Journal of Health, Medicine and Nursing
ISSN 2422-8419 An International Peer-reviewed Journal
Vol.26, 2016

Factors Associated With Adverse Perinatal Outcomes Among Women Referred In Labour to Mbarara Regional Referral Hospital.

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The research was financed by African Development Bank (ADB).

Abstract

Background: In 2013, 1 million newborns died on the day they were born, 2 million newborns died within the first seven days after birth, representing 73 per cent of all neonatal deaths. There are also 1 million intrapartum related stillbirths yet 280,000 babies die of birth asphyxia soon after birth. Women referred for delivery have higher poor neonatal outcomes**.**

Objective: The objective of the study was to determine factors associated with adverse perinatal outcomes among women referred in labour to Mbarara regional referral hospital**.**

Methods: In an unmatched case-control study was conducted between October 2015 and February 2016 a total of 318 referred mothers (106 cases and 212 controls) were enrolled. Data was collected on socio-demographics, obstetric and health system variables, entered in Epidata version 3.1 and analyzed using STATA Version 2012. Frequencies, percentages were summarized, the odds ratios of each parameter were recorded with the corresponding 95% confidence intervals (CI) and p-values**.**

Results: Admission in second stage of labour (aOR 3.7 95% CI: 1.53-9.03, p=0.0001), fetal distress (aOR 7.1 95% CI: 2.92-17.45, p<0.001), cord prolapse (aOR 7.2 95% CI:1.13-45.72, p=0.037), gestational age below 37 weeks (aOR 2.7 95% CI: 1.25-6.00], p<0.0391), preeclampsia aOR (13.3 95% CI: 2.75-63.85, p=0.001), ruptured uterus (aOR 38.7 95% CI: 4.55-329.00, p=0.001), receiving pre-referral interventions aOR 2.0 95% CI: 1.12-3.73, p=0.020), and stay at the referring facility for less than 6 hours (aOR 4.7 95% CI: 1.33-16.48, p=0.0221) were independently associated with adverse perinatal outcomes among women referred in labour to MRRH. The socio-demographic factors were not associated with adverse perinatal outcomes.

Conclusion: Admission in second stage of labour, fetal distress, gestational age less than 37 weeks, ruptured uterus, cord prolapse, pre-eclampsia, pre-referral interventions and stay at the referring health facility for less than 6 hours were independently associated with adverse perinatal outcomes among women referred labour to MRRH. Early recognition of women at risk of adverse perinatal outcomes, timely referral followed by prompt and appropriate management, may reduce the adverse perinatal outcomes of referrals.

Key words: Referrals, adverse, perinatal outcome, labour.

Background

In 2013, 1 million newborns died on the day they were born, 2 million newborns died within the first seven days after birth, representing 73 per cent of all neonatal deaths (UNICEF, 2014).There are also 1.19 million intrapartum related stillbirths (Lawn et al., 2011) yet 280,000 babies die of birth asphyxia soon after birth (Lawn et al., 2005).The perinatal mortality rates are still high in sub-Saharan Africa, where little progress has been made over recent decades yet majority of these newborn deaths are due to preventable causes(Kinney et al., 2010, Lawn et al., 2005) Maternal interventions do benefit newborn babies particularly in relation to newborn survival but preventing deaths in new born babies is still a major challenge in developing countries, particularly in Africa (Darmstadt et al., 2005, Lawn et al., 2005). Therefore early detection and transfer to higher levels of care substantially reduces complications of child birth, including birth asphyxia, that have been found to contribute up to one third of the neonatal deaths in some developing countries(Mother et al., 1994, Kusiako et al., 2000).

Access to appropriate maternity care including prompt referrals for emergency obstetric care (EmOC) services and skilled birth attendance could significantly reduce both perinatal and maternal mortality and/or morbidity (Ronsmans et al., 2006, Paxton et al., 2005). Once a decision is made that a complication needs medical intervention, availability of transport and easy accessibility to a facility with emergency obstetric care

services is crucial. Three main delays influence the provision and use of emergency obstetric care delay in decision making to seek care when a complication arises, delay in reaching a facility that can provide emergency obstetric care and delay in initiating care (Thaddeus and Maine, 1994)

Poor fetal outcomes are higher among women referred for delivery. A registry study conducted in tertiary hospital in north eastern Tanzania on 21,011 deliveries, drawn from the birth registry, during 2000-07 showed that low Apgar score (adjusted OR 1.42, 95% CI 1.09-1.86, P < 0.01) and neonatal ward transfer was significantly associated with formal referral (Sørbye et al., 2011).

A study conducted to determine antenatal and intrapartum risk factors for birth asphyxia among emergency obstetric referrals at Mulago Hospital, Kampala, Uganda showed that socio-demographic factors were not associated with birth asphyxia. Factors significantly associated with birth asphyxia were, antepartum haemorrhage (OR 2.12, 95% CI: 1.11-4.05, p=0.018),severe preeclampsia/eclampsia (OR 10.62 95% CI: 2.92-38.47,p=0.020) ,fetal distress and meconium staining of liquor (OR 6.40 95% CI: 2.76-14.82, p=0.001) (Kaye, 2004).

A cross-sectional descriptive survey on the maternal and fetal outcomes among women with obstetric emergencies referred to Kenyatta National Hospital, Nairobi, Kenya showed that 57.4% of the neonates had good outcomes. The main adverse neonatal outcomes were asphyxia (23.2%) and prematurity (12.8%). Two neonatal deaths due to complications of severe asphyxia were recorded. Most of the emergency obstetric referrals were of low socio-economic status and were referred from lower level health facilities that is, Level two to four **(**Njoroge, 2012).

Uganda's perinatal mortality rate is 40/1000 births (UDHS 2011). Western Uganda has a perinatal rate of 54/1000 birth which is the highest rate in Uganda (UDHS 2011). Review of MRRH records between September and November 2014 showed that referrals contributed to 60% of the 112 adverse perinatal outcomes (still births, birth asphyxia and early neonatal deaths).

The aim of this study was to determine factors associated with adverse perinatal outcomes among women referred in labour to MRRH.

Materials and methods

Study design: This was an un-matched case control study.
Study site: This study was conducted in the postnatal ward of Mbarara Regional Referral Hospital .The hospital is located in Mbarara Municipality, which is 286 km south west of Kampala the capital city of Uganda. It is a public hospital funded by the Government of Uganda through Ministry of Health. It is the referral hospital for south western Uganda with a 400 bed capacity serving 10 districts with a population of more than 5 million people. It also receives patients from neighbouring countries of Rwanda, Tanzania and Democratic Republic of Congo. It is the teaching hospital for Mbarara University of Science and Technology medical school. On average it receives five referrals per day.
Study population: Referrals in labour who delivered from MRRH during the study period.
Definition of cases and controls and selection of study participants.
A case was a health facility referred mother who delivered a baby with adverse perinatal outcomes at or above 28 weeks of gestation at MRRH.
A control was a health facility referred mother who delivered a live baby at or above 28weeks of gestation with no adverse perinatal outcomes at MRRH.
An adverse perinatal outcome included one or more of the following: delivery of a stillbirth, an early neonatal death and a need to admit the baby to the neonatal ward. The cases and controls were enrolled at discharge. For every case, the next two controls were selected.
The independent variables: Included socio-demographic factors like age of mother, district of residence, religion, level of education, marital status; obstetric factors like parity, gestational age, antenatal attendance, mode of delivery, obstetric complications like, antepartum haemorrhage, Preeclampsia, ruptured uterus, obstructed labour. Health system factors included; distance from Health Centre (H/C) to MRRH, level of H/C, pre-referral treatment, duration of stay at referring facility.
Primary outcome variable: The primary outcome was adverse perinatal outcome.
Sample size calculation: The sample size was determined using Kelsey formula (1965) for unmatched case-control studies (Kelsey, 1996). A total of 318 mothers (106 cases and 212 controls were recruited in the study.
Sampling method: Consecutive sampling was used to enroll participants. At recruitment, women's socio-demographic characteristics, and obstetric history, details of the labour and delivery and health system factors were collected through an interviewer administered questionnaire.

Statistical analysis: The data collected was coded and entered in Epidata 3.1 software package. It was then exported to STATA version 2012 for analysis. The frequency distributions of the maternal socio-demographics, obstetric characteristics and health system characteristics were summarized and presented as frequencies and proportions. Bivariate analyses were conducted to assess the association between adverse perinatal outcomes and the maternal socio-demographic, obstetric and health system factors. A p-value less than 0.05 was considered statistically significant. To control for confounding, we employed multivariate logistic regression analysis. We included factors with a p-value of 0.05 or less in the bivariate analysis. The results were reported as odds ratios with their corresponding 95% confidence intervals.

Ethical approval: This study was approved by Mbarara University Faculty of Medicine Research Committee (FRC) Mbarara University of science and Technology Research Ethics Committee (MUST-REC).Written informed consent was obtained from the participants.

Results:

A total of 318 mothers (106 cases and 212 controls) referred in labour that delivered at MRRH between October 2015 and February 2016 were enrolled in the study.

Table 1: Respondents' socio-demographic characteristics

Characteristic	Controls N=212 n (%)	Cases N=106, n (%)	p-value
Age			0.178
less than 20 years	48 (22.6)	20 (18.9)	
20-29 years	120 (56.6)	57 (53.7)	
30-39 years	40 (18.9)	29 (27.4)	
40 years and above	4 (1.89)	0 (0.0)	
District			0.126
Mbarara	89 (42.0)	33 (31.1)	
Isingiro	61 (28.8)	43 (40.6)	
Kiruhura	22 (10.4)	13 (12.3)	
Others	40 (18.9)	17 (16.0)	
Residence setting:			0.369
Rural	187 (88.2)	97 (91.5)	
Urban	25 (11.8)	9 (8.5)	
Religion			0.744
Catholic	88 (41.5)	49 (46.2)	
Protestant	97 (45.8)	46 (43.4)	
Muslim	9 (4.25)	5 (4.7)	
Others	18 (8.5)	6 (5.7)	
Marital status			0.439
Married	204 (96.2)	100 (94.3)	
Not married	8 (3.8)	6 (5.7)	
Education status			0.012
None	15 (7.1)	20 (18.9)	
Primary	139 (65.6)	65 (61.32)	
Secondary	54 (25.5)	19 (17.9)	
Tertiary	4 (1.9)	2 (1.9)	
Key decision maker			0.674
Husband	147 (69.3)	71 (68.6)	
Mother(herself)	21 (9.9)	14 (11.0)	
Other	44 (20.8)	21 (20.4)	
HIV status			0.894
Negative	191(90.1)	96 (90.6)	
Positive	21(9.9)	10 (9.4)	

From the study (table 1) there were no differences in most of the socio-demographic characteristics of the respondents except for level of education (p >0.05). There was significant difference in the level of education among cases and controls (p=0.012).A significantly higher proportion of cases had no formal education (18.9%, n=20) compared to controls (7.1%, n=15).

Table 1: Respondents' obstetric characteristics

Characteristic	Controls N=212 n (%)	Cases N=106 n (%)	p-value
Parity			0.071
1	94 (44.3)	39 (36.8)	
2-4	83 (39.2)	121 (35.9)	
5 Or More	35 (16.5)	29 (27.4)	
Gestational age			0.020
below 37 weeks	23 (10.9)	24 (22.6)	
37-41weeks	165 (77.8)	71 (74.1)	
weeks or more	24 (11.3)	35 (10.4)	
No. of ANC visits			0.866
less than 4	69 (33)	36 (34)	
4 or more	140 (67)	70 (66)	
Stage of labour at admission			0.000
	45 (21.2)	21 (19.8)	
Latent phase	137 (64.6)	49 (46.2)	
Active phase	30 (14.2)	36 (34.0)	
Second stage			
Herbs use during labour			0.874
No	108 (50.9)	53 (50.0)	
Yes	104 (49.1)	53 (50.0)	
Partograph use			0.123
No	197 (92.9)	103 (97.2)	
Yes	15 (7.1)	3 (2.8)	
Ruptured uterus	1 (0.5)	12 (11.3)	0.000
Cord prolapse	2 (0.9)	4 (3.8)	0.080
Obstructed labour			0.355
No	164 (77.4)	77 (72.6)	
Yes	48 (22.6)	29 (27.4)	
PROM			0.738
No	200 (94.3)	99 (93.4)	
Yes	12 (5.7)	7 (6.6)	
Fetal distress			0.000
No	199 (93.9)	85 (80.2)	
Yes	13 (6.1)	21 (19.8)	
Chorioamnionitis			0.076
No	209 (98.6)	101 (95.3)	
Yes	03 (1.4)	05 (4.7)	
Preeclampsia			0.002
No	209 (98.6)	97 (9.5)	
Yes	3 (1.4)	9 (8.5)	
APH			0.787
No	207 (97.6)	104 (98.1)	
Yes	5 (2.4)	2 (1.9)	
Mode of delivery			0.699
SVD	61 (28.8)	34 (32.1)	
C- section	147 (69.3)	71 (67)	
Vacuum extraction	4 (1.9)	1 (0.9)	

Parity, gestational age, ruptured uterus, fetal distress and preeclampsia were significantly different ($p<0.05$) among controls and cases (table 2). The proportion of cases whose gestational age was below 37 weeks (22.6%) was twice that in the control group (10.9%). Majority of the controls were admitted in active labour (64.6%) compared to cases (46.2%). There were more cases admitted in second stage of labour (34.0%) as compared to controls (14.2%).There were more cases with ruptured uterus (11.3%) than controls (0.5%).

Table 2: Health system characteristics

Characteristic	Controls	Cases	P value
Referral level			0.055
HCII	10 (4.7)	7 (6.6)	
HCIII	66 (13.1)	37 (34.9)	
HCIV	113 (53.3)	40 (37.4)	
Hospital	7 (4.7)	9 (8.5)	
Private clinic	13 (6.3)	13 (12.3)	
Distance to MRRH			0.069
0-5km	23 (10.9)	5 (4.7)	
>5km	189 (89.2)	101 (95.6)	
Mode of transport to MRRH			0.007
Public	108 (50.9)	36 (34)	
Private	49 (23.1)	38 (35.9)	
Ambulance	42 (19.8)	29 (27.4)	
Other	13 (6.1)	3 (2.8)	
Pre-referral interventions			0.001
No	132 (62.3)	45 (42.5)	
Yes	80 (37.4)	61 (57.6)	
Duration of stay at referring facility			0.040
< 6 hours	116 (54.7)	71 (67)	
6 to <12 hours	61 (28.8)	29 (27.4)	
12 to < 18 hours	29 (13.9)	5 (4.7)	
> 18 hours	6 (2.8)	1 (0.9)	
Decision to delivery time			0.188
1 hour or less	63 (42)	37 (51.4)	
>1hour	87 (58)	35 (48.6)	
Reason for delay(DDI > 1 hour)			0.006
No personnel	5 (5.6)	4 (11.1)	
Supplies	32 (36)	17 (47.2)	
Theatre space	50 (56.2)	10 (27.8)	
Others	2 (2.3)	5 (13.9)	

From table 3 more cases (33%, n=35) than referrals received pre-referral interventions like intravenous fluids, antibiotics and oxygen (18.4%39). There were more cases (57.6, n=61) that received pre-referral interventions compared to controls (37.4% n=80).

Table 3: Bivariate analysis for socio-demographic, obstetric and health system variables vs. perinatal outcomes.

Variable	Unadjusted OR [95% CI]	P value
Age		0.2440
Less than 20 years	10.9 [0.48-1.61]	
20-29 years	1.0	
30-39 years	1.7 [0.86-32.71]	
40 years and above	NA	
District		0.1273
Mbarara	1.0	
Isingiro	1.9 [1.09-3.32]	
Kiruhura	1.6 [0.72-3.52]	
Others	0.4 [0.25-0.55]	
Residence setting, Urban	0.7 [0.31-1.55]	0.3607
Religion		0.7358
Catholic	1.0	
Protestant	0.9 [0.52-1.40]	
Muslim	1.0 [0.32-3.14]	
Others	0.6 [0.22-1.61]	
Marital status		0.4480
Married	1.0	
Not married	1.5 [0.52-4.53]	
Education level		0.0159*
None	2.9 [1.62-8.86]	

Primary	1.3 [0.73-2.42]	
Secondary	1.0	
Tertiary	1.4 [0.24-8.34]	
Key decision maker		0.6810
Husband	1.0	
Mother(herself)	1.4 [0.66-2.87]	
Other	1.0 [0.55-1.79]	
HIV status, positive	0.95 [0.43-2.09]	0.8934
Parity		0.0769
1	0.9 [0.53-1.55]	
2-4	1.0	
5 Or more	1.8 [0.97-3.38]	
Gestational age		0.0241*
Below 37 weeks	2.4 [1.28-4.58]	
37-41weeks	1.0	
42 weeks or more	0.4 [0.33-0.57]	
4 or more ANC visits	1.0 [0.58-1.58]	0.8886
Stage of labour at admission		0.0002*
Latent phase	1	
Active phase	0.8 [0.42-1.41]	
Second stage	2.5 [1.27-5.23]	
Use of herbs during labour	1.0 [0.65-1.66]	0.8740
Partograph use	0.38[0.11-1.35]	0.1023
Ruptured uterus	26.9 [3.45-210.17]	0.0000*
Cord prolapse	4.1[0.74-22.85]	0.0925
Obstructed labour	1.3 [0.75-2.20]	0.3578
PROM	1.2 [0.45-3.09]	0.7399
Fetal distress	13.8 [1.81-7.90]	0.0003*
Preeclampsia	6.5 [1.71-24.41]	0.0026*
APH	0.8 [0.15-4.17]	0.7843
Mode of delivery		0.6875
SVD	1	
C- section	0.9 [0.52-1.44	
Vacuum extraction	0.5 [0.05-1.44]	
Level of referring unit		0.0579
HCII	2.0 [0.71-5.55]	
HCIII	1.6 [0.92-2.72]	
HCIV	1	
Hospital	2.5 [0.96-6.71]	
Private clinic	2.8 [1.21-6.60]	
Distance to MRRH >5km	2.5 [0.91-6.66]	0.0561
Mode of transport to MRRH		0.0068
Public	1	
Private	2.3 [1.31-4.10]	
Ambulance	2.1 [1.13-14.4]	
Other	0.6 [0.19-2.57]	
Pre-referral interventions	2.3 [1.39-3.60]	0.0008
Length of stay at referring unit		0.0262*
< 6 hours	3.6 [1.31-9.60]	
6 to <12 hours	2.8 [0.97-7.86]	
12 to < 18 hours	1	
> 18 hours	0.2 [0.07-0.45]	
Referral to arrival time		0.7027
Less than 60 minutes	1	
1-2 hours	1.2 [0.65-2.05]	
> 2 hours	0.9 [0.29-0.76]	

*p-value <0.05

Factors that were statistically significant at bivariate analysis include, no formal education (p=0.0159), admission in second stage of labour (p=0.0002), gestational age below 37 weeks (0.0241), ruptured uterus

(p<0.0001), fetal distress (p =0.0003), preeclampsia (p<0.0001), pre-referral interventions like antibiotics, intravenous fluids, oxygen therapy (p=0.0008), length of stay at referring unit of less than 6 hours (p=0.0262).

Factors independently associated with adverse perinatal outcomes among women referred in labour

Table 5: Factors associated with adverse perinatal outcomes at multivariate logistic regression.

Variable	Adjusted OR [95% CI]	p value
Stage of labour at admission		0.0001*
Latent phase	1.0	
Active phase	0.8 [0.35-1.72]	
Second stage	3.7 [1.53-9.03]	
Cord prolapse	7.2 [1.13-45.72]	0.037*
Fetal distress	7.1 [2.73-14.89]	0.001*
Gestational age		0.0391*
Below 37 weeks	2.4 [1.25-6.00]	
37-41weeks	1.0	
42 weeks or more	1.1 [0.44-2.71]	
Preeclampsia	13.3 [2.75-63.85]	0.001*
Ruptured uterus	38.7 [4.55-329.00]	0.001*
Pre-referral interventions	2.0 [1.12-3.73]	0.020*
Length of stay at referring health unit		0.0221*
	4.7 [1.33-16.48]	
< 6 hours	2.7 [0.72-9.81]	
6 to <12 hours	1.0	
12 to < 18 hours	0.8 [0.04-18.54]	
> 18 hours		

*p-value <0.05

After adjusting for confounders at multivariate logistic regression (Table 5), admission in second stage of labour (aOR 3.7 95% CI: 1.53-9.03, p=0.0001), fetal distress (aOR 7.1 95% CI: 2.92-17.45, p<0.001), cord prolapse (aOR 7.2 95% CI:1.13-45.72, p=0.037), gestational age below 37 weeks aOR 2.7 95% CI: 1.25-6.00], p<0.0391), preeclampsia aOR 13.3 95% CI: 2.75-63.85, p=0.001), ruptured uterus (aOR 38.7 95% CI: 4.55-329.00, p=0.001), receiving pre-referral interventions aOR 2.0 95% CI: 1.12-3.73, p=0.020), and stay at the referring facility for less than 6 hours aOR 4.7 95% CI: 1.33-16.48, p=0.0221) were independently associated with adverse perinatal outcomes among women referred in labour to MRRH. The socio-demographic factors were not associated with adverse perinatal outcomes.

Discussion:

Our study showed that there was no association between socio-demographic factors and adverse perinatal outcomes among referrals in labour at MRRH. Similar findings were noted in a study by Kaye et al that assessed antenatal and intrapartum risk factors for birth asphyxia among emergency obstetric referrals at Mulago Hospital, Kampala, Uganda

Admission in second stage of labour, gestational age less than 37 weeks, ruptured uterus, cord prolapse, fetal distress, pre-eclampsia, pre-referral interventions and stay at the referring health facility for less than 6 hours were independently associated with adverse perinatal outcomes among referrals in labour at MRRH. The following factors were independently associated with adverse perinatal outcomes among women referred in labour at Mbarara Regional Referral Hospital.

Referred women who were admitted in second stage of labour had a 3.7 times higher odds of adverse perinatal outcomes compared with those admitted in latent labour. Admission in second stage of labour may indicate a delay in referral from the lower health units and a longer stay in second stage of labour thus increasing the risk of labour complications like prolonged labour, obstructed labour and ruptured uterus. This increases the risk of adverse perinatal outcomes. In a case control study conducted on admissions in second stage of labour in two teaching hospitals in Ethiopia, substantial association was observed with Apgar scores of 3 or less .Neonatal ICU admission and perinatal loss were also higher in mothers admitted in second stage of labour. The main reason for presenting late in second stage for majority of the mothers was late referral in 64.2% of the cases (Tekle and Kumbi, 2007, Afari et al., 2014). Prolonged second stage of labour was also associated with low Apgar scores at five minutes in other studies (Altman et al., 2015, Frisell et al., 2015).

There were also studies that reported no association between the duration of second stage of labour and adverse fetal outcomes such as low Apgar scores at 5 minutes, admission to neonatal ICU (Le Ray et al., 2009, Rouse et al., 2009, Allen et al., 2009).These studies were conducted in settings of continuous fetal surveillance in second stage of labour which is remains a major challenge in the limited resource settings more so among mothers referred in labour.

Cord prolapse was associated with adverse perinatal outcomes among women referred in labour to MRRH .This was probably due to delay in accessing emergency obstetric care among mothers diagnosed with cord prolapse or failure to have them deliver urgently by emergency caesarean section once the diagnosis of cord prolapse had been made. This study is in agreement with other studies. A 10 year retrospective study in Mulago Hospital (2000-2009) to determine the incidence of fetal demise and associated factors following cord prolapse on 438 cases of cord prolapse showed a 23%(101) incidence fetal death within 24 hours (Wasswa et al., 2014).A high perinatal mortality (34%) was also found in a 20 year review of 92 cases of cord prolapse in south Nigeria with 65% of the cases being unbooked (Esike et al., 2015). Cord prolapse was also found strongly associated with stillbirths in a study conducted at MRRH (Agaba et al., 2016). Studies have also proved that time is of essence in reducing perinatal mortality in cases of umbilical cord prolapse with diagnosis to delivery time interval of less than 30 minutes being protective (Khan et al., 2007, Wasswa et al., 2014). Therefore Interventions to deliver the fetus urgently once a diagnosis of cord prolapse has been made may reduce perinatal mortality and morbidity in our setting.

Our study also found that referrals admitted with fetal distress had a 7.1 times higher odds of adverse perinatal outcomes compared to those admitted without fetal distress. A study conducted in 2003 on a antenatal and intrapartum risk factors for birth asphyxia among emergency obstetric referrals at Mulago Hospital , Kampala ,Uganda also showed a significant association between fetal distress and meconium staining with perinatal morbidity and intensive care admission (Kaye, 2004).Also in a study done in MRRH, fetal distress was highly associated with stillbirths (Agaba et al 2016).

In this study, women referred in labour with a gestational of less than 37 weeks were 2.4 times more prone to adverse perinatal outcomes. Similar findings were reported from other studies. Preterm labour (labour before 37 weeks of gestation) is associated with low birth weights, respiratory distress syndrome a major risk for early neonatal death (Mlay and Manji, 2000). Preterm births contributed 60% (n=50) of the 84 neonatal deaths in an audit of obstetric referrals in Abbasi Shaheed Hospital Gambia (Khatoon et al., 2011). Khashu et al in 2009 found perinatal mortality rate to be 8 times higher, neonatal mortality rate to be 5.5 times higher and, respiratory morbidity to be 4.4 times higher in the pre-term babies than in term babies.

Women referred with preeclampsia were more prone to adverse perinatal outcomes. Women with preeclampsia have decreased utero-placental blood circulation and ischaemia which compromises blood flow to the fetus (Backes et al., 2011).This increases the likelihood that a mother with severe pre-eclampsia will deliver a baby that will develop an adverse outcome. This compares with a study conducted in 2003 to determine antenatal and intrapartum risk factors for birth asphyxia among emergency obstetric referrals at Mulago Hospital, Kampala ,Uganda (OR=2.12,: [95% CI: 1.11-4.05],p=0.020)(Kaye, 2004).

Ruptured uterus was associated with adverse perinatal outcomes among women referred in labour in this study. Uterine rupture is a catastrophic event associated with high perinatal mortality. In a retrospective analysis of referral cases at a tertiary care centre in Kanpur city -India , neonatal survival was only 10% The main factor limiting management was delay in diagnosis and transportation to the referral unit (Dwivedi and Kumar, 2015). In an unmatched case control study conducted in a teaching hospital in Western Uganda, uterine rupture was associated with facility referral and high stillbirths (80.5%) were recorded among the cases of uterine rupture (Mukasa et al., 2013). The study findings were also in agreement with the findings of a study in MRRH in which showed that ruptured uterus was independently associated with still births (Agaba et al 2016).Similar findings were reported in other studies in a university hospital in Nigeria in 2000 (Ekpo, 2000) and in a tertiary centre in Eastern Nepal (Chuni, 2006).

Interventions to the mothers in labour are important in newborn survival (Ronsmans et al., 2006). In the current study however, women who received pre-referral interventions from the referring units had a 2.0 times higher odds of adverse perinatal outcomes. This was probably because most of the referrals who received pre-referral interventions had already developed complications that put the fetus at increased risk of adverse perinatal outcome. The challenge also lies on whether the interventions were appropriate. A hospital-based study in Nigeria found that referrals to the hospital for appropriate management were made only after prolonged delay and onset of complication, and health centres often misdiagnosed cases (Ezechi, 2001). Likewise, in Assin North, deficits were noted in recognizing danger signs, stabilizing patients, and handing over to receiving staff (Afari et al., 2014). This represents inadequacies in skills to promptly and accurately triage mothers at risk and

calls for refresher training and mentorship to improve vigilance of the health workers on the danger signs and instituting appropriate management.

Finally, referred women who stayed at the referring facility of less than 6 hours before referral to Mbarara Regional referral Hospital were 4.7 times more likely to develop adverse perinatal outcomes. This is probably because mothers reached the primary facility after developing complications that were life threatening to the fetus. Studies in western Uganda have shown that women in labour delay at home and only present at health facilities after failing to deliver from home (Kabakyenga et al., 2011).

Conclusions:

Admission in second stage of labour, gestational age less than 37 weeks, ruptured uterus, cord prolapse, fetal distress, pre-eclampsia, pre-referral interventions and stay at the referring health facility for less than 6 hours were independently associated with adverse perinatal outcomes among referrals in labour at MRRH. There was no association between socio-demographic factors and adverse perinatal outcomes of referrals to MRRH. Early recognition of complications among emergency obstetric referrals, followed by prompt and appropriate management, may reduce the adverse perinatal outcomes of referrals at MRRH. Community sensitization is recommended in order to improve health seeking behavior of women in labour for timely access of emergency obstetric care for better perinatal outcomes

Competing interests: The authors declare no competing interests.

Acknowledgements: We would like to acknowledge the efforts of midwives who collected the data, the hospital staff and administration for their valuable time and effort rendered during the course of this study. Special thanks go to Prof. Yarine Farjado, Dr Wasswa Ssalongo for the mentorship, Dr. Atwine Daniel and YARDEC for the statistical input.

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