East African Medical Journal Vol. 90 No. 8 August 2013
DETERMINANTS OF MATERNAL MORTALITY AMONG WOMEN OF REPRODUCTIVE AGE ATTENDING KISII GENERAL HOSPITAL, KISII CENTRAL DISTRICT, KENYA (JANUARY 2009- JUNE 2010)
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ABSTRACT

***Objective*: To describe the causes and determinants of maternal mortality among women of reproductive age seeking healthcare services at Kisii General Hospital.**
***Design*: Descriptive retrospective study.**
***Setting*: Kisii General Hospital which is a Level-5 Referral Hospital.**
***Subjects*: Seventy-two women who had died as a result of pregnancy and childbirth related conditions who had sought obstetric services at Kisii General Hospital.**
***Results*: Majority 51 (70.8%) of deceased did not go to hospital promptly, due to; lack of transport 22 (30.6%), lack of money 17 (23.6%), and hospital distance 8 (11.1%). About 43 (60%) of those who died were between 15-25 years of age. Hospital experiences included; delay in service provision by staff 14 (19.4%), unavailability of blood for transfusion 6 (8.3%), and lack of money for drugs 12 (16.7%). Complications which led to maternal mortality were mainly; postpartum sepsis, bleeding, hypertension and cardiovascular conditions.**
***Conclusion*: Lack of lack of transport, inability to pay, delayed care seeking and lack of emergency obstetrics were the major challenges. Postpartum sepses, bleeding and pre-eclampsia were the leading complications that led to death.**

INTRODUCTION

Maternal mortality is on the increase in spite of efforts made by national governments and international agencies. Globally, nearly eight million women suffer from complications of pregnancy and childbirth and approximately 600,000 women die while giving birth annually (1). In sub-Saharan Africa, women have a one in 22 life-time risk of dying in either pregnancy or childbirth compared to a one in 7,300 chance for women of developed nations (2). However, maternal mortality ratio has decreased from 1990 to 2010 (1100 to 675 per 100,000 live births, respectively) in Sub-Saharan Africa which is still higher than global statistic which is 210 per 100,000 live births (3). The fifth MDG aims to improve maternal health with a target of reducing the MMR by 75% by 2015. Kenya is unlikely to reach the Millennium Development Goal, because according to KDHS, MMR has increased from 414 per 100,000 live birth in 2003 to 488 per 100,000 live birth in 2008 / 2009 (4). The efforts that have been made by member states and international organizations to reduce maternal mortality rates in order to achieve MDG 5 which is to improve maternal health haven't achieved much, especially in developing countries (5). For instance, India and Nigeria accounted for a third of global maternal deaths, with India at 19% (56,000) and Nigeria at 14% (40,000) between 1990 to 2010. Global, maternal mortality rate (MMR) in 2010 was 210 maternal deaths per 100,000 live births, down from 400 maternal deaths per 100,000 live births in 1990 (3, 6).

The numbers of women who die or suffer from morbidity following childbirth complications reveal that maternal health is extremely poor in many countries of the world. A tool that can be used to explore the story behind the woman's death is "Confidential Female Death Inquiries". Information received can help policy-makers to formulate policy guidelines and interventions at individual, community, facility, and political level. The three delay model tool can reveal: Who are these women who are dying? Why

did they come to hospital with risk factors which led to their death? Was there a delay in reaching the hospital? Why was there a delay? Were there difficulty in finding transportation to the hospital? Was there a financial problem? Was there nobody to make the decision or give permission? Was there a delay in accessing services at the hospital? Did the hospital have adequate supplies, equipments and adequate staff (7)? Many of them fall into the "Three Delays" conceptual model that ties the pieces and events of the stories that subsequently led to maternal deaths (8). The model proposes that pregnancy-related mortality is overwhelmingly contributed to by delay in three phases:

1. Deciding to seek appropriate medical help for an obstetric emergency which is influenced by the factors involved in decision-making; socio-cultural factors; distance from the health facility; financial and opportunity costs.
2. Reaching an appropriate obstetric facility, which depends on how far away the nearest facility is from her home in terms of distance and travel time; availability and cost of transportation; road conditions.
3. Receiving adequate care when a facility is reached; factors affecting the receipt and provision of care (includes the adequacy of the referral system); shortages of supplies, equipment, and trained personnel; competence of available personnel, ineffective communication, and poor patient management.

These three though complex, are related to each other, may contribute to maternal mortality.

The first step of reducing maternal mortality is to identify factors which are associated with maternal death. It starts with individual care seeking behavior, community support systems, and at the healthcare institution. Listening to stories behind a woman's death as well as complications of childbirth will help healthcare providers, healthcare administrators and policy-makers to have better understanding of the circumstances which lead to death of the women. It will identify strengths and weaknesses of the healthcare system that need to be strengthened in order to reduce maternal mortality (9). Verbal autopsy, confidential female death inquiry, facility-based death reviews and clinical audit are some of the strategies that have been used to measure process and health outcomes as well as structural contributors to maternal morbidity and mortality including facilities and equipment (1). Maternal mortality is a major public health concern and is an indicator of the standard of health care system, 98% of all maternal deaths occur in developing countries (10, 11). This represents one of the most glaring and unacceptable gaps between the developed and developing countries. In developed countries, there are approximately 27 maternal deaths per 100,000 live births each year; while in developing countries; the average is 18 times higher at 480 deaths per 100,000 live births. In some developing countries, one woman in ten dies from a pregnancy-related cause while in industrialised countries, this is one in 4,000. Overall each year close to 600,000 women die from complications related to pregnancy and childbirth. This is more than one death per minute (12).

In sub-Saharan Africa, the lifetime risk of maternal death for women is one in 39. In the US, it is one in 2,400; while in Sweden it is one in 14,100. This underscores the need for urgent and targeted investments in the hardest-hit countries (6).

Maternal mortality is a major public health problem in Kenya with an estimated 488 mortalities per 100,000 live births (13). In Kisii County it is estimated to be 500 deaths per 100,000 live births (14). The main objective of this study was to establish the causes, determinants and outcomes of pregnancy and childbirth which contribute to maternal mortality among women of reproductive age seeking for delivery services at Kisii Level 5 Hospital in the period 2009 to 2010.

MATERIALS AND METHODS

We retrospectively investigated causes and determinants of individual experiences and hospital factors antecedent to maternal mortality in a Kenyan referral Hospital: Kisii Level-5.

Study design: A descriptive retrospective study was used and qualitative and quantitative methods selected to conduct an in-depth investigation and analysis of the circumstances and events surrounding individual cases of maternal deaths.

Ethical approval was granted by the Ethical Research Committee from Kenya Medical Research Institute (KEMRI) Protocol No.1851 of November 2010. The permission to conduct the study was obtained from the Provincial Director of Medical Services Nyanza. The area Chief was informed. Those who participated in the study were assured of confidentiality; and if there were any psychological or emotional issues arising, counseling intervention within the research team was available.

Study Participants: Health records of maternal deaths which occurred from January 2009 to June 2010 at Kisii level 5 Hospital was used to trace the homes of the deceased to identify the study participants. A total of 72 maternal deaths occurred within that period and they were all included in the study. A structured questionnaire was administered to the immediate adult family member, who was present and attended to the deceased, thus the husband and if he was unavailable, then the mother or a close

relative participated. The interview was conducted by a registered nurse accompanied with two clinical officers in a room with no movement of people which was identified. Informed consent was sought prior to the interview from the respondents.

The research assistants introduced themselves to the family of the deceased, expressing condolences for the death of a beloved sister/wife who had died as a result of childbirth related complications.

The purpose of the visit was then stated as to try and establish the circumstances which led to her death. Information of her condition prior to her death was sought with the explanation that this was important, to prevent others like her from dying in similar circumstances. This would thus stop further tragic happenings.

The researchers used a Confidential Questionnaire of Female Deaths (CQFD) which were developed and validated by Chandramohn *et al.*, (15) in conducting verbal autopsies. Confidential Questionnaire of Maternal Mortality (CQMM) was used to gather information about: (misclassified) maternal deaths at hospital. The purpose of the two questionnaires was to link the diagnosis then list and classify the underpinning causes and determinants of maternal mortality.

For each family visited and reviewed, the sister method was used to investigate other women in the locality who had died as result of childbirth and associated causes. This was meant to capture additional maternal deaths occurring within the community. The families of the deceased mothers identified using the sister method were also approached and requested for participation in the study in a family interview as described earlier using the same tool.

Desk review of hospital files: All files of maternal deaths which occurred during the study period were sorted out and recorded in an entry list in the order in which they occurred. A systematic review was carried out, an independent Obstetrician and Gynecologist reviewed the case files: to determine the correctness of; the diagnosis and, evaluated the management and to establish if there was any mismanagement.

Data Collection Tools: Data collection involved three activities: extraction of hospital medical records, (sorting and listing them according to their respective diagnosis), a structured interviewer administered questionnaire for the family of the deceased. The CQFDs was used to list and classify all maternal deaths from January 2009 to June 2010. These tools were translated to Kisii and Kiswahili for easier understanding to the respondents who would not communicate in English.

Maternal deaths that were included in the study were traced to their respective communities where family kins were interviewed. Verbal autopsy and contributing factors questionnaire was used. It contained the following five sections:

1. Background pertaining demographics of the deceased;
2. Symptoms observed or the woman experienced and voiced concern;
3. Existing diseases, a list of diseases that may have indirectly caused maternal death (or adversely impacted the pregnancy);
4. Health seeking behavior/contributing factors to assess what the woman and those caring for her did between the time she fell ill and her death; and
5. Family's account of events surrounding the woman's illness and death. The interviews were conducted by the research assistants in the privacy of the deceased women's homes, within 12 and 18 months of the maternal death and recorded in a designed form.

Data Analysis: The demographic and obstetric data that were extracted from hospital medical records were analyzed using SPSS version 16.0. The hospital staff interview questionnaire and the verbal autopsy and contributing factors to maternal death, were analysed using a directed approach to content analysis (8). This approach was used in respect to the Three Delays Model pertaining to maternal death. The information provided an understanding of the context in which the maternal death occurred.

RESULTS

The study findings are presented in three parts. The first part presents the social demographic profile of the deceased women. The second part presents the underlying factors to maternal mortality. The third part presents the outcomes of pregnancy and childbirth complication antecedent to maternal death.

Demographics

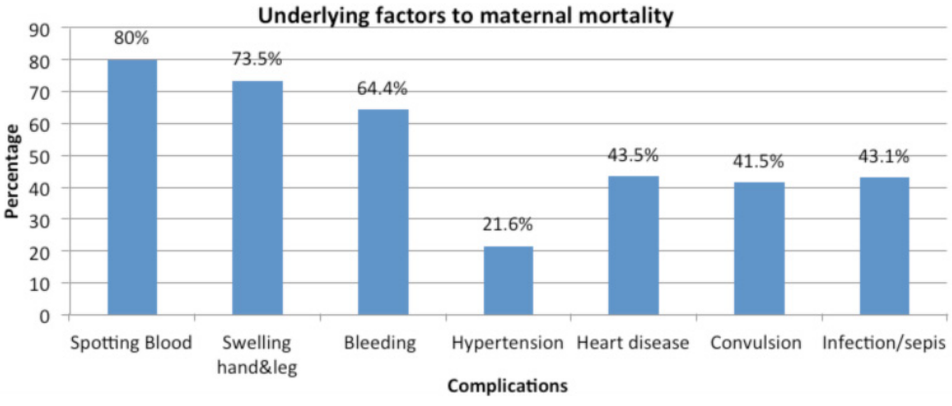
Between January 2009 and June 2010, 72 cases of maternal deaths occurred. Patients aged 15 to 45 years of age. Majority, 29 (40.3%) were between 21 to 25 years. See Table 1.

Table 1
Socio-demographic characteristics (N=72)

		N	%
Age in Years	15-20	14	19.4
	21-25	29	40.3
	26-30	21	29.2
	31-35	7	9.7
	36-45	1	1.4
Marital Status	Single	21	29.2
	Married	47	65.3
	Separated	3	4.2
	Widowed	1	14
Education	None	4	6.9
	Primary	5	6.9
	Secondary	33	45.8
	College/tertiary	29	40.3
Religion	Catholic	35	48.6
	Protestant	33	45.8
	Others (SDA)	4	5.6
	35		
Occupation	None	2	2.8
	Farmer	19	26.4
	Housewife	29	40.3
	Businesswoman	18	25.0
	Formal employment	7	9.7
Residence	Rural	50	69.4
	Urban	15	20.8
	Peri-urban	7	9.7

Underlying Factors to maternal mortality: More than a third of the subjects 80% experienced spotting of blood, 73.5% experienced swelling of hands and feet, 64.4% had bleeding in pregnancy, while 21.6% had raised blood pressure. The study also revealed that 43.5% subjects had pre-existing heart disease, 41.5% had convulsive disorders while 43.1% had postpartum infections.

Figure 1
Underlying factors to maternal mortality



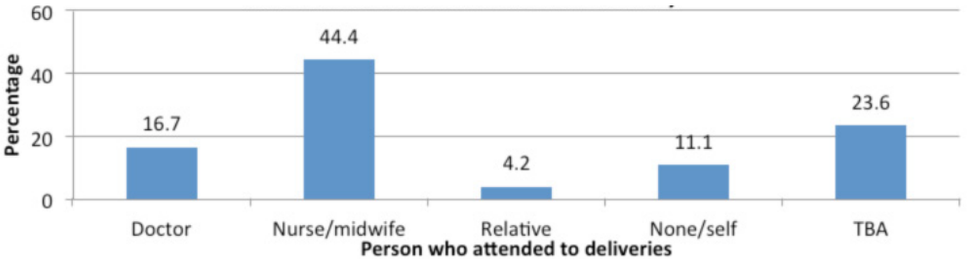
Immediate risk factors associated with maternal mortality: Out of 72 subjects, 38 didn't plan for their pregnancies, 20 pregnancies ended in abortion. Fourteen deliveries were preterm, while 25 deliveries occurred at home and 51 mothers didn't go promptly to hospital when labour started. Sixty-one had normal delivery, eight of them were operated, while three were breech deliveries. Although majority of the deliveries were normal, they were accompanied with risk factors that led to maternal death. See Table 2.

Table 2
Immediate Risk factors associated with maternal mortality (N==72)

		N	%
Previous pregnancies planned	No	38	52.8
	Yes	32	44.4
Abortion	Doubtful	2	2.8
	No	52	72.2
	Yes	20	27.8
Duration of previous pregnancies	Doubtful	14	61.1
	Term	44	19.4
	Preterm	14	34.7
Location of previous deliveries	Home	25	34.7
	Dispensary	7	9.7
	Health centre	17	23.6
	Hospital	23	31.9
Go promptly to hospital when labour started	No	51	70.8
	Yes	21	29.2
Type of delivery or birth	Normal	61	84.7
	Surgery or operation	8	11.1
	Breech	3	4.2

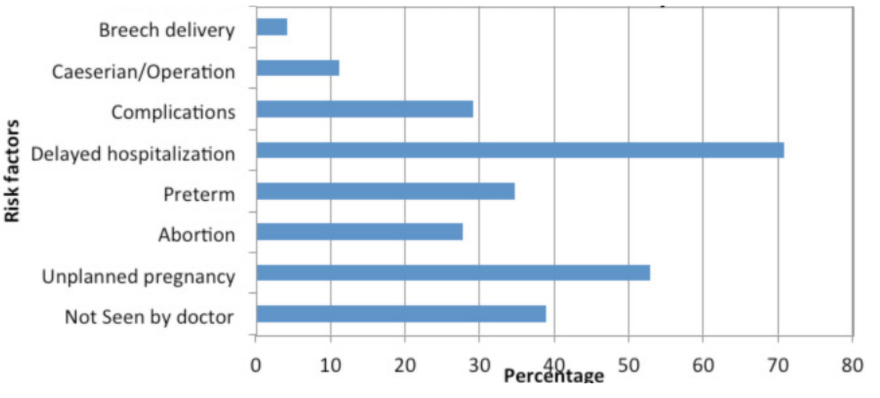
Outcome of pregnancy and childbirth complications antecedent to maternal death: The indirect causes of maternal mortality as reported by the adult kins of the deceased and collaborated by the obstetrician were; pre-eclampsia, bleeding, postpartum sepsis, pregnancy-induced hypertension and heart disease. Many deliveries were conducted by skilled attendants and other key players yet they had risk factors which led to maternal death. See Figure 4.2.

Figure 4.2
Person who conducted the last delivery



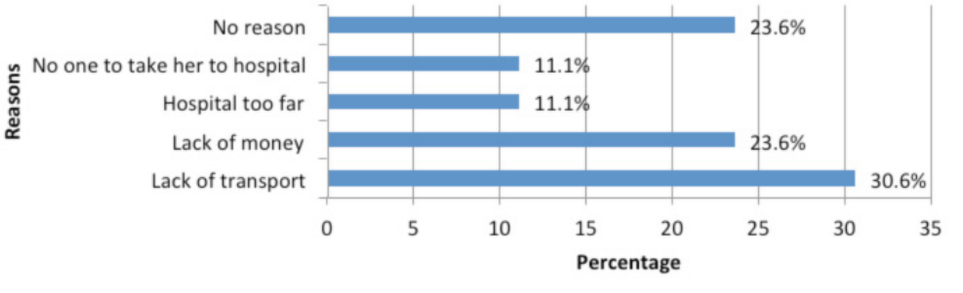
Risk factors to maternal mortality: Risk factors antecedent to maternal mortality included; delayed hospitalization, unplanned pregnancies, and obstetric complications, abortion, not being seen by the doctor, surgery and preterm deliveries. See Figure 4.3.

Figure 4.3
Type of Risk Complications which contributed to Maternal Death



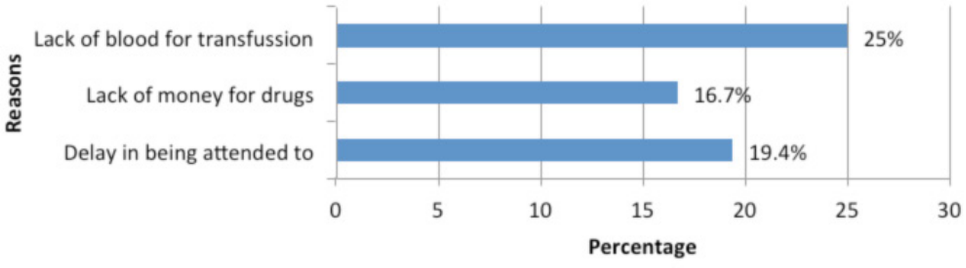
The outcomes of pregnancy and childbirth complications antecedent to maternal death. The Three Delays model (8) was used in the analysis of the circumstances which surrounded the event that led to these women's death from the community to the health institution.
Most of the subjects 51 (70.8%) did not seek prompt healthcare services.
The study confirmed that lack of transport, lack of money and long distances to the hospital were the main reason for not seeking healthcare promptly (Figure 4.4). However, 17 (23.6%) subjects had no reason why they did not seek prompt healthcare.

Figure 4.4
Reasons for delay in reaching hospital



Problem that affected the Availability, Quality and Utilization of Maternal Health Services: Delay in provision of healthcare services by staff was reported by 14 (19.4) subjects, while 6 (8.3%) subjects attributed the problem to lack of blood for transfusion following severe bleeding and 12 (16.7%) subjects had no money for purchasing prescription drugs. However, 18 (25%) subjects had no reason for not seeking health care services. See Figure 4.5.

Figure 4.5
Reasons for delay in receiving care at the institution



DISCUSSION

We retrospectively investigated individual and hospital factors antecedent to maternal mortality at Kisii General Hospital, a Kenyan Level-5 Referral Hospital.

Demographic characteristics: Majority of women who succumbed to maternal mortality were young females (21-25 years), had attained secondary education and 29.2% were unmarried and 28% died as a result of abortion. This study agree with another study (16) in which both reported that adolescent girls between the age of 15-24 are vulnerable to maternal death because of none use of antenatal care. Mortality among this group and their babies is a global collective failure (17), and dying in pregnancy or childbirth is common among teenage girls in developing countries (6).

Causes of maternal mortality: The study revealed that the major causes of maternal mortality were post-partum bleeding, heart diseases, infection/sepsis and convulsive disorders. The findings concur with other previous studies (18), except that heart diseases did not feature in them. This is probably a unique local variation in the study area. One salient finding in this study concerns abortion, (27.8%) for which a distinctive pattern emerged among women aged 15 to 19 years. Indeed the death rate from this group may be more than it is represented here since it is considered an illegal activity.

The outcomes of pregnancy and childbirth that were antecedent to maternal death: The study revealed that 61.1% were attended by skilled birth attendants yet they succumbed to death, while other deliveries were conducted at home where the women are exposed to risk factors which may have led them to death. While using the sisterhood method, the researchers netted 5 cases of maternal death. From these cases, we can deduce that maternal deaths take place in both hospitals and rural homes. Mothers seek healthcare services when they are in bad obstetric or health condition that it becomes almost impossible for the healthcare workers to reverse the situation. Various beliefs and customs affect the use of health facilities, for example, in Kisii community; delivery has to be conducted by elderly mothers. Most of the women deliver at home under unhygienic conditions, exposing them to greater risk of death.

Delay in seeking care: Out of the seventy-two deceased women, 23.6% had no reported reason as to why they did not seek obstetric care. This can be attributed to health seeking behavior. The inaction contributed to delay in seeking care (8). It has been observed that women do not seek healthcare services due to probably lack of independence in decision- making process on key issues affecting their own lives. For example, decision-making process is influenced by the husband, mother-in-law and occasionally advice from family members regarding where a mother can deliver. Many women need permission to visit a health facility or must be escorted when husband is away from home.

Delay in reaching the health facility: Delay in accessing healthcare services; lack of transport, lack of money, and hospital being far, were some of the challenges that negated accessing care. Transport can be a nightmare especially at night when labour start and the health facility is far and none in the neighbourhood has a vehicle even if money is available. Those trying to reach a far-off facility, fail and women with serious complications may die en route to hospital. This is made worse when combined with lack of transport, during rain-season and poor roads.

Limited access to financial resources is a major limiting factor in women control over their lives. In situations where women have no control over their own or their family income, their ability to use maternity services especially where user fees are involved are further constrained (20). Therefore, the economic independence of a woman seemed to have a direct effect on their lives for it would hinder the use of maternity care service facilities even when available. However, this is not only endangering their lives but also the lives of the newborn babies as well (20). The study showed that majority of women (69.4%) live in rural areas which have limited skilled

attendants; they seek the services of the TBAs thus, citing the reason for their delay. This concurs with another study (21) which showed that some of the skilled attendants have bad attitude that although they are trained, many women feel that they have insufficient and inadequate skills.

Unplanned pregnancies were revealed by the study as a challenge that can be addressed by access to contraceptives. The study revealed that 28% had abortion and this correlated with another study (22), which report that 13% of all maternal deaths occur among adolescents mainly as a result of complications of unsafe abortion.

The study revealed 11.1% of the subjects, cited Communication challenges. Healthcare facilities are few and spread far apart with poor road network that are impassable during rainy season

Delay in receiving care upon reaching healthcare facility: Delay in service provision by staff (19.4%) was cited as a challenge. They reported that few staff were on duty quite busy with other patients, while they waited for their turn. Lack of blood for transfusion and lack of money for prescription drugs negated provision of quality services. These are institutional problems that are common, and negate emergency obstetric care. However, many institutions are not functional due to frequent stock-outs, lack of equipment, essential supplies and qualified staff (8). This may have necessitated the choice of non-orthodox delivery services by these pregnant women.

In conclusion, given the clear lack of progress towards achieving MDG-5, in our country, it is important that if this goal is to become a reality, then best healthcare interventions and strategies should be identified on the basis of sound evidence that should be put into practice. Comprehensive analysis of the burden of mortality and morbidity would need to address both direct and indirect causes of death and disabilities. It also has to be acknowledged that as a whole, maternal death result from health system failures at many levels. That is from the individuals, the community structures and health system failure. Verbal autopsy should have a place as an important method that can be used to collect information on the cause of maternal deaths.

ACKNOWLEDGEMENT

This work received partial support from "Strengthening Nurses' Capacity in HIV Policy Development in Sub-Saharan Africa and the Caribbean funded by the Global Health Research Initiative (GHRI), a collaborative research funding partnership of the Canadian Institutes of Health Research, the Canadian International Development Agency, Health Canada, the International Development Research Centre, and the Public Health Agency of Canada.

CONFLICT OF INTEREST

The authors have no conflicts of interest.

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