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Prevalence and associated factors of obstructed labour among labouring mothers in southern Ethiopia: A facility-based cross sectional study

Abstract

Background: An obstructed labour poses a significant threat to maternal and newborn health, especially in low-income countries, like Ethiopia. This cross-sectional study aimed to determine the prevalence and identify factors associated with obstructed labour among women admitted to a public hospital in the Wolaita zone.

Method: A cross-sectional study was conducted from August to September 2023 to assess the prevalence of obstructed labour and associated factors among mothers giving birth at public hospitals in the Wolaita zone. The study used systematic sampling techniques to collect the required sample size and used a structured questionnaire to collect data. Then, the collected data was entered in to EPI data V.4.6 and analyzed using Stata version 14. Research results were presented in many different methods, such as tables, text, and graphs. Bivariate logistic regression was initially used to identify potential factors associated with obstructed labour, with variables with p values less than 0.25 considered candidates for multivariable logistic regression. A final multivariable logistic regression analysis was then performed, with variables with a significance level of $p < 0.05$ considered statistically significant..

Results: The prevalence of obstructed labour in study participants was 20(9%). The incidence of obstructed labour was significantly associated with age 24 hours AOR: 4.4, 95% CI (2.56, 7.67) and use of parthograph with partially filled AOR: 4.2, 95 % CI (2.63, 6.98).

Conclusion: The study showed that 9% of mothers had experienced obstructed labor, which is contrary to the national policy that obstructed labor should not be performed in public facilities. The main causes are imbalance of the pelvic head area, wrong position and abnormal expression. Factors such as maternal age, duration of labor, and use of a a partograph during labor and delivery were found to be significantly associated with obstructed labor.

Keywords: obstructed labour, Wolaita zone public hospitals, labouring mother, Ethiopia

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Temesgen Geta, Bizuayehu Atinafu Ataro, Eshetu Elifios
School of Nursing, Wolaita Sodo University, Wolaita, Ethiopia

Correspondence: Temesgen Geta, School of Nursing, Wolaita Sodo University, Wolaita, Ethiopia

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Abbreviations: ANC, antenatal care; AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; SNNPR, South Nation Nationalities and peoples region

Background

The World Health Organization (WHO) describes obstructed labor as the situation where powerful uterine contractions fail to facilitate the descent of the fetus through the pelvis because of an obstruction, typically occurring at various points within the pelvis.[1,2] This condition poses significant risks to both the mother and the unborn child, with cranio-pelvic disproportion (CPD) being identified as the primary cause of obstructed labor.[1,2]

Obstructed labor presents with a range of signs and symptoms indicative of its serious nature and potential complications.[3,4] Laboring women typically experience an extended first stage of labor, often accompanied by an early rupture of fetal membranes. Abnormal vital signs, including low blood pressure, may manifest, along with fatigue and metabolic acidosis.[2,4] Genital infections are common, and damage to the genital tract can occur, leading to complications such as postpartum hemorrhage (PPH), uterine rupture, and swollen lower uterine segments with Bandl's ring.[4] Additionally, Kanula syndrome-related edema of the lower vagina and vulva may be observed. Bloody urine may also be present as a result of bladder injury.[2,4] These signs and symptoms underscore the urgency of prompt and appropriate management to mitigate risks to both the mother and fetus.[2,4]

Obstructed labor is a significant global health concern, contributing to maternal mortality rates worldwide.[5,6] It is estimated to affect approximately 5% of pregnancies globally and is responsible for about 8% of maternal fatalities. This obstetric complication, often indicative of inadequate obstetric care, leads to various adverse outcomes for both mothers and unborn children, including uterine rupture, difficulties with cesarean deliveries, postpartum hemorrhage, anesthetic complications, puerperal infections, and hypoxia, potentially resulting in brain damage. The incidence of obstructed labor varies between regions, with rates ranging from 3% to 6% worldwide.[6] While developed regions tend to experience lower incidence rates, less developed areas, particularly in Africa and Asia, bear a higher burden. In Africa, obstructed labor accounts for approximately 4.1% of all maternal deaths, compared to 9.4% in Asia and 13.4% in Latin America and the Caribbean.[5,6] These disparities underscore the importance of addressing obstetric care deficiencies to reduce maternal mortality associated with obstructed labor on a global scale.[6]

In low-income countries like Ethiopia, obstructed labor stands out as a prevalent and preventable cause of maternal and perinatal morbidity and mortality, particularly in communities marked by high rates of child undernutrition and limited access to medical services.[7,8] Factors such as malpresentation, malposition, and cephalopelvic disproportion commonly contribute to this issue. Improving the nutritional status of girls is crucial in preventing obstructed labor.[7] Additionally, proactive measures like antenatal identification of risk factors for prolonged labor—such as a large baby relative to the size of the mother, malpresentation, and malposition—and intrapartum interventions like continuous monitoring, utilization of partographs, and timely intervention in cases of prolonged labor due to mechanical factors are essential for prevention.[8,9] Recognizing signs of impending obstructed labor, such as the failure of labor progress despite adequate uterine contractions for a reasonable duration (typically 2-4 hours), is critical for timely intervention.[9]

The current study sheds light on the significant impact of obstructed labor on maternal and perinatal health, particularly in low-income countries like Ethiopia. It underscores the preventable nature of this obstetric complication and highlights key factors contributing to its prevalence, such as malnutrition and limited access to medical care.

Methods

Study area and period

A facility-based cross-sectional study was conducted in Wolaita zone public hospitals, Southern region, Ethiopia. Wolaita zone is located from 328 km from capital city of Ethiopia, Addis Ababa. Based on the 2020 Central Statistical Agency (CSA) report, the population of Wolaita zone was projected to be 5,385,782. From these, 2,687,021 populations are accounted by males and 2,698,261 populations were females. Currently, there are 8 public hospitals in this zone including Wolaita Sodo university comprehensive specialized hospital (WSUCSH), Bodit primary hospital PH, Gasuba PH, Tebela PH, Bale PH, Halale PH, Bombe PH, and Bitana PH. These public hospitals have been providing health service for all Wolaita zone population and some other surrounding zones.

Population

Source of population for this study was all pregnant women who give birth at Wolaita zone public hospital labor and delivery room and the study population was all pregnant women who give birth at gedeo zone public hospital delivery room during the study period.

Eligibility criteria

The inclusion criteria encompassed all pregnant mothers delivering at Wolaita public hospitals who were present during data collection. Exclusion criteria comprised women with psychiatric issues or those unable to respond adequately due to factors such as hearing impairment. Additionally, mothers who were critically ill during the postnatal period were also excluded from the study.

Sample size determination

The sample size was determined by using single population proportion sample size calculation formula. Prevalence rate 15.6 %[4] from a study in MTUTH By considering 95% confidence interval (CI) and 5% marginal error the sample size is calculated as follows

$$n = (Za/2)^2 p (1-p)/d^2$$

NB where z = confidence level of 95%

n= Sample size from finite population.

z= the standard score (critical value) corresponding to 95% confidence level = 1.96.

d= the proportion of sampling error between the sample and the population = 5% (0.05).

P = 15.6%

$n = (1.96)^2. (0.156)(1-0.156)/(0.05)^2$

203+ none respond rate (10%)

n= 224

Sampling technique

Initially, we collected six-month HMIS reports from each public hospital to establish the average monthly delivery figures. From there, we determined the mean number of mothers giving birth per month: 150 at Bombbe, 20 at Bale Primary Hospital, 38 at Bitana Primary Hospital, and 36 at Tebela Primary Hospital. Using this data, we sequentially sampled from each hospital until reaching the desired sample size.

Variables

The study examined obstructed labor as the dependent variable, while investigating several independent variables. These included socio-demographic characteristics such as age and area of residency, marital status, ethnicity, Educational status, occupation and religion, obstetric factors including parity, number of antenatal care (ANC) follow-ups, and duration of labor before hospital admission, as well as healthcare-related factors such as the use of a partograph, the effectiveness of the referral system, and the distance from the health institution.

Operational definition

Obstructed labor: refers to the situation where, despite sufficient uterine contractions, the delivery of the baby cannot be completed in a normal and natural manner within an appropriate timeframe, necessitating active intervention by healthcare professionals.[4]

Parthograph: indicated a graphical representation of the dilatation of the cervix against time with an alert and an action line based on cervical dilatation of 1 cm/hr. between 4 and 10 cm, **"partially filled,"** it means that not all of the required information on the partograph has been recorded or completed. This might include missing data points or incomplete monitoring of labor progress where as **"completely filled"** means that all necessary information has been recorded according to the standard protocol. This would include accurate and continuous monitoring of cervical dilation, fetal heart rate, maternal vital signs, and other relevant parameters throughout the labor process.[10]

Data collection tools

A structure English Questionnaire (adapted from other study with modification).[11] Was prepared which consists socio-demographic, health factor and Obstetrics related characteristics to collect data from the women, and chart review was used to trace some of the rest variables. The data was collected by two BSC midwifery holder data collectors.

Data quality assurance

The questionnaires was prepared in English and translated to Amharic and data was collected by face to face interview for the

improvement of data quality. The questionnaire was pre-tested on 5% of the sample to see the accuracy of the response and to estimate the time needed for interview. Based on the pretest, an appropriate modification was made before the actual data collection. Each day, the collected data was checked for completeness and consistency.

Data processing and analysis

The returned questionnaire was checked for completeness manually and the data was coded and cleaned. After that it was export to Stata version 18 for analysis. A descriptive analysis was used to summarize for both categorical and continuous variables. A variable P value less than 0.25 during Bivariable logistic regression was transferred to multivariable logistic regression model to adjust confounders` effects and a P value less than 0.05 was considered as significantly associated. Strength of the association between independent variables and outcome variable was measured by using odd ratio. Crude and adjusted odds ratios with their 95% confidence intervals were calculated. Finally, the result of the study was presented using tables, figures and texts based on the data obtained.

Result

Socio-Demographic characteristics of study participants

Out of the 224 individuals selected for the study, all 224 participated, resulting in a 100% response rate. Among these participants, the majority, comprising over two-thirds, were aged between 20 and 30 years, accounting for 144 individuals or 64.2% of the total. The average age of the respondents was 28.5 years, with a standard deviation of 5.6, ranging from 17 to 47 years old. A significant portion, 145 individuals or 64.7%, resided in urban areas, while 91 individuals, making up 40.6%, identified as ethnically Wolaita. The vast majority, more than 197 individuals or 87.9%, were married, and 120 individuals, representing 53.6% of the total, identified as housewives (Table 1).

Table 1 Socio-Demographic characteristics of participants in assessment of predictors of difficult labor among laboring mother in Wolaita zone public hospitals, Southern Ethiopia, 2023 (n=224)

Variables	Category	Frequency	Percentages (%)
Age	<20	7	3.0%
	20-30	144	64.0%
	>30	73	33.0%
Residence	Urban	145	64.7%
	Rural	79	35.3%
Religion	Protestant	96	42.9%
	Orthodox	63	28.1%
	Muslim	48	21.4%
	Catholic	17	7.6%
Ethnicity	Wolaita	91	40.6%
	Oromo	53	23.7%
	Amhara	43	19.2%
	Sidama	29	12.9%
	Other	8	3.6%
Marital status	Single	3	1.3%
	Married	197	87.9%
	Divorced	18	8.0%
	Widowed	6	2.7%
Educational status	No formal education	43	19.3%
	Primary school	58	25.9%
	Secondary school	83	37.1%
	Tertiary (degree and above)	40	17.9%
Occupation	House wife	120	53.6%
	Government employee	47	21.0%
	Self-employee	47	21.0%
	Student	10	4.5%

Obstetric history of study participants

The majority of cases, specifically 159 individuals or 71.0%, were categorized as Multi Para with a range spanning from II to V. Among the participants in the study, 189 individuals or 84.3% had attended Antenatal Care (ANC) visits during their pregnancy, and 131 individuals or 58.5% of ANC attendees initiated their ANC follow-up during the second trimester of their pregnancy (Table 2).

Table 2 Obstetric history of study participants in assessment of predictors of difficult labor among laboring mother in Wolaita zone public hospitals, Southern Ethiopia, 2023 (n=224)

Variable	Category	Frequency	Percentage
Parity	Primipara	22	9.8%
	Multipara	159	71.0%
	Grand Multipara	43	19.2%
ANC follow up	Yes	189	84.3%
	No	35	15.7%
When did you start	First trimester	36	16.1%
	Second trimester	137	61.2%
	Third trimester	16	7.1%
How many times	One	7	3.1%
	Two	26	11.6%
	Three	73	32.6%
	Four	56	25.0%
	More than four	27	12.1%

Prevalence of Obstructed labor among study participants

Out of the 224 study participants, the prevalence of obstructed labor was identified in 18 individuals, constituting 8.0% of the total. The primary cause of obstructed labor was Cepalo-pelvic disproportion (CPD), affecting 7 individuals or 3.1% of the participants. The labor duration for 193 individuals, or 86.1% of participants, spanned from 12 to 24 hours. Additionally, 26 individuals, representing 11.6% of the total, underwent cesarean section delivery. Moreover, in this study, the weights of 209 babies during delivery were within the range of 2500 to 4000 grams, accounting for 93.3% of the total (Table 3).

Health care characteristics of obstructed labor

In this study, the Partograph was fully completed for 178 individuals, constituting 79.5% of the total cases, while only 46 cases, representing 20.5%, were partially filled. Approximately 154 cases, or 68.8%, resided within a radius of less than 10 kilometers from the hospital, whereas 51 cases, accounting for 22.8%, lived 10 to 50 kilometers away from the selected hospital. Regarding referrals,

about 118 individuals, making up 52.7%, referred themselves, while 55 individuals, comprising 24.6%, were referred from health centers (Table 4).

Table 3 Prevalence and causes of obstructed labor among participants in assessment of predictors of difficult labor among laboring mother in Wolaita zone public hospitals, Southern Ethiopia, 2023 (n=224)

Variable	Category	Frequency	Percentage
Obstructed labor	Yes	18	8.0%
	No	206	92.0%
Cause of obstruction	CPD	7	3.1%
	Mal presentation	5	2.2%
	Fetal anomaly	2	0.9%
	Myoma	2	0.9%
	Other spacfic	2	0.9%
Duration of labor	12-24	193	86.1%
	>24	31	13.9%
Mode of delivery	Vacuum	8	3.6%
	Forceps	4	1.8%
	Caesarean delivery	26	11.6%
	Destructive delivery	3	1.35%
	Spontaneous vaginal deliver	183	81.7%
Birth weight	2500-4000gm	209	93.3%
	>4000gm	15	6.7%

Table 4 Health care characteristics of obstructed labor among participants in assessment of predictors of difficult labor among laboring mother in Wolaita zone public hospitals, Southern Ethiopia, 2023 (n=224)

Variables	Category	Frequency	Percentages (%)
Partograph use	Partially	46	20.5%
	Complete/ correctly	178	79.5%
Distance from hospitals	< 10km	154	68.8%
	10-50km	51	22.8%
	>50km	19	8.5%
Source of referral	Self	118	52.%
	Hospital	28	12.5%
	Health center	55	24.6%
	Traditional birth attendant	22	9.8%
	Other	1	0.4%

Factors associated with obstructed labour

In bivariate logistic regression analysis variables such as Age, ANC follow up, Parity, distance from Hospital, Duration of labor, Birth weight and Parthograph use were significantly associated with obstructed labor. Variables with P-Value less than 0.25 in bivariate logistic regression analysis were selected for multivariable logistic regression analysis to identify variables with independent associ

In multivariable logistic regression analysis three variables were significantly associated with obstructed labor and other variables lost their significance association. Among socio-demographic characteristics of study participants, maternal age was found to be statistically significantly associated with obstructed labor. Those women with age group <20 were 8 times more likely to develop obstructed labor compared with maternal age >30 AOR:8, 95% CI (2.96,22.12).and women's whose age is 20-30 were 5.2 times more likely risk for obstructed labor compared with maternal age >30 AOR:5.2, 95% CI (1.72,16.10).

Among obstetric characteristics of study participants, Duration of labor was also found to be statistically significantly associated with obstructed labor. Those women whose labor took >24 were 4.4 times more likely to be diagnosed for obstructed labor than women whose labor took 12-24 hours of duration AOR:4.4, 95% CI (2.56,7.67). Among health care facility characteristics of study participants, parthograph use was found to be statistically significantly associated with obstructed labor. women whose parthograph was partial filled were 4.2 times more likely to be diagnosed for obstructed labour than women whose parthograph was complete filled AOR:4.2, 95% CI (2.63,6.98) (Table 5).

Table 5 Predictors of difficult labor among laboring mother in Wolaita zone public hospitals, Southern Ethiopia, 2023

Variables	Category	Obstructed labor		COR (95%CI	AOR(95%CI)
		Yes	No		
Age	<20	2(28.5%)	5(71.5%)	8.7(3.73,20.6)	8(2.98,22.12) *
	20_30	10(6.9%)	134(93.0%)	7.7(3.19,18.8)	5.2(1.72,16.10) *
	>30	6(8.2%)	67(91.7%)	1	1
Duration of labor	12-24hr	11(5.7%)	182(94.3%)	1	1
	>24hr	7(22.6%)	24(77.4%)	5.7(3.56,9.21)	4.4(2.56,7.67) *
Partograph	Partial	9(19.5%)	37(80.4%)	5.6(3.68,8.78)	4.2(2.63,6.98) *
	Complete	9(5.0%)	169(94.9%)	1	1

Discussion

The research revealed that out of 224 study participants, the prevalence of obstructed labor was 18 cases, accounting for 8.0% with a 95% confidence interval ranging from 4.2% to 12.1%. This finding aligns with similar studies conducted globally, such as in Mizan Aman, Southern Ethiopia (7.95%),[2] in Pakistan (5.2%),[12] and in Uganda (10.5%).[13] The prevalence of obstructed labor in this current study was noted to be higher compared to findings from Oromia, Ethiopia (4.1%),[14] and India (1.64%).[15] This disparity could be attributed to differences in several factors including the study setting, sample size, socio-economic conditions, and variations in the time duration of the studies. This magnitude of obstructed labor in the study area implies the need to give special attention to health care given for women during pregnancy, labor and delivery more than ever. In doing so will assure the health and wellbeing of mothers.

On the contrary, the prevalence of obstructed labor documented in the present study is lower compared to other studies conducted in Jimma (12.2%),[16] in Mizan (15.6%),[4] Wollega 18.1%,[17] in Nigeria (20.5%[18]and Ethiopia (29%).[19] The observed differences could

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potentially be attributed to improvements in the healthcare system, enhanced care during pregnancy and delivery, and better antenatal care (ANC) follow-up in recent years. These improvements may have contributed to reducing the prevalence of obstructed labor compared to earlier studies.

This study revealed that age is a significant factor associated with the risk of obstructed labor. Women aged between 20 and 30 years were found to be 5.2 times more likely to be at risk for obstructed labor, while mothers aged 20 or younger were 8 times more likely to be at risk compared to those aged 30 and above. This finding aligns with previous studies.[9,13,17] This might be due to young and first-time pregnant women may face a higher likelihood of obstructed labor due to factors like cephalopelvic disproportion (CPD) and other obstetric complications. This emphasizes the significant risks posed to both maternal and fetal health during pregnancies and labor among teenagers.

In the current study, another factor associated with obstructed labor was the duration of labor. Mothers experiencing labor lasting 24 hours or more were found to be 4.4 times more likely to be affected by obstructed labor compared to those with a labor duration of 12 to 24 hours. This finding is consistent with other studies indicating that prenatal complications are more prevalent among women with prolonged labor (>24 hours) compared to those with a normal duration of labor.[20] Therefore, ensuring proper monitoring of potential signs of obstructed labor during labor and delivery, along with implementing appropriate interventions to address these challenges, could help mitigate maternal and prenatal mortality associated with labor and delivery.[21]

Another factor linked to obstructed labor in this study was the completion status of the partograph. Women with partially filled partographs were found to be 4.2 times more prone to the risk of obstructed labor compared to those with fully completed partographs. This result is in line with prior research findings, suggesting that incomplete documentation on the partograph may contribute to the risk of obstructed labor.[10] The reasons behind this association could include inadequate monitoring and documentation of labor progress, leading to delays in recognizing and addressing potential complications. Additionally, incomplete partographs may reflect inadequate healthcare provider attention or resources, potentially resulting in missed opportunities for timely interventions to prevent or manage obstructed labor.

While this study has yielded significant findings regarding obstructed labor, several limitations should be considered. Firstly, its quantitative and hospital-based approach may not fully capture the true prevalence of obstructed labor, as it relies on pregnant women seeking care at one geographic zone. Additionally, the study's small sample size and short duration of data collection over only one month may limit its ability to provide comprehensive insights into obstructed labor patterns and risk factors. These constraints, along with the potential lack of generalizability beyond the specific study context, underscore the need for caution when interpreting and extrapolating the findings to broader populations or settings. Future research with larger and more diverse samples, conducted over longer periods and across multiple healthcare facilities and regions, would help address these limitations and enhance our understanding of obstructed labor.

Conclusion

The research indicates that there is a high prevalence of obstructed labor at 9.0%, which contrasts with the national guideline stating that obstructed labor should not occur at public institutions. The primary reasons for this are cephalo-pelvic disproportion, malposition, and malpresentation. Factors such as maternal age, duration of labor, and the use of a partograph during labor and delivery were found to be significantly linked to obstructed labor. This magnitude of obstructed labor in the study area implies the need to give special attention to health care given for women during pregnancy, labor and delivery more than ever. In doing so will assure the health and wellbeing of mothers.

Declaration

Ethical approval and participant consent: An ethical clearance was obtained from the institutional review board of Wolaita Sodo University with the reference number of 9/801/2023 and then submitted to the Wolaita Zone Health Office. Then a permission and cooperation letter was obtained from the zonal health office and distributed to each selected Hospital prior to data collection. Written informed consent was obtained from the study participant and data was collected after assuring the confidentiality nature of responses. All methods throughout the study were carried out in accordance with relevant guidelines and regulations.

Consent for publication: not applicable

Availability of data and materials: The datasets generated and/or analysed during the current study are not publicly available to prevent any kinds of misuse by the public before publication but are available from the corresponding author upon reasonable request.

Author's contributions

TG: Conceived data and designed the study, supervised the data collection, performed the analysis and interpretation of data, drafted the manuscript, and finally approved the revision for publication. TG had full access to all the data in the study and takes responsibility for the integrity of data and the accuracy of data analysis. EE, BA, and TG assisted in designing the study and data interpretation, and critically reviewed the manuscript. All authors read and approved the final manuscript.

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Conflict of interest

The author declared no competing interests.

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