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Original Article

Prevalence and associated factors of obstructed labor among mothers delivered at a tertiary care hospital in Uganda: A descriptive retrospective cross-sectional study.

Steven Elijah Bulega*, Bridget Kabanyoro, Ronald Odokonyero, Patricia Bafumba, Joannah Nalwoga, Meble Kasande, Mariam Nakafeero, Sanyu Tusubira, Peter Okello, Sophia Nakitto, Robert Ssentongo
Kayunga Regional Referral Hospital

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Abstract

Background:

Obstructed labor (OL) is a major contributor to the high maternal and neonatal morbidity and mortality rates, especially in low and middle-income countries (LMICs) where structural barriers to accessing quality obstetric services are commonplace. This study aimed to document the magnitude of obstructed labor and its associated factors at a public regional referral hospital in Uganda.

Methods:

A descriptive retrospective cross-sectional study was conducted at Kayunga Regional Referral Hospital in Uganda that involved a review of 2,176 hospital records of mothers who delivered from 1st January to 31st December 2023. A pretested data extraction tool was used for data collection from the patient charts. A Multivariate Modified Poisson Regression model was employed to identify determinants of obstructed labor.

Results:

This study's prevalence of obstructed labor was 18.57% (405 out of 2176). Women referred from lower health facilities were likelier to experience OL, with a prevalence ratio of 1.83 (95% 1.43-2.34, p-value <0.001). Primipara mothers were 3 times more likely to encounter obstructed labor when compared to multigravidas (95% 1.94-6.35, p-value <0.001). Women of >42 weeks of gestation were 7 times more likely to encounter obstructed labor compared to those with 37-42 weeks (95% CI: 5.69-10.89, <0.001). The likelihood of encountering obstructed labor among mothers where a partograph was not used during labor was 3.55 times higher (95% CI: 2.68-4.70, p-value = <0.001) compared to those where a partograph was completed.

Conclusion:

The prevalence of obstructed labor is still high in LMICs. Referral from a lower health facility, parity, and partograph utilization were significantly associated with obstructed labor.

Recommendation:

Therefore, improving partograph use, training and equipping healthcare workers to diagnose OL, as well as early and timely interventions to prevent complications of OL, are recommended.

Keywords: Prevalence, Associated factors, Obstructed Labor, Uganda.

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Corresponding Author: Steven Elijah Bulega

Email: bulegasteven69@gmail.com

Kayunga Regional Referral Hospital

Introduction

Globally, every two minutes a woman dies from a pregnancy and childbirth-related cause, with the majority of these happening in limited resource settings like Sub-Saharan Africa. According to the World Health Organization, the African region's maternal mortality ratio stood at 531 deaths

per 100,000 live births, accounting for 69% of global maternal deaths in 2020 [1]. Among the top five causes of maternal morbidity and mortality, including hemorrhage, infections, unsafe abortions, and hypertensive disorders, obstructed labor ranks fifth [2].



Obstructed labor is defined as the failure of the fetal presenting part to descend in the birth canal due to mechanical reasons, despite having adequate uterine contractions (3,4). The burden of obstructed labor is high in low and middle-income countries (LMICs), where there is limited access to obstetric care. Globally, obstructed labor is estimated to occur in 5% of pregnancies and contributes to about 8% of maternal deaths [5,6]. A systematic review of the pooled incidence of obstructed labor in Ethiopia was reported at 12.93% [6], and another retrospective cross-sectional study at six hospitals from Western Uganda revealed a 10.5% prevalence rate of obstructed labor [3]. A cross-sectional study in Ethiopia reported the prevalence of obstructed labor at 16% [7].

The burden of obstructed labor remains high in LMICs, where several health systems and structural challenges exist that impede access and utilization of quality and reliable maternal health services. Studies have shown that health system factors, including distant health facilities, delays in availing appropriate emergency obstetric care, and poor or non-functional referral systems, contribute to the occurrence of obstructed labor [8,9]. In addition, studies have highlighted some socio-demographic attributes like level of education, employment status, and maternal age as possible factors that increase one's risk of obstructed labor [10,11]. However, it is also critical to underscore individual maternal factors that are known to increase the risk of obstructed labor, including low parity (primiparous parity), contracted pelvis, non-attendance of antenatal care, and the use of herbal medicines during labor, among others [6,12–14]. Therefore, this study aimed at not only establishing the prevalence of obstructed labor among mothers delivered at the public Regional Referral Hospital in Central Uganda, but also exploring the factors associated with obstructed labor among the above-mentioned population.

Materials and methods

Study setting

The study was conducted at Kayunga Regional Referral Hospital (Kayunga RRH), a tertiary Hospital located in Kayunga District, in Central Uganda, approximately 69.1 km by road via Kampala-Jinja highway northeast of Kampala. This hospital serves 7 districts: Buikwe, Kayunga, Buvuma, Luweero, Mukono, Nakasongola, and Nakaseke. It is a government-run, not-for-profit, charge-free, with nine labor suite beds and forty-two post-natal beds in the Department of Obstetrics and Gynecology. Annually, about 3,270 deliveries occur in the hospital. The hospital has a functional Neonatal Intensive Care Unit (NICU) where neonates with birth complications associated with

obstructed labor, including birth asphyxiation, can be managed. From 1st January to 31st December 2023

Study design

A descriptive retrospective cross-sectional study that involved the collection of data from patient records.

Study population

All records of pregnant women admitted, who went into labor and delivered at Kayunga RRH from 1st January to 31st December 2023, were included in the study. The data was collected for a period of 3 months. The diagnosis for obstructed labor among these study participants was made by either the medical officer, senior house officer (SHO), or obstetrician using the American College of Obstetricians and Gynecologists (ACOG) guidelines for arrest of labor [15] alongside local protocols.

Sample size and sampling

The Kish-Leslie formula of sample size estimation was used for a single proportion [16] by considering a 95% confidence interval (CI), the maximum possible prevalence of obstructed labor to be 50% and a margin of error of 0.021 which is one-fifth of the prevalence of obstructed labor as was in South Western Uganda study 10.5% [3], hence giving a sample size of 2,178.

All medical records/patient files were reviewed from 1st January to 31st December 2023 of pregnant women, irrespective of age, who delivered from Kayunga RRH. A total of 2,182 medical records (files) were sampled using consecutive sampling. This was achieved in a 3-month data collection period.

Inclusion criteria

All patient records or files of pregnant women admitted, who went into labor and delivered at Kayunga RRH.

Exclusion criteria

All patient records or files of pregnant women with insufficient information, for instance, where there is a lack of information about the diagnosis and or outcome of labor, were excluded. Patient records whose information was illegible were also excluded, regardless of the presence of an outcome captured or not.

Study variables

The socio-demographic factors that were collected in our study included age, marital status, employment status, level



of education, and area of residence. The obstetric factors included parity, antenatal attendance, a history of being referred from a lower health facility, a history of visiting a traditional birth attendant, and use of herbal medications during labor. The outcome variable was having a diagnosis of obstructed labor as documented under the indication for the cesarean section.

Data collection and management

A standardized data extraction tool was designed and pre-tested to collect socio-demographic and maternal variables from the patient files. Trained research assistants who were qualified midwives collected this data from all eligible patient files. All research assistants were blinded to the hypothesis of the study. Available records, such as the antenatal cards, facility registers, and case report files, were reviewed by the research assistants to cross-check some of the retrieved information from the patient files. The extracted data was uploaded to a password-protected server to which only the PI or his designee had access, and on a daily basis, was reviewed for completeness. The data was downloaded into an Excel spreadsheet and exported to STATA version 18.5 for further cleaning and analysis.

Data analysis

Statistical analysis was conducted using STATA version 18.5. Descriptive statistics were used to summarize sociodemographic, obstetric, and birth outcomes. Categorical variables were presented as frequencies and proportions, while continuous variables were summarized using medians and interquartile ranges. Associations between the dependent variables and the outcome variable (diagnosis of obstructed labor: yes/no) were assessed using chi-square or Fisher's exact tests for categorical variables, and the Mann-Whitney U test for continuous variables.

Variables with p-values <0.2 in the bivariate analysis were included in a multivariate analysis using a Modified Poisson Regression model. Backward elimination was applied to identify significant predictors. Statistical significance was set at $p < 0.05$.

Ethical considerations

The study was approved by the Mildmay Uganda Research Ethics Committee (MUREC) on the 13th September, 2024, with a REC clearance number of MUREC-2024-427 and the Uganda National Council of Science and Technology (UNCST) on the 14th March, 2025, with a research registration number with the UNCST of HS5564ES.

The study also received clearance from the Kayunga Regional Referral Hospital Administration and the Department of Obstetrics and Gynecology, as well as the Department of Records and Archives, to access the patient files. A waiver of consent was also sought from MUREC, considering that already existing patient records were used with no direct interaction with patients.

Results

Socio-demographic characteristics of participants

The median age of the participants was 24.0 years with an IQR of 20.0,28.0. More than one-third (36.8%) of participants were aged 20–24 years. One thousand sixty-two (1062,48.8%) of the participants were employed, one thousand two hundred and two (1202, 55.4%) of the participants were urban residents, one thousand nine hundred and two (1902, 87.8%) of the participants were married; and in terms of education level six hundred thirty-one (631, 47.1%) of the participants attended secondary education.

Table 1: Social demographic characteristics of the sample population

Variable	Category	Frequency N(Col %)
Age (years)	Median (IQR)	24.0 (20.0, 28.0)
Employment Status (N=2,175)	Employed	1,062 (48.8)
	Unemployed	1,113 (51.2)
Type of Residence (N=2,171)	Rural	969 (44.6)
	Urban	1,202 (55.4)
Marital Status (N=2,168)		



Level of Education (N=1,338)	Divorced	5 (0.2)
	Married	1,902 (87.8)
	Single	152 (7.0)
	Unknown	109 (5.0)
	Primary	530 (39.6)
	Secondary	631 (47.1)
	Tertiary	77 (5.8)
	Uneducated	100 (7.5)

Col% % stands for column percentages, and IQR stands for inter-quantile range.

Obstetric characteristics and labor outcomes

One-third (37.7%) of participants were primipara. The majority (89.9%) of the participants had their pregnancy weeks between 37-42. The majority (94.2%) of the participants had an antenatal visit during their pregnancy, of whom five hundred ninety-four (594, 29.8%) had more than

four ANC visits. Partograph use during labor was reported for one thousand three hundred ten (1,310, 61.6%) women, and the average time from admission to delivery was 6.7 hours. Fifty-six women (56,2.6%) had received services from a traditional birth attendant, and one hundred thirty-four women (134, 6.3%) had used herbal medicines during pregnancy.

Table 2: Obstetric characteristics and labor outcomes of the sample population

Variable	Category	Frequency N(Col %)
Referral Status (N=2,159)	Not Referred	1,688 (78.2)
	Referred	471 (21.8)
Parity (N=2,175)	1	820 (37.7)
	2 to 3	835 (38.4)
	≥ 4	520 (23.9)
Pregnancy Gestation weeks (N=2,098)	<37 weeks	210 (10.0)
	37-42 weeks	1,886 (89.9)
	>42 weeks	2 (0.1)
Attended ANC(N=2,155)	No	125 (5.8)
	Yes	2,030 (94.2)
Number of ANC Visits(N=1,996)	≤ 4 visits	1,402 (70.2)
	> 4 visits	594 (29.8)
Mode of Delivery(N=2,174)	Caesarean section	858 (39.5)
	SVD	1,315 (60.5)
	Instrument delivery	1 (0.0)
Partograph use during labor(N=2,126)	No	816 (38.4)
	Yes	1,310 (61.6)



Time (hours) from Diagnosis of Obstructed Labor to incision/delivery	Mean $\pm$ SD	6.7 $\pm$ 10
Baby Presentation(N=2,175)	Breech	1 (0.0)
	Cephalic	2,174 (100.0)
History of TBA Use(N=2,131)	No	2,075 (97.4)
	Yes	56 (2.6)
Use of Herbal Medicines(N=2,125)	No	1,991 (93.7)
	Yes	134 (6.3)
Maternal Complications (N=1,193)	No	1154 (96.7)
	Yes	39 (3.3)
Fetal Complications (N=1,223)	No	1130 (92.4)
	Yes	93 (7.6)

Col% % stands for column percentage, ANC stands for antenatal care, TBA stands for traditional birth attendant, and SVD stands for spontaneous vaginal delivery.

Prevalence and Factors associated with obstructed labor

Of the 2,176 patient files reviewed, a total of 405 had a diagnosis of obstructed labor (OL) documented, which gave the prevalence of OL at Kayunga Regional Referral Hospital to be 18.57%. A binary logistic regression analysis was done to identify factors associated with obstructed labor. In the bivariate analysis, variables such as age, employment status, level of education, referral status, parity, gestation age, antenatal attendance, partograph use during labor, and visiting traditional birth attendants were shown to be associated at a p-value of less than 0.2. The participants' marital status, mode of delivery, and baby presentation were not added to the model because of their frequency distributions (See Tables 1 and 2). In multivariate analysis

(after controlling for potential confounders), variables such as referral status, parity, gestation age, and partograph use during labor showed an independent association with OL. Accordingly, mothers who were referred from lower health facilities were more likely to experience OL compared to those who weren't referred, with a prevalence ratio of 1.83 (95% 1.43-2.34, p-value <0.001). Primipara mothers were 3 times more likely to encounter obstructed labor when compared to multigravidas (95% 1.94-6.35, p-value <0.001). Women with >42 weeks of gestation were 7 times more likely to encounter obstructed labor compared to those with 37-42 weeks (95% CI: 5.69-10.89, <0.001). The likelihood of encountering obstructed labor among mothers where a partograph was not used during labor was 3.55 times higher compared to those where a partograph was completed (95% CI: 2.68-4.70, p-value = <0.001).

Table 4. Factors associated with Obstructed Labor (n = 405).

Characteristic	Un-adjusted (95% CI)	PR	p-value	Adjusted PR (95% CI)	p-value
Social demographic characteristics					
Age (years)	0.96(0.94 - 0.97)		<0.001	1.00(0.97-1.04)	0.845
Employment Status					
Employed	Reference			Reference	
Unemployed	1.12(0.94 - 1.34)		0.196	1.03(0.82-1.30)	0.804
Type of Residence					
Rural	1.1(0.92 - 1.31)		0.283	N/A	N/A
Urban	Reference			N/A	N/A



Level of Education				
Primary	2.08(1 - 4.3)	0.049	1.79(0.78-4.09)	0.170
Secondary	2.16(1.05 - 4.46)	0.037	1.94(0.87-4.33)	0.103
Tertiary	Reference		Reference	
Uneducated	1.32(0.55 - 3.19)	0.538	0.92(0.33-2.57)	0.875
Obstetric characteristics				
Referral Status				
Not Referred	Reference		Reference	
Referred	2.61(2.21 - 3.1)	<0.001	1.83(1.43-2.34)	<0.001
Parity				
1	2.84(2.12 - 3.81)	<0.001	3.51(1.94-6.35)	<0.001
2 to 3	1.84(1.35 - 2.51)	<0.001	2.37(1.39-4.06)	0.002
>=4	Reference		Reference	
Pregnancy Gestation weeks				
<37 weeks	0.56(0.38 - 0.84)	0.004	0.70(0.44-1.10)	0.124
37-42 weeks	Reference		Reference	
>42 weeks	2.57(0.64 - 10.31)	0.183	7.87(5.69-10.89)	<0.001
Attended ANC				
No	Reference		N/A	N/A
Yes	1.06(0.71 - 1.56)	0.787	N/A	N/A
Number of ANC Visits				
<=4 visits	Reference		Reference	
>4 visits	1.25(1.03 - 1.52)	0.021	1.18(0.93-1.50)	0.182
Partograph use during labor				
No	2.95(2.45 - 3.55)	<0.001	3.55(2.68-4.70)	<0.001
Yes	Reference		Reference	
History of TBA Use				
No	Reference		Reference	
Yes	1.87(1.28 - 2.73)	0.001	1.62(0.78-3.35)	0.197
Use of Herbal Medicines				
No	1.2(0.8 - 1.8)	0.372	N/A	N/A
Yes	Reference		N/A	N/A

PR denotes Prevalence Ratios and 95% CI obtained by fitting a modified Poisson regression model on complete cases (N=1,110). Factors were selected into the adjusted model if p-value<0.2 at un-adjusted. Statistical significance in the adjusted model was considered for variables that obtained a p-value < 0.05.

Discussion

Obstructed labor (OL) continues to be high in the LMICs, especially in resource-limited settings like Uganda [17,18]. This study aimed to analyze the prevalence of obstructed labor and the factors associated with obstructed labor at a tertiary care hospital in Uganda. Our study found the prevalence of OL at 18.57%, which is relatively high compared to previous studies conducted in similar settings. A retrospective cross-sectional study at six hospitals from Western Uganda revealed a 10.5% prevalence rate of obstructed labor [3], while a cross-sectional study in Ethiopia reported the prevalence of obstructed labor at 16% [12]. These differences in findings, although related, could

be explained by the variations in study design and the variable characteristics of the different study populations. In this study, referral from a lower health facility (95% 1.43-2.34, p-value= <0.001), and primiparity (95% CI:1.94-6.35, p-value= <0.001) were strongly associated with obstructed labor. These findings are consistent with a case-control study conducted in Eastern Uganda that showed that women referred from a lower health facility (AOR 6.80, 95% CI: 4.20–11.00) and being a prime parous mother (AOR 2.15, 95% CI: 1.26–3.66) were associated with OL [19]. Other studies have also reported similar findings [3,7,8]. It is also important to emphasize the role of delayed referral from the lower health facilities as a possible contributing factor. The



ability of a healthcare worker to make a prompt diagnosis of OL and ensure early referral is critical in preventing the associated maternal-fetal complications of OL.

In this study, the majority of first-time mothers were young, i.e., 14-19 years (20.3%) and 20-24 years (36.8%), and there is a known link between maternal age and pelvic development, which may explain the correlation with OL [3,20]. However, it is also critical to underscore other social determinants of healthcare access that may be at play within this young demographic, for example, unemployment and stigma, which may deter them from seeking quality healthcare [21,22].

In this study, OL was 3.55 times higher among women where a partograph was not completed (95% CI: 2.68-4.70, p-value = <0.001). These findings are consistent with other studies; for example, a case-control study in Ethiopia showed that women whose labor was not monitored with a partograph were five times more likely to encounter OL (AOR = 4.93, 95% CI: 0.76, 13.7) [8]. Comprehensive documentation of partographs can notify a health worker when obstructed labor is likely to happen and enable them to intervene at an early stage before complications set in. The poor usage of partographs within this study setting mirrors other studies where factors, including health worker attitudes, knowledge, and workload, have been pointed out as possible drivers [23]. These observations call for a need to strengthen obstetric care at Kayunga RRH and other affected facilities through on-the-job training and intensive monitoring to ensure the use of essential obstetric tools like the partograph.

This study did not find any correlations between antenatal attendance and risk to OL. However, studies have shown that antenatal attendance may reduce the risk of OL [6,12]. This may be explained by the fact that ANC attendance enables early identification of any potential maternal risk factors and helps develop a birth plan that reduces maternal complications. In addition, the ability to know and thus demand such obstetric care has been shown to correlate with one's level of education and employment status [3,9]. All these factors were found not to be statistically significant in this study, possibly due to differences in study designs and populations.

The strength of this study lies in its large sample size (2,176). Additionally, the reliability of the diagnosis of OL was strengthened by the second affirmation from a senior provider who was either a medical officer, senior house officer (SHO), or an Obstetrician.

These findings, considering that the target population was in a referral hospital in Uganda, can be generalized to the extent of Uganda as a nation, since most of the significantly

associated factors with the adverse outcomes are consistent within the population across the nation of Uganda.

Conclusion

The prevalence of OL was high at 18.57% (405/2,176). Factors including referral from a lower health facility, parity, and partograph utilization were significantly associated with obstructed labor. Obstructed labor increases the risk of the occurrence of both maternal and neonatal complications. These study findings underscore the need to improve the usage of the partograph, training, and skills development of healthcare workers on prevention and early detection of obstructed labor, ensuring adequate equipping and preparedness of obstetric emergency teams at all health facility levels for early referrals. These efforts will possibly curb the problem of OL and hence improve outcomes for both the mother and newborn baby.

Limitations

Considering that the study was a retrospective one, it meant that missing information from the records could not be retrieved, which potentially could affect the study outcomes; nonetheless, this was prepared for by excluding all patient files with insufficient and unclear information.

The study also had a limited generalizability, considering that the target population was mothers who delivered at a referral hospital in Central Uganda, a population that could possibly have different or varied factors from other populations in other nations.

Recommendations

Encouraging, emphasizing, and close monitoring of the use of partographs for monitoring of labor progress, training and equipping healthcare workers to diagnose OL, as well as early and timely interventions to prevent complications of OL are highly recommended.

Conflict of interest

The authors declare having no conflict of interest at all.

Availability of data and materials

All data generated and analysed during this study are included in this published article [and its supplementary information files].

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The study was funded by the government of Uganda through the Ministry of Health.



Authors' Contributions

SEB conceptualized the research idea, participated in data collection, cleaning and analysis, and wrote the first and revised drafts of the paper; BK participated in the manuscript writing and review; RO participated in data cleaning and manuscript writing; PB participated in conceptualizing the research idea, data cleaning and review of the manuscript; JN, NS and SR contributed to the conceptualization of the research idea, provided general oversight to the research study administration and provided review comments to both the initial and final drafts of the manuscripts; as well as mentorship throughout the process; ST participated in the data collection, and cleaning and provided comments to the initial review of the paper; MK participated in the data collection, and cleaning and provided comments to the initial review of the paper; PO participated in the data collection, and cleaning and provided comments to the initial review of the paper and MN participated in the data collection, and cleaning and provided comments to the initial review of the paper.

List of abbreviations

ACOG- American College of Obstetricians and Gynecologists
ANC- Antenatal Care
C-section- Caesarean section
DALYs- Disability-adjusted life-years
EMOC - Emergency Obstetric Care
LMICs- Low and middle-income countries
OL- Obstructed labor
PPH- Postpartum Hemorrhage
SHO- Senior House Officer
SVD- Spontaneous Vertex Delivery
NICU- Neonatal Intensive Care Unit

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