

Factors Associated with Maternal Near Miss among Postnatal Mothers at Jinja Regional Referral Hospital

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ABSTRACT

Maternal near miss (MNM) serves as a pivotal marker for assessing the quality of maternal healthcare services and identifying areas for improvement. This study investigates the factors contributing to MNM among postnatal mothers at Jinja Regional Referral Hospital, Uganda. A cross-sectional analysis was conducted on 316 postnatal mothers admitted. Data collection involved structured questionnaires and medical record reviews, encompassing socio-demographic characteristics, obstetric history, antenatal care utilization, delivery-related factors, and maternal outcomes. The prevalence of MNM was 33%. Significant associations were found between MNM and maternal mortality. These results emphasize the imperative of tailored interventions targeting identified factors to enhance maternal health outcomes. Strengthening antenatal care services, improving access to skilled delivery, and implementing prompt interventions for obstetric complications are paramount in reducing MNM incidences. Further research is warranted to delve deeper into additional determinants and assess intervention effectiveness. This study contributes valuable insights into enhancing maternal healthcare delivery and reducing maternal morbidity and mortality rates in the region.

Keywords: Factors; Maternal Near Miss; Postnatal Mothers; Jinja Regional Referral Hospital; Association

INTRODUCTION

The improvement of maternal health has made slow progress in most of the sub-Saharan African countries [1, 2]. According to the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA) and the World Bank (2015) estimate, globally, 303,000 maternal deaths occurred in 2015, with the highest burden being in sub-Saharan African countries [3, 4]. Despite the high number of maternal deaths in many of the institutions within these countries, the absolute number for each center classifies these events as rare. Thus, in this situation, severe acute maternal morbidity or maternal near-miss could serve as a surrogate for maternal death to evaluate the quality of obstetric care in particular health institutions [5]. A maternal near-miss event or severe acute maternal morbidity is currently defined by the WHO as „a woman who nearly died, but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy“ [6]. Because there were no uniform criteria for the identification of near-miss cases and no standard definition for maternal near-miss until 2009, a heterogeneous estimate of rates was observed in different published literatures around the world. For instance, the rate ranged between 0.14% and 0.75% in some of the high-income countries [7] it ranged between 1.5% and 7.7% in some of middle-income countries [8], and, in sub-Saharan African countries, it ranged between 2.21% and 12% [2]. Worldwide, hypertensive diseases of pregnancy, obstetric hemorrhage, sepsis, anemia and obstructed labor/dystocia have been identified as the major causes of maternal near-miss [9]. Different literatures on maternal near-miss around the globe revealed different factors. Advanced maternal age, race, lower socio-economic status, rural residence, less or no antenatal care (ANC) follow-up, multiple pregnancies, nulliparous, multiparous, previous cesarean section delivery, pre-existing medical conditions, overweight and underweight were documented as factors for maternal near-miss [10]. Several studies have shown that the presence of maternal near-miss condition in women is strongly associated with the occurrence of adverse perinatal outcomes such as stillbirth, preterm birth, low birth weight, early neonatal mortality, birth asphyxia, and a possible admission to Neonatal Intensive Care Unit (NICU) [11]. In September 2015, the United Nations (UN) General Assembly formally approved a set of 17 Sustainable Development Goals (SDG) as a follow-up to Millennium Development Goals (MDGs). Improving maternal health remains an important topic of SDG, which is to reduce the global Maternal Mortality Ratio (MMR) to less than 70 per 100,000 live births by 2030 [12]. Globally, 303,000 maternal deaths occurred in 2015 with sub-Saharan Africa alone accounts for 66% of the deaths [3, 4]. The study of maternal mortality is a challenge mainly due to small number of maternal deaths in each health facility. Thus, because maternal mortality is a rare event, and because it follows a similar pathway to maternal near-miss, there is a benefit to include a larger number of cases for analysis, as research related to maternal near-miss is crucial when

examining the quality of obstetric care. Assessing near-miss has an advantage over maternal death as near-misses are more common and statistically robust [13].

Every year, at least 15% of women who become pregnant experience life-threatening complications, the majority of these occurrences are in low-resource settings [14]. These complications can result in either death or maternal near-miss (MNM). MNM refers to a woman who nearly died but ultimately survived life-threatening pregnancy complications [15]. In Sub-Saharan Africa, the incidence of MNM ranges from 1.1% to 33.4% of all deliveries [16]. In Uganda, the incidence of MNM and its risk factors remain unclear. MNM events are associated with high healthcare costs, poor maternal and infant outcomes, lost productivity, increased burden on healthcare systems, and increased risk of maternal death [17]. However, relatively little attention has been paid to MNM, particularly its prevalence and associated risk factors. Establishing the factors associated with among postnatal mothers attending postnatal clinic at JRRH in order to provide an important contribution to improving quality of obstetric care to reduce maternal death and improve maternal health is the aim of this study.

METHODOLOGY

Study Design

A facility-based cross-sectional study design was used to address the first and second objective of the study. A nested case-control study design, matched for age and study setting will be employed to address the third objective.

Area of Study

This study was conducted in Jinja Regional Referral Hospital in the obstetric and gynecological department in maternity unit. Jinja Regional Referral Hospital is located in Jinja Municipality, in the centre of Jinja approximately 84km East of Kampala. The hospital caters for populations of the Greater Bunyoro Region, encompassing the analysis of Busoga viz: Jinja, Bugiri, Iganga, Kaliro, Kamuli, Luuka, Mayuge, Namayingo, Kayunga, and Buikwe. The present bed capacity is 600. The hospital is one of the oldest hospitals in Uganda, dating as far back as the 1920's. It offers comprehensive obstetric services including Caesarean sections. It has an operating theatre that functions 24 hours a day and access to a blood bank. Jinja regional referral hospital refers patients with complex conditions to Mulago National Referral Hospital for advanced services (Ministry of Health).

Inclusion Criteria

All women admitted to the participating hospitals during the study period for the treatment of pregnancy-related complications (such as ectopic pregnancy or abortion), having delivered, or within 42 days of termination of pregnancy, and who fulfilled at least one of the conditions stated in the WHO criteria.

Exclusion Criteria

Those women with maternal near miss who delivered at another facility and come to the participating hospitals for further follow-up.

Sampling Size Determination

Using a sample size formula by Kish Leslie for cross-sectional studies (Kish Leslie et al. survey sampling. [18]:

$$n = Z^2 P (1 - P) / E^2$$

Where n = sample size estimate.

P = assumed true population prevalence of NM, results of a study in Kagadi hospital by Makubuya, Duncan Bruce, 2021, so P = 23.21%.

Z = Standard normal deviate at 95% confidence interval corresponding to 1.96

E = Absolute error between the estimated and true population prevalence of NM of 5%.

The calculated sample size $n = (1.96)^2 (0.893 \times 0.107) / (0.05)^2$
 $(3.8416 \times 0.14288) / 0.0025 = 316$.

Sampling Methods

The researcher used simple random sampling to obtain the required sample size

Data Collection Methods

Women who experienced a maternal near-miss event during pregnancy, delivery or the postpartum period will be identified prospectively. Data relating to the most important variables was abstracted from the medical record of the participants using the data abstraction tool. Women with a maternal near-miss condition and those without any complications during delivery will also be interviewed using structured, pre-tested questionnaire. The questionnaires were prepared following a thorough review of literatures. Data on the total number of live births occurring over one year was extracted from the Health Management Information System (HMIS).

Data Analysis

The data for the first objective were entered using Epi Info 7 software and analyzed using SPSS version 22 and Open Epi computer software.

Ethical Considerations

Acceptable ethical standards were strictly adhered to throughout the study process. The study first was approved by the Institutional Review Board KIU. It was also approved by the Ethical Review Committee of HRR hospital. Adequate explanation about the purpose of the study and a letter of support was given to all concerned bodies. In

order to abstract pertinent information from the participants' record, permission was obtained from the participants and administrators of the hospital. For studies that are not clinical trials that involve invasive procedures, taking verbal consent is the standard requirement of the Institutional Review Board of KIU. Hence, the participants gave verbal consent to be enrolled in the study after they received an adequate explanation of the study aim, benefits and potential harm. Privacy of the participants was maintained throughout the interview process. The anonymity of the participants was respected via the use of codes rather than the name of the participant. The names of the participants were not reported in the findings of the study to ensure confidentiality. The participants received an assurance that participation is voluntary and were informed as they have full right of withdrawal from the study without affecting the care they were permitted to.

RESULTS

Socio-demographic Characteristics of Respondents

Three-hundred and sixty mothers participated in the study with a 100% response rate. The mean age of the study participants was 26 years (SD ± 5.6 years) and the majority, of the study participants, 270 (85.4%) were married. Among the total respondents, 26 (8.2%) of mothers had no formal education level and (36.7%) were Orthodox Christians. Two third of the respondent, 220 (69.6%) were urban residents whereas 96 (30.4%) were from rural residents. Of the respondents, 127 (40.2%) were housewives and 65 (20.6%) were government employed as shown in Table 1 below.

Table 1: Socio-demographic characteristics of the study participants, Jinja regional referral Hospital (n = 316)

Socio-demographic characteristics	Category	Frequency (%)
Age	15-20	21 (6.6%)
	21-24	93 (29.4%)
	25-30	94 (29.7%)
	31-34	72 (22.8%)
	35-40	27 (8.5%)
	> 40	9 (2.8%)
Place of Residence	Rural	96 (30.4%)
	Urban	220 (69.6%)
Current marital status	Single	36 (11.4%)
	Married	270 (85.4%)
	Divorced	8 (2.5%)
	Widowed	2 (0.6%)
Education status	No formal education	26 (8.2%)
	Primary school	135 (42.7%)
	Secondary	82 (25.9%)
	College and above	73 (23.1%)
Occupation	Farmer	13 (4.1%)
	Merchant	61 (19.3%)
	Government	65 (20.6%)
	Housewife	127 (40.2%)
	Daily laborer	22 (7.0%)
	Others	28 (8.9%)
Religion	Orthodox	116 (36.7)
	Muslim	86 (27.2%)
	Protestants	111 (35.1%)

	others	3 (0.9%)
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Obstetrics and Gynecological Characteristics of the Respondents

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Of the total respondents nearly half of the study participants, 152 (48.1%) were multi-gravid. The majority, 283 (98.6%) pregnancies were wanted. Of all respondents, 11 (3.2%) had a history of stillbirth and 26 (8.2%) had a history of abortion. Regarding ANC follow up only three fourth 241 (76.3%) of pregnant mothers had ANC follow-up. 72 (22.8%) of the study participants were referred from another health facility. Of the respondents, 19 (6.0%) had a previous history of CS. Concerning the type of pregnancy majority, 306 (96.8%) of the participants were singleton. Among the respondents, 20 (6.3%) had preexisting medical conditions and such as hypertension (25%), Diabetes mellitus (20%), and HIV (20%) (Table 2).

Table 2: Obstetrics characteristics of the study participants, Jinja regional referral Hospital (n = 316).

Gynecological and obstetrics related factors	Category	Frequency (%)
Gravidity	Gravida 1	134 (42.4%)
	Gravida 2-4	152 (48.1%)
	Gravida > 4	30 (9.5%)
Parity (n = 168)	para 1	91 (54.2%)
	para 2-4	64 (38.1%)
	Para > 4	13 (7.7%)
Current pregnancy	Wanted	283 (89.6%)
	Unwanted	33 (10.4%)
History of stillbirth	Yes	11 (3.2%)
	No	305 (96.8%)
Number of stillbirths (n = 11)	Once	8 (72.7%)
	More than once	3 (27.3%)
History of abortion	Yes	26 (8.2%)
	No	290 (91.8%)
ANC follow up	Yes	241 (76.3)
	No	75 (23.7%)
Referred case	Yes	72 (22.8%)
	No	244 (77.2%)
Source of referral (n = 72)	Health center	22 (30.6%)
	Hospitals	32 (44.4%)
	Private clinic	18 (25%)
Previous history of CS delivery	Yes	19 (6.0%)
	No	297 (96.0%)
Type of pregnancy	Singleton	306 (96.8%)

	Multiply	10 (3.2%)
Preexisting medical condition	Yes	20 (6.3%)
	No	296 (93.7%)

Prevalence and Causes of Maternal Near-miss

The prevalence of maternal near-miss was (16.1%), with 95% CI (12.3, 20.3) among mothers at Jinja Regional Referral hospital. Of those, the intervention given for management of maternal near-miss was blood transfusion (19.6%), laparotomy (13.7%), 7H2O.MgSO4 (41.2%) and antibiotics (25.5%). The majority of maternal near-miss cases was hypertensive disorder 21 (41.2%), followed by sepsis 12 (23.5%), Obstetric hemorrhage 10 (19.6%), OL/uterine rupture 5 (9.8%), and pregnancy with abortive outcome 3 (5.9%) (Figure 1).

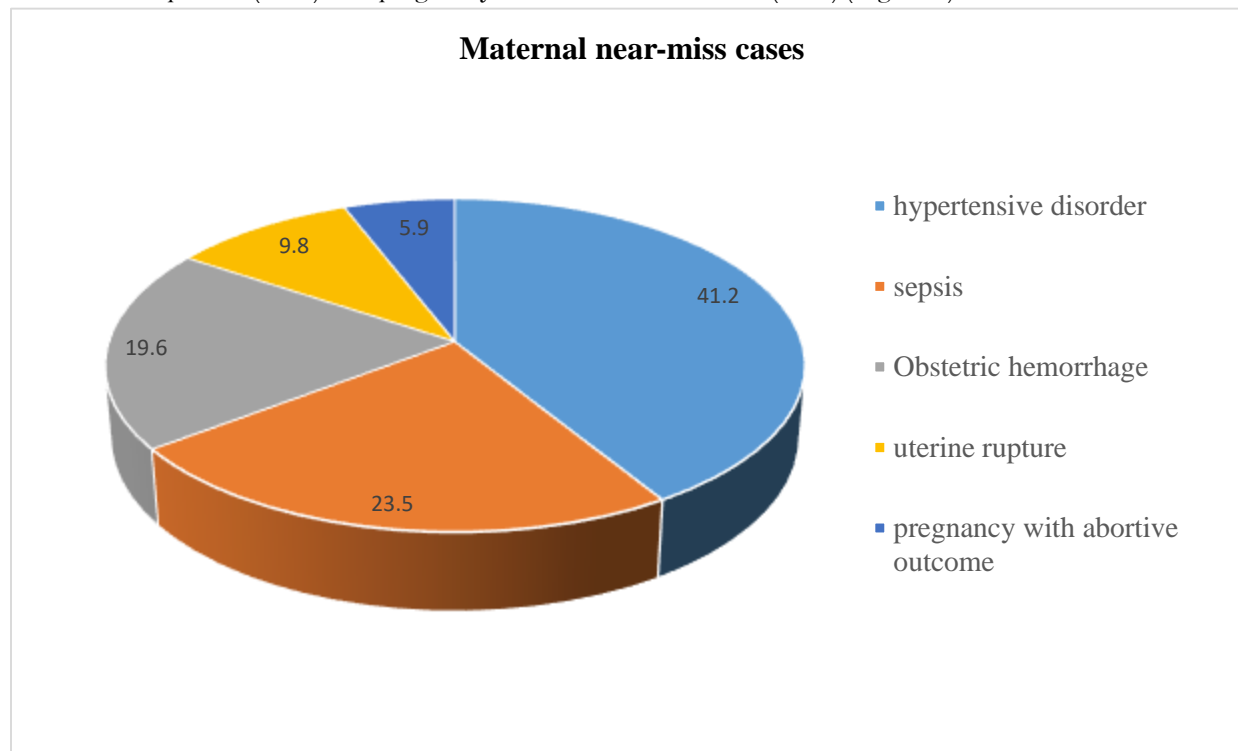


Figure 1: Maternal near-miss cases

Factors Contributing to Maternal Near-miss

Of the respondents, 12 (3.8%) of pregnant mothers were delayed in seeking health care facilities. The dominant reason for the first delay was traditional practices (41.7%) followed by underestimating severe conditions (25%), belief that God was in control (16.7%), lack decision to go to the hospital (8.3%), and bad experience to health systems (8.3%). Most of the study participants, 271 (85.8%) were reached the hospital within 60 minutes to receive care. The median time taken to reach the final care health facility (second delay) among study participants was reportedly 40 minutes with an IQR of 20 minutes. Regarding the Third delay (delay in receiving care) the median time taken to get clinical interventions was 10 minutes after admission to the hospital. Of the respondents, 42 (13.3%) faced problems in the hospital. Of the problems lack of supply and equipment's, 19 (45.2%) were the most predominant problem for the third delay in the hospital as indicated in table 3 below.

Table 3: Factors contributing to maternal near-miss

Access to reproductive health services	Category	Frequency (%)
Delay in deciding to seek health facility	Yes	12 (3.8%)
	No	304 (96.2%)
Time to reach the hospital	Within 60 minute	271 (85.8%)
	> 60 minute	45 (14.2%)

Delay at treating hospital	<= 30 minute	292 (92.8%)
	> 30 minutes	24 (7.2%)
Did you face problems in hospitals	Yes	42 (13.3%)
	No	274 (86.7%)

Association of Factors with Maternal Near-Miss.

Maternal near-miss were 4.2 times more likely among mothers who were rural residents as compared to urban residents [AOR: 4.2, 95% CI (1.3, 13.9)]. Likewise, study participants who were referred from other health facility were 5.5 more likely to had maternal near-miss as compared to who were not referred [AOR: 5.5, 95% CI (1.8, 17.4)]. The odds of maternal near-miss were 10.2 times more likely among those who had a history of stillbirth as compared to those who didn't [AOR: 10.2, 95% CI (1.4, 71.8)]. Pregnant mothers who reach > 60 minutes to the hospital were 4.8 times more likely to develop maternal near-miss as compared to those who reached within 60 minutes [AOR: 4.8, 95% CI (1.34, 16.9)] as shown in Table 4.

Table 4: showing association of factors with near-miss

Variables	Category	Near-miss		COR (95% CI)	AOR (95% CI)
		Yes	No		
Place of residency	Rural	32	64	5.3 (2.8, 9.9)	4.2 (1.3, 13.9)*
	Urban	19	201	1	1
Educational status	No formal education	10	16	3.8 (1.6, 8.9)	2.6 (0.49, 13.7)
	Have formal education	41	249	1	1
Parity	Para 1	10	81	1	1
	Para 2-4	13	51	2.1 (0.84, 5.1)	1.2 (0.32, 4.6)
	Para > 4	5	8	5.1 (1.4, 18.5)	0.22 (0.02, 3.1)
Gravidity	Prim-gravid	22	112	0.7 (0.35, 1.3)	0.52 (0.1, 2.9)
	Multi-gravid	29	152	1	1
Referral case	Yes	36	36	15 (7.6, 30.7)	5.5 (1.8, 17.4)*
	No	15	229	1	1
History of stillbirth	Yes	5	5	5.6 (1.6, 20)	10.2 (1.4, 71.8)*
	No	46	259	1	1
History of abortion	Yes	2	24	0.41 (0.1, 1.8)	0.2 (0.01, 3.9)
	No	49	241	1	1
Delay to make a decision	Yes	8	4	12.5 (3.5, 42)	1.2 (0.12, 7.7)
	No	43	261	1	1
Time to reach the hospital	Within 60 minutes	28	243	1	1
	> 60 minutes	23	22	9.1 (4.5, 18.3)	4.8 (1.34, 16.9)*

DISCUSSION

In this study, the prevalence of maternal near-miss was 16.1% with 95% CI (12.5, 20.3). This study was almost in line with finding from global reported 15% and Sub-Sahara countries 12.2% respectively [19]. However, it is higher than the report in India at 1.6%, Bangladesh 2%, Brazil 0.5%, Ghana 3%, and Southwestern Nigeria at 1.8% [17]. The current study is also higher than the study done in some parts of Ethiopia, Felege Hiwot Hospitals 10.6%, Addis Ababa Specialized Hospital 0.81%, and Yirgalem hospitals 3.3% [20]. The reason for the high prevalence might be

related to the study area difference because in this study majority of the patients including outpatient, and inpatients are being referred from collateral health facilities to the hospital. The other reason might be since the data were collected prospectively, there were no missing cards or missing patients. In another way, in this study the prevalence of maternal near-miss was lower when compared to the studies done in Amhara region hospital 23.3 and Mizan Tepi Hospital 24.85% [21]. The possible reason might be the difference in a health facility and socio-demographic difference. This study also revealed that almost half the underlying cause of maternal near-miss was due to hypertensive disorder of pregnancy and most maternal near-miss occurred before arrival to these hospitals. This study is similar to the study done in India, Nigeria, Addis Ababa Specialized Hospital, and southern Ethiopia [22]. In the current study, the rural residence was one of the significantly associated factors for maternal near-miss. This study was in line with the study conducted in Nigeria, Ethiopia, Amahara regional state, Mizen-Tepi South region, Addis Ababa Specialized Hospital, and Jimma Specialized Hospital [23]. Because most of the near-miss cases were frequent and related to delays in reaching and receiving adequate care [24]. Similarly, being referred from other health facilities also was found as a significantly associated factor with maternal near misses. This is similar to study done in Ghana, South Africa, Gurage zone hospitals, and Addis Ababa Ethiopia [24]. Because most of the near-miss cases were frequent and related to delays in reaching and receiving adequate care. Another contributing factor for maternal near-miss in the study was a history of stillbirth. This finding was consistent with the study done in Bangladesh and Addis Ababa hospitals [25]. This might be mothers who had a history of the previous stillbirth in the previous pregnancy might have a chronic disease and obstetrics complications that might be complicated during pregnancy might have recurred in the current pregnancy. Second, maternal delay (time to reach the final care health facility) was found to have a significantly associated factor with a maternal near miss. This finding is in line with the study done in Somalia [26].

CONCLUSION

In this study, the prevalence of maternal near-miss was relatively high. Being a rural residence, referred mothers, the time takes to reach the hospital, and the previous stillbirth were the factors independently associated with the occurrence of maternal near-miss. The presence of maternal near-miss in mothers is an independent risk factor for adverse perinatal outcomes.

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