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Mortality Rate and Predictors Among Women With Obstructed Labor in a Tertiary Academic Medical Center of Ethiopia: A Retrospective Cohort Study

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Abstract

Introduction: Obstructed labor is one of the most common preventable causes of maternal morbidity and mortality. In Ethiopia, 36% of maternal mortality was due to obstructed labor with uterine rupture. Thus, this study proposed to measure predictors of maternal mortality among women with obstructed labor in a tertiary academic medical center in Southern Ethiopia.

Methods: An institution-based retrospective cohort study was conducted at Hawassa University Specialized Hospital from July 25 to September 30, 2018. Women who had obstructed labor from 2015 to 2017 were recruited. A pretested checklist was used to retrieve data from the woman's chart. A multivariable logistic regression model was employed to identify variables associated with maternal mortality, and variables with a *p*-value <.05 were considered significant at 95% CI.

Results: With a response rate of 96.3%, 156 moms who experienced labor obstruction were included in the study. Obstructed labor caused the deaths of 14 women, resulting in a maternal mortality rate of 8.9% (95% CI: 7.15, 16.4). Maternal mortality from obstructed labor was reduced in women who received antenatal care visits (AOR = 0.25, 95% CI: 0.13, 0.76) and blood transfusions (AOR = 0.49, 95% CI: 0.03, 0.89). Women who experienced uterine rupture (AOR = 6.25, 95% CI: 5.3, 15.6) and antepartum hemorrhage (AOR = 14, 95% CI: 2.45, 70.5) had a greater risk of maternal mortality than women who did not have the corresponding morbidity.

Conclusions: The center had a higher rate of maternal mortality due to obstructed labor. Early screening and improving the care for women at greatest risk of antenatal and postnatal co-morbidities like uterine rupture and shock were the major priorities and fundamental strategies to decreasing maternal mortality. It also showed that antenatal care visits, early referral, and blood transfusion for women with obstructed labor should be amended in order to lower maternal mortality.

Keywords

maternal mortality, obstructed labor, predictors, tertiary center, Ethiopia

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Background

The rapid drop in global maternal and child deaths in the last 20 years is one of the world's most spectacular and hopeful stories. Despite those gains, women's and perinatal mortality and morbidity related to obstructed labor (OL) is still a significant challenge (CDC, 2017; Garba et al., 2011; Nakimuli et al., 2015), and 3% of maternal death is due to OL (Chou et al., 2015; Say et al., 2014).

A study in low resource setting of Nigeria concluded that most OL had maternal morbidity and perinatal mortality (Oguejiofor et al., 2022). A study done in Eastern Uganda among women diagnosed with OL showed that there were 24 fresh still births and 32 early neonatal deaths making a rate of 43.8% and 58.4% per 1000 total births, respectively (Musaba et al., 2021). A similar study in Uganda reviled that primipara, use of herbal medicines in labor and referred mothers from lower health facility were the risk factors for OL (Musaba et al., 2020).

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OL was the leading cause of maternal mortality in the last decade with uterine rupture (36%) (Yifru Berhan & Berhan, 2014). In a developing nation, obstetric fistula is the most devastating condition, causing 80%–90% of victims to be permanently excluded from their communities, suffer from depression, and contract infections (Elly Arnoff & Lauri Romanzi, 2017). OL resulted in 3.5% (Sinha, 2017) and 1.6% of maternal mortality (Indra et al., 2017; Mondal et al., 2013) in India, 0.19% of maternal death in Rwanda (Kalisa, 2016), and 1.2% of maternal death in Uganda (Kabakyenga et al., 2011). A similar study in Sudan showed that OL accounted for 4.8% of maternal mortality and another study in Tanzania showed that neglected OL is the leading cause of uterine rupture (38%), maternal and perinatal mortality (Ali & Adam, 2010; Kidantou et al., 2012). A study in Sylhet showed that maternal death (1%) were due to OL (Khatun & Khanom, 2017). A study done in different regions of Ethiopia also revealed that OL had resulted in different complications of maternal and perinatal outcomes (Aliyu et al., 2016).

A study in Tigray, Suhul revealed that majority of the mothers (89%) and about 93% of the babies with OL had developed at least one complication; postpartum hemorrhage (PPH) and puerperal sepsis, 56.8% each and uterine rupture, 25% (Ukke et al., 2017) were the commonest. Many deaths and morbidities due to OL are entirely preventable and treatable. Early management and access to Emergency Obstetric and Newborn Care and strengthening postpartum care following OL reduces maternal mortality (Harrison et al., 2016). Safe surgery mainly averted 1.1 million daily adjusted life lost, and 16,800 maternal deaths prevented (Alkire et al., 2012). For this, the Ethiopian government performed different activities like improving antenatal care (ANC) coverage, strengthening the referral systems, comprehensive obstetrics care in nearby health institutions and giving training for health center professionals on when to refer the laboring mother. Despite this, studies showed that the OL-associated adverse maternal outcomes appear to be high and remain a common challenge in Ethiopia (Ahmed et al., 2017; Aljuhaysh et al., 2017; Aliyu et al., 2016; Bayou & Berhan, 2012; Fantu et al., 2010; Gudina et al., 2016; Henok & Asefa, 2015; Ukke et al., 2017). Additionally, there is no data on the case fatality and predictors of maternal mortality among women with OL in Ethiopia. Therefore, this study aimed to assess the case fatality rate and predictors of maternal mortality associated with OL in Ethiopia.

Literature Review

Determinants of OL

Identifying the determinant factors of OL is essential for the provision of intervention based on those factors. A prospective study of maternal, fetal, and neonatal outcomes in the low and middle income countries revealed that OL was more common in women aged <20, nulliparous women, women with a body mass index (BMI) >25 and infants >3500 g. While, parity of ≥3, having an infant <1500 g, preterm deliveries, and having a BMI <18 were protective of OL (Harrison et al., 2015). A cross-sectional study in Bangladesh tertiary care Hospital revealed that OL was common on unbooked and primigravida. The commonest cause was cephalo-pelvic disproportion (CPD) (47.5%) followed by fetal malposition (25.7%) and malpresentation (24.8%) (Islam et al., 2012). A similar population based study in India showed that malposition (45.61%) followed by CPD (43.85%) were the most common cause of OL (Sinha, 2017). A case-control study in Rwanda showed that respondents with maternal age of <19 years, being a primiparous status, attending <4 ANC, and being resident of one specific district were more likely to have OL (Kalisa, 2016a). Another study in Uganda revealed that maternal age <19 years, being resident of Isingiro district, being nulliparous and delivered once before were predisposing factors of OL (Kabakyenga et al., 2011). According to a study conducted in Sudan, primigravida, illiterates, and people living in rural areas were more likely to have OL (Ali & Adam, 2010). A study done in Nigeria revealed that being OL was prevalent among nulliparous and unbooked women (Nwogu-Ikojo et al., 2010). A study done in Adama Hospital revealed that the odds of OL were more likely with duration of labor before arrival to the health facility greater than 24 h, 4–6 h of travel to health facility, malpresentation, and fetal weight greater than 4 kg (Gudina et al., 2016). A similar study in Jima University Hospital (Fantu et al., 2010) and West Harare (Wube et al., 2018) showed that had at least one visit, resides near to small distance from health facility, and Partograph utilization were protective factors of OL.

Another study done in Mizan Tepi University Hospital revealed that ANC visit, birth weight of the new born, and duration of labor were significant determinants of OL(Henok & Asefa, 2015; Liyew et al., 2017). A case-control study done in Hawassa revealed that being rural residence, lack of ANC, had contracted pelvis, status of fetal membranes, and fetal head malposition were independent predictors of OL. Rural residents, women who haven't ANC visit, and women with contracted pelvis were more likely to encounter OL. Women with intact fetal membrane were 90% less likely to have the case than rupture membrane. Occipito posterior, occipito transverse, and other malposition were more likely to encounter OL (Abraham & Berhan, 2014). Macrosomia in women of reproductive age was one determinants of OL. This is due to a rise of diabetes mellitus globally, which end up with OL, neonatal mortality, and long-term disability. Neonatal size relative to the birth-relevant maternal dimensions is positively associated with reproductive success until it reaches a critical value. Regular use of caesarean sections throughout the last decades has led to an evolutionary increase of OL or

women whose infants were born by caesarean because of feto-pelvic disproportion are more likely to develop OL (Iversen, 2017; Koyanagi et al., 2013; Mitteroecker et al., 2017).

Maternal and Perinatal Outcomes of OL

OL is one of the most common preventable causes of maternal and perinatal morbidity and mortality in developing countries. The risky pregnancy condition known as OL has almost completely vanished from the western world. OL accounted for 22% of all obstetrical problems in 40 countries, with 9% of all maternal deaths, with the lowest rates in Latin America (12%) and the greatest rates in SSA with high perinatal mortality (Bailey et al., 2017). A prospective population-based study in low- and middle-income countries showed that maternal death, still birth, neonatal death, ante partum hemorrhage and PPH, a maternal and neonatal infection were common on women with OL (Harrison et al., 2015). A study in Bangladesh showed that majority of women faced morbidity (76.19%) and 24.76% of prenatal mortality (Islam et al., 2012). A prospective study done in India showed that, OL resulted in maternal and perinatal mortality of 3.5% and 39%, respectively. Paralytic ileus (52.6%), severe anemia (48.2%), infections (23.68%), and ruptured uterus (21.92%) were the commonest complications followed by 0.8% of vesico-vaginal fistula (VVF) (Sinha, 2017). A similar study in India also showed that OL causes 1.6% of maternal mortality and 23% of perinatal mortality due to delay to referral system. The commonest complications were paralytic ileus (50%), sepsis (49.8%), PPH (33.9%), and anemia (30%) followed by VVF (4%) (Mondal et al., 2013; Usharani & Bendigeri, 2017).

A retrospective case-control study in Rwanda showed that OL causes 0.19% of maternal deaths and a perinatal mortality rate of 59 per 1000. Maternal complications were higher among women with OL (12.1%) compared to those with spontaneous vaginal delivery. Of those, puerperal sepsis and transfusion were common in women with OL (Kalisa, 2016a). Another study in Nigeria showed that the majority of OL caused 89.7% of uterine rupture and resulted with maternal or perinatal mortality and common obstetric morbidities (Lawani et al., 2016). A study in Uganda stated that maternal complications in women with OL were more among 10.8% in women with OL. Perinatal mortality rate was more common among women who had the condition, which was 142/1000 versus 65/1000. It also showed that ruptured uterus (7.1%), puerperal sepsis (3.4%), bladder injury (1.8%), PPH (1.2%), VVF (1.4%), and 1.2% of maternal death were due to OL (Kabakyenga et al., 2011).

A similar study in Sudan showed that OL accounted for 4.8% of maternal mortality and 35.7% of perinatal mortality, 14.3% of ruptured uterus, and 4.8% VVF. Another study in Tanzania showed that neglected OL is the leading cause of uterine rupture (38%), obstetric hemorrhage, sepsis, maternal and perinatal mortality (Ali & Adam, 2010; Kidantou et al., 2012). A study in Sylhet showed that PPH (4%), puerperal sepsis (4%), rupture uterus (2%), VVF (2%), maternal death (1%), and 7% of perinatal death were due to OL (Khatun & Khanom, 2017).

A study conducted in several regions of Ethiopia also showed that OL has caused a variety of difficult maternal and neonatal outcomes. A study done in Debre Markos hospital, Amhara region showed that OL causes 80% of uterine rupture compared with 20% uterine rupture without OL (Aliyu et al., 2016). Another study done in Metu Karl Referral Hospital revealed that 289 cases (91.7%) had serious maternal complications, of those sepsis 234 (79.1%), surgical site infection 87 (27.5%) and uterine rupture 76 (24.1%) were commonest. Furthermore, 185 (58.5%) neonates had serious complications, among them 111 (35.1%) were stillbirths, 60% newborn had low Apgar score, 152 (48.1%) had birth trauma, 127 (40.2%) had asphyxia, and 58 (18.4%) had neonatal sepsis. Maternal age and Apgar score were significantly associated with maternal and perinatal clinical outcome of OL. A similar study in Jima stated that uterine rupture in 55 (45.1%) and sepsis in 48 (39.3%) and all newborn who had low first minute APGAR score were the commonest complications of OL (Ahmed et al., 2017; Fantu et al., 2010).

A study in Tigray, Suhul revealed that majority of the mothers (89%) and about 93% of the babies with OL had developed at least one complication. The major complications were PPH and puerperal sepsis each 25(56.8%), uterine rupture 11(25%), and stillbirths 18 (40.9%) (Gebresilasea et al., 2017). Another study in Mizan Tepi showed that PPH (32.25%), uterine rupture (25%), wound dehiscence (18.75%), puerperal sepsis (18.75%), bladder rupture (6.25%), and perinatal mortality (41.7%) were adverse outcomes of OL. A similar study also showed that majority of women (96%) and 82.2% of infants delivered from obstructed mothers did not develop complication (Henok & Asefa, 2015; Liyew et al., 2017).

Methods and Materials

Study Design, Setting, and Period

An institution-based retrospective cohort study design was conducted in a tertiary academic medical center in Southern Ethiopia, Hawassa, from July 25 to September 30, 2018. The medical center is found in Hawassa City, the capital of the Southern Nations, Nationalities and People's Region (SNNPR), and located 275 km far from the capital city of the country, Addis Ababa. The center has one of the largest Hospitals in the region, which serves as a specialized and teaching medical center at the regional level and provides both delivery and neonatal intensive care unit services.

Populations and Sampling Procedure

All women who gave birth in the hospital in the last 3 years were the source populations. Women who experienced OL

between 2015 and 2017 were eligible for the trial, regardless of mode of delivery or fetal fate. All women with OL who gave birth after 28 weeks of gestation or weight of at least 1000 g were included. However, mothers with congenital anomalies like hydrocephalus, and multiple pregnancies were excluded. All women who had OL (162) were retrieved from the hospital record office and were cross-checked with the delivery logbook and operating theatre registers. Of this, six of them were excluded due to incomplete data and a total of 156 women participated in the study.

Variables and Measurements

The dependent variable was maternal mortality of OL, whereas socio-demographic (age, residence), obstetrical (ANC visit), and health facility factors were the independent variables used.

Obstructed labor: laboring woman admitted to a hospital with a pregnancy gestational age of 28 weeks or more and have confirmed a clinical diagnosis of OL.

Adverse maternal outcomes: those women, who had at least one complication such as uterine rupture, PPH, severe anemia, sepsis, shock, fistula, and prolonged hospitalizations.

Data Collection Tool and Quality Control

Data were collected using a structured and pretested data abstraction checklist. The tool was adapted from related literature and modified and conceptualized to fit the research objectives. To gather the necessary data, the admission history, labor follows-up sheets, birth summary, and ANC follow-up sheets from the mother's or newborn's obstetric records were reviewed. On a regular basis, the acquired data's accuracy, consistency, and completeness were checked.

Data Processing and Analysis

The data were coded, cleaned, and entered by Epi data 3.1 software and exported to Statistical package for social science (SPSS) software version 20 for analysis. Summary statistics such as the mean and standard deviation and the proportion of the characteristics were computed. A binary logistic regression model was carried out to examine the effect of selected predictors on the outcome variable. Variables with the level of p-value <.25 in the Bivariate logistic regression model were entered into the multivariable logistic regression model to control the possible confounding effects of the confounders. *Hosmer–Lemeshow* test was employed to test the goodness of fit (p-value = .39) that is the fitted model was well fit. Variables with a p-value <.05 were considered to be statistically significant predictors and odds ratio with 95% confidence interval was used to measure the strength of association. The analysis was done by reporting guidelines on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement checklist (15).

Results

Socio-Demographic Characteristics of the Participant

A total of 156 women who had OL were included in this study, with a response rate of 96.3%. The mean age of the women was 27.13 (5.85 ±SD), and nearly two-thirds (100) (64%) of women were in the age group of 20–34 years old. About three-fourth 120 (76.9%) of women were residing out of Hawassa city (Table 1).

Table 1. Characteristics of Women With Obstructed Labor in Hawassa Hospital, 2018.

Variables	Category	Frequency	Percent
Age	<20 year	30	19.2
	20–34 year	100	64.1
	≥ 35 year	26	16.7
Area of residence	Outside Hawassa	120	76.9
	Hawassa	36	23.1
Parity	One	53	33.9
	2–4	54	34.6
	≥ 5	49	31.4
ANC visit	Yes	103	66.0
	No	53	34.0
Frequency of visit	< 4 visits	61	59.2
	≥ 4 visits	42	40.8
Pregnancy complications	Yes	43	27.6
	No	113	72.4
APH in pregnancy	Yes	12	7.7
	No	144	92.3
Previous CS	Yes	40	25.6
	No	116	74.4
Partograph utilization	Yes	13	8.3
	Unknown	81	51.9
	No	62	39.7
Duration of labor	> 24 h.	90	57.7
	12–24 h.	50	32.1
	< 12 h.	16	10.3
Source of referral	Self	21	13.5
	Health center	61	39.1
	Hospital	74	47.4
Maternal morbidities	Yes	102	65.4
	No	54	34.6
Uterine rupture	Yes	60	38.5
	No	96	61.5
Postnatal anemia	Yes	59	37.8
	No	97	62.2
Blood transfusion	Yes	37	23.7
	No	119	76.3
PPH	Yes	46	29.5
	No	110	70.5
Sepsis	Yes	32	20.5
	No	124	79.5
Shock	Yes	33	21.2
	No	123	78.8

Obstetrics Characteristics of the Participant

Fifty-four (34.6%) and 49 (31.4%) of women were multiparous and grand-multiparous, respectively. Two-thirds 103 (66%) of women had ANC visits, and of that 61 (59.2%) of women had less than four ANC visits. Forty (25.6%) of women had history of previous cesarean delivery. Moreover, in regard to the progress of labor, only 13 (8.3%) of women were monitored with a Partograph. More than half 90 (57.7%) of women were on labor for more than 24 h and 74 (47.4%) were referred from other hospitals (Table 1).

Mortality and Morbidities of Obstructed Labor

Nearly three-fourths 102 (65.4%) of women who had OL developed maternal complication. The most morbidities were uterine rupture 60 (38.5%), post-natal anemia 59 (37.8%), PPH 46 (29.5%), and sepsis 32 (20.5%). Thirty-three (21.3%) and 37 (23.7%) of women developed shock and transfused blood, respectively (Table 1).

Predictors of Maternal Mortality

In multivariable logistic regression, ANC visits, APH in pregnancy, uterine rupture, and blood transfusion were significantly associated with maternal mortality. Thus, those women who had ANC visit 0.25 (95% CI: 0.13, 0.76) and blood transfusion 0.49 (95% CI: 0.03, 0.89) had reduced maternal death by 75% and 51%, respectively. While, women who had APH in pregnancy at 14.2 (95% CI: 8.97, 24.9) and uterine rupture at 9.5 (95% CI: 8.9, 17.6) were more likely to have maternal death than their counterparts (Table 2).

Discussions

The study demonstrated that maternal death due to OL was 8.9% (95% CI: 7.15, 16.4). This is higher than study findings done in India, 1.6%, Uganda, 1.2% (Kabakyenga et al., 2011), Sudan, 4.8% (Ali & Adam, 2010), Nigeria, 3.3% (Nwogu-Ikojo et al., 2008), Tanzania, 2% (Hanson et al., 2015), Bangladesh, 1% (Islam et al., 2012), and 2.3% in Ethiopia (Ukke et al., 2017). However, the present finding is lower than a study done in Sudan, 14% (Mohammed et al., 2011), and Uganda 12% (Kabakyenga et al., 2011). The possible variation might be due to high burden of morbidities; all women had at least one maternal morbidity mainly shock (93.8%), uterine rupture (38.5%), PPH (29.5%), and anemia (37.8%) in this setting. In comparison to the Uganda findings: prolonged duration of labor before admission to the center, delay in referral, variation in the study setting, and methodology difference might be the possible reason. In addition, low ANC service utilization, which in this case accounted for one-third of women with OL not receiving the service, may also contribute to the high maternal mortality rate by preventing access to birth preparedness and complication readiness (BPCR) interventions, particularly the minimum BPCR in Oromia, which was 16%

Table 2. Predictors of Maternal Death Among Women With Obstructed Labor in HUCSH, 2018.

		Maternal death		OR [95% confidence interval]	
Variables	Category	Yes	No	COR	AOR
Age	<20 year	3	27	0.6 (0.12, 3.02)	—
	20–34 year	9	91	0.5 (0.15, 1.93)	
	≥ 35 year	4	22	1	
Parity	One	3	50	0.5 (0.05, 4.47)	—
	2–4	6	48	0.75 (0.23, 2.41)	
	≥ 5	7	42	1	
ANC visit	Yes	7	96	2.8 (0.98, 8.02)*	0.25(0.13, 0.76)**
	No	9	44	1	
APH in pregnancy	Yes	7	5	21 (5.5, 79.5)*	14.2 (8.97,24.9)**
	No	9	135	1	
Previous CS	Yes	7	33	2.1 (0.67, 6.36)*	1.2 (0.25,5.01)
	No	7	109	1	1
Source of referral	Self	2	19	0.67 (0.14, 3.34)	2.64 (0.29,23.6)
	Health center	4	57	0.45 (0.13, 1.5)*	1.13 (0.24,5.35)
	Hospital	10	64	1	1
Uterine rupture	Yes	12	48	5.75 (1.76, 18.8)*	9.50 (8.9, 17.6)**
	No	4	92	1	1
Postnatal anemia	Yes	14	45	14.8 (3.22, 67.8)*	3.69(0.76, 5.42)
	No	2	95	1	
Blood transfusion	Yes	9	28	5.14 (1.76, 15)*	0.49 (0.03, 0.89)**
	No	7	112	1	1

*$p < .25$, **$p < .05$.

(Kaso & Addisse, 2014) and SNNPR, which was 17% (Hailu et al., 2011; Soubeiga et al., 2014).

According to this study, women who had an ANC visit had an 80% lower chance of maternal death owing to labor obstruction than women who hadn't. This is supported by findings done in Ethiopia (Berhan & Endeshaw, 2015), Nigeria (Fawole et al., 2012), Uganda (Ngonzi et al., 2016), Kampala (Wandabwa et al., 2011), Kenya (Yego et al., 2014), and SSA (Alvarez et al., 2009). The possible reason for this might be explained due to the fact that those women who had ANC visit were more likely to be screened for risk factors of complications, given advice on BPCR plan, had access to institutional delivery, and arrived at the health facility earlier.

Additionally, the study discovered that blood transfusions are another protective factor for lowering maternal mortality due to OL, decreasing it by more than half (51%). This is similar to findings of a maternal and neonatal directed assessment of technology analysis in SSA (Harrison et al., 2016), Uganda (Nakimuli et al., 2016; Wandabwa et al., 2011), and high- and low-income countries (Goldenberg & McClure, 2015). Another study in Ethiopia (Mengistie et al., 2016), Uganda (Kaye et al., 2003), and SSA (Bates et al., 2008; Hamilton & Hayton, 2009) also found that absence or shortage of blood transfusion increased maternal morbidity and mortality.

Moreover, women who had associated uterine rupture with OL were the commonest factor that increased the risk of maternal death by 20 times than those who hadn't uterine rupture. This is similar to the findings in Ethiopia (Astatikie et al., 2017). It was also supported by studies done in Uganda (Ngonzi et al., 2016) and Kenya (Yego et al., 2014). This may be because women who suffer uterine rupture might have co-morbidities such as antepartum hemorrhage, PPH, anemia, and delayed referral, which in turn prevents them from receiving life-saving treatments in a timely manner.

Likewise, the study also showed that the presence of antepartum hemorrhage among women with OL was significantly associated with maternal mortality. This may be due to the higher risk of PPH. This is supported by a study done in SSA (Chu et al., 2012); the risk of maternal death was 13 times more likely among women with antepartum hemorrhage. The present study is also supported by a study done in Ethiopia, Debre Markos Hospital (Astatikie et al., 2017), Mizan Aman Hospital (Mengistie et al., 2016), and Niger (Garba et al., 2011). This might be explained due to the high burden of hemorrhage which increased the progression to hypovolemic shock and anemia. Women also experienced higher burden of shock (93.8%) in our setting.

Strengths and Limitations

Despite the study was a cohort study and extensive efforts have been made, the finding could be interpreted in the presence of some inevitable limitations. The study might overestimate maternal death due to associated morbidities and unable to assess death after discharge. Additionally, due to the study's retrospective nature, some variables such as educational level, socioeconomic situation, and the three delay models may not be studied. This study used many references that were extensively searched to support the background, literature review, and discussions of the paper.

Implications for Practice

Many deaths and morbidities due to OL are entirely preventable and treatable. Determining the maternal outcomes of OL in our setting remains paramount to reducing mortality and morbidity. This study filled the gaps in maternal health services, particularly in ANC, referral systems, and blood transfusions, where many OL have happened. Furthermore, this study may be used by policymakers as a means of achieving the SDG target of feto-maternal deaths from 2030.

Conclusions and Recommendations

Maternal mortality due to OL was found to be higher in the center. The main priority and essential techniques for reducing maternal mortality were early screening and enhancing care for those at the highest risk of prenatal and postnatal co-morbidities, such as uterine rupture and shock. It also revealed that provision of ANC visit, early referral, and blood transfusion for women with OL should be improved.

Abbreviations

ANC	ante natal care
BPCR	birth preparedness and complication readiness
HUCSH	Hawassa University Comprehensive Specialized Hospital
OL	obstructed labor
PPH	postpartum hemorrhage
SSA	Sub-Saharan Africa
VVF	vesico-vaginal fistula

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Author Contributions

MD and AA* conceived, designed the study, analyzed the data, and wrote up the manuscript, and approved the final manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Consideration

The study was reviewed and approved by Hawassa University, College of Medicine and Health Science Institutional Review Board Review Committee. Official letter of cooperation was

obtained from College of Medicine and Health Science to Hawassa Specialized Hospital and permission was secured from medical director. All study participants charts were reviewed and returned after data extraction.

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