere sub-counties. Mothers who had prompt action during an antenatal complication were 60% less likely to experience perinatal mortality (AOR= 0.6; 95% CI: 0.1 – 0.9; $p = 0.03$). Mothers who prepared for emergencies were 90% less likely to experience perinatal death (AOR=0.1; 95 % CI: 0.04-0.42; p=0.0007). Similarly, mothers who made prompt decisions on newborn care were 90% less likely to experience perinatal mortality (AOR=01; 95% CI: 010.4; $p < 0.0001$).

Table 8: Multivariate logistic regression of predictors of perinatal mortality

Type of delay	Variable	Estimate	AOR	95%CI	p value
First delay	ANC delays	-0.23	0.8	0.3 – 2.4	0.7
	ANC complication	-1.02	0.4	0.1 – 0.9	**0.03**
	Emergency preparedness	-2.07	0.1	0.04 – 0.42	**0.0007**
	Labour and delivery	-0.15	0.9	0.3 – 2.3	0.8
	Newborn	-1.92	0.1	0.1 – 0.4	**<0.0001**

3.11 Discussion

The objective of the study was to determine the relationship between the delay in making a timely decision to seek medical assistance and perinatal mortality in Lurambi and Butere sub-counties. The socio-demographic factors that were significantly associated with perinatal mortality were maternal education and occupation and factors related to delay in making a timely decision to seek medical assistance. A significantly higher proportion of mothers who had none or primary education experienced perinatal mortality as compared to the respondents who had secondary and above level of education.

This finding confirms the results of a study conducted by Usynina, et al., (2017) which also reported similar findings where mothers with the lowest rates of education were more likely than those with a high level of education to experience perinatal death. The possible explanation is that, the group with higher level of education is equipped with relevant health information and is able to make informed decisions concerning their own health issues compared to those with none or low education levels (Gakidou, Cowling, Lozano, & Murray, 2010).

Morakinyo & Fagbamigbe (2017) demonstrated in a study done in Nigeria that mother's educational level, income status and deaths of newborns are closely related. The study findings revealed that among mothers who had better income, also had higher level of health education and were able to make appropriate health care decisions affecting both their health and newborns, reducing maternal and newborn deaths). Educated women are more likely during pregnancy and infancy to receive professional medical treatment.

Mother's unemployment is a risk factor of perinatal mortality as reported in this study. The finding is confirmed by a study reported by Behal & Vinayak (2015) whose results showed that lower socio-economic condition contributed to 48% of the perinatal deaths compared to 19% in the middle class. Notably, unemployed women have no resources to facilitate themselves to access health services and depend on others for support. This could also be due to the possibility of having majority of the unemployed mothers being less educated which would play a negative role in their health seeking behavior and hence delay in decision making to seek medical assistance.

First delay factors that were independently associated with perinatal mortality included delay in emergency preparedness and delay in making decision in the event of antenatal complication and newborn complications. Inadequate preparedness implied that mothers were poorly prepared to respond to a complication, unaware of danger signs and experienced danger signs without taking any appropriate action. Mothers who took prompt action during antenatal complication were 60% less likely to experience perinatal mortality. Mothers who prepared for emergencies were 90% less likely to experience perinatal death. Hazardous assumptions, which are viewed as culturally secure, pose a high risk to baby survival because scientific evidence shows that 99% of perinatal deaths are preventable (Pattinson, 2013). The perception that complication in pregnancy was normal, cultural beliefs and the superstitious perception that preparing for the unborn child could result to the loss of the baby, contribute to delay in deciding to seek health care services.

Limited resources within the women's reach made some mothers unable to save money. Lack of knowledge regarding danger signs and birth plan were among the reasons that led to the first delay. These findings are similar

to the ones recorded by Echoka, et al., (2014) in Malindi, Kenya which indicated that, lack of birth preparedness contributes greatly to newborn deaths. A first step towards seeking adequate, prompt treatment in relation to obstetrical emergency is the awareness of danger signs during pregnancy, childbirth and postpartum. Educated women tend to be well informed regarding danger signs. A study in Nigeria found that educated mothers made prompt correct decisions for their health and that of their newborns (Morakinyo & Fagbamigbe, 2017) thus preventing both maternal and newborn deaths.

Mothers who did not respond to their own complication promptly were 7.5 times more likely to experience perinatal death as compared to those who responded promptly. The most frequent reason why health facility was not considered initially as the source of care was too long waiting time. On the other hand, complication in pregnancy was considered as a normal occurrence and others preferred to stay at home waiting for spontaneous resolution of these problems. The alternatives to health care services were seeking care from other sources like relatives, TBAs, herbalists and local pharmacies. In the study area, TBAs used herbs known locally as 'shikutuli' to hasten labor process. The health care providers linked complications such as uterine rupture, fetal death and postpartum hemorrhage to the use of the herb. Similar findings in Uganda indicated that use of traditional herbs caused women to delay in seeking appropriate care resulting to stillbirths (Mukasa, et al., 2013).

This study presents evidence of association between lack of knowledge of danger sign in the newborn and perinatal deaths amongst mothers in Lurambi and Butere sub-counties. Recognition of danger signs and knowledge about prompt seeking of the available interventions should promote health care-seeking behavior. Mothers who made prompt decisions on newborn care were 90% less likely to experience perinatal mortality. The findings of this study are consistent with previous studies that showed that lack of awareness of danger signs amongst mothers led to underestimation of the severity of newborn illness leading to perinatal deaths (Okereke, et al., 2013; Schmiegelow, et al., 2012; Waiswa, et al., 2010). Similarly, a study done by Anyanwu and Okeke (2014) highlighted poor health care seeking behavior as being influenced by the underestimation of seriousness and duration of an illness contributing to poor pregnancy outcomes. Likewise, Echoka, et al., (2014) found out that maternal knowledge of neonatal danger signs and decision to seek medical care was a major contributor for newborn mortality in Albuluk pediatrics' Teaching Hospital in Sudan.

Reduction of socio-cultural barriers and dependence on other unqualified health care providers that negatively influence health-seeking behavior are crucial in minimising perinatal deaths (Mukasa, et al., 2013). Timely and appropriate health care seeking behavior regarding newborn illnesses is critical in ensuring survival of the newborn (Herbert, et al., 2012). These factors which are associated with first delays are very important to note because once there is a delay in making decision to seek care at the household level, the subsequent care automatically gets delivered late resulting in perinatal deaths.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The application of three delay model shades light on the contextual factors related to perinatal deaths occurring in Lurambi and Butere sub-counties, Kakamega County, Kenya. This study identified factors contributing to delays in decision making that play a key role in promoting newborn survival.

Maternal education and occupation have significant association with perinatal mortality. Educated and employed women are likely to seek prompt treatment. Inability to respond to a complication promptly, being unaware of danger signs and experiencing danger signs without taking any appropriate action contribute to newborn deaths. Late decision making, perception that complication in pregnancy is normal, use of herbal medicine, cultural belief and limited resources within women's reach are the most frequent reasons that lead to delayed decision making. Predictors of perinatal mortality that are related to delay in making a timely decision to seek prompt medical assistance in the study area are taking prompt action during an antenatal complication, being prepared for emergencies and making prompt decisions on newborn care.

4.2 Recommendations

This study recommends that the County Health Management Team (CHMT) and Sub-county Health Management Teams (SCHMT) should enhance reproductive health education programs by empowering women and building strong social support system that considers community and family, specifically male involvement, in maternal and newborn care services. Endeavors to increase awareness regarding birth preparedness and complication readiness strategy that promote the timely use of skilled maternal and neonatal care services should be prioritized. Birth preparedness and complication readiness reduce delay in obtaining care. Perinatal survival remains an urgent concern for achievement of Sustainable Development Goals by 2030. Strengthening maternal education and social support system along the continuum of care during pregnancy, delivery and post-natal periods is paramount to ensure newborn survival.

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