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FACTORS ASSOCIATED WITH OBSTRUCTED LABOR AND ITS MATERNAL AND PERINATAL OUTCOMES AMONG MOTHERS WHO GAVE BIRTH AT WOLKITE UNIVERSITY SPECIALIZED HOSPITAL: UNMATCHED CASE-CONTROL STUDY, WOLKITE, ETHIOPIA

BY:

MUKTAR MOHAMMAD (MD, OBSTETRICS AND GYNECOLOGY RESIDENT)

THESIS SUBMITTED TO WOLKITE UNIVERSITY, SCHOOL OF MEDICINE, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY IN PARTIAL FULLFILMENT FOR THE REQUIREMENTS OF SPECIALITY CERTIFICATE IN OBSTETRICS AND GYNECOLOGY

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Factors associated with obstructed labor and its maternal and perinatal outcomes among mothers who gave birth at Wolkite University Specialized Hospital: unmatched case-control study, Wolkite, Ethiopia

Thesis Submitted To Wolkite University, School Of Medicine, Department of Obstetrics and Gynecology in Partial Fulfillment for the Requirements of Specialty Certificate in Obstetrics and Gynecology

By: Muktar Mohammad (MD, Obstetrics and Gynecology Resident)

Advisor: Feleke Habte (MD, MPH, Assistant Prof. of Obstetrics and Gynecology)

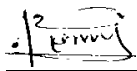
Co - advisor: Kifle Lentiro (Assistant Prof. of Reproductive Health)

Approval sheet

Submitted by:

Obstetrics and Gynecology Candidate

1. Dr Muktar Mohammad



03/07/2018 E.C

Name

Signature

Date

Approved by

1. Major advisor: Dr. Feleke Habte (MD, MPH, Asst Prof.)



03/07/2018 E.C

Name

Signature

Date

2. Co-advisor: Kifle Lentiro (Bsc Asst Prof.RH)



04/07/2018 E.C

Name

Signature

Date

Examiners

1. Dr. Teshome Gensa(BSc, PhD in RH)



04/07/2018 E.C

Name

Signature

Date

2. Dr. Misbah (MD, Asst.Prof)



04/07/2018 E.C

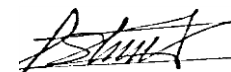
Name

Signature

Date

Head, Department

1. Dr. Shemellis Gizew (MD, Asst.Prof)



04/07/2018 E.C

Name

Signature

Date

College/Institute Dean

1. _____

Name

Signature

Date

Director, School of Graduate studies

1. _____

Name

Signature

Date

Certification Sheet

We hereby certify that we have read and evaluated this Thesis titled “Factors associated with obstructed labor and its maternal and perinatal outcomes among mothers who gave birth at Wolkite University Specialized Hospital: unmatched case-control study, Wolkite, Ethiopia” prepared under our guidance by Dr Muktar Mohammad We recommend that the Thesis shall be submitted as fulfilling the requirements for the award of Certificate of Specialty in Obstetrics and Gynecology. Submitted by:

1. Dr. Feleke Habte (MD, MPH, Asst Prof.)
Name of Advisor



Signature

03/07/2018 E.C
Date

2. Mr. Kifle Lentirol (Bsc Asst Prof. of RH)
Name of Co - advisor



Signature

04/07/2018 E.C
Date

As member of the board examiner for a specialty certificate in obstetrics and gynecology thesis open defense examinations, we certify that we have read, evaluated the thesis prepared by, Dr. Muktar Mohammad and examined the candidate. We recommended that the thesis accepted as fulfilling the thesis partial fulfillment of the requirement for a specialty certificate in obstetrics and gynecology.

Examiners:

1. Teshome Gensa (BSc, PhD in RH)
Name of examiner 1



Signature

04/07/2018 E.C
Date

2. Misbah Solomon (MD, Asst Prof.)
Name of examiner 2



Signature

04/07/2018 E.C
Date

3. _____
Name of chairperson

Signature

Date

DECLARATION

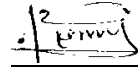
By my signature below, I declare and affirm that this specialty thesis entitled “Factors associated with obstructed labor and its maternal and perinatal outcomes among mothers who gave birth at Wolkite University Specialized Hospital: unmatched case-control study, Wolkite, Ethiopia” is my original work in partial fulfillment for the requirement of **certificate of specialty in Obstetrics and Gynecology program** and not submitted for any other educational program fulfillments or publications. All sources used here for review of the proposal and the thesis are duly acknowledged.

Name of Investigator

Signature:

Date

1. Dr Muktar Mohammad (MD, year iv OBGYN resident)



03/07/2018 E.C

Advisors:

1. Dr. Feleke Habte (MD MPH, Asst prof) Signature



Date: 03/07/2018 E.C

2. Mr. Kifle Lentiro (BSc, Asst. Prof of RH) Signature



Date: 04/07/2018 E.C

Abstract

Background: Global maternal mortality due to obstructed labor is responsible for 9% of all maternal deaths. About half of the maternal deaths occurred in sub-Saharan Africa alone and one third took place in South Asia. Obstructed labor contributes 13% of maternal death in Ethiopia. Women who experienced obstructed labor for prolonged time can be complicated with fistula, serious social issues of divorce, separation from religious exercises, detachment from their families which can worsen poverty and malnutrition.

Objective: To assess factors associated with obstructed labor and its maternal and perinatal outcomes among mothers who gave birth in WKUSH from January, 2022 to December, 2024

Methodology: Unmatched case - control study design was employed among cases and controls who delivered in WKUSH from January, 2022 to December 2024. Total sample size calculated to be 176, 59 were cases and 117 were control. Cases of obstructed labor were selected by simple random sampling and convenience sampling was employed to enroll the control group. Bivariate analysis between dependent and independent variables was performed. Variables with a p-value of <0.25 in bivariate analysis were entered into multivariate analysis. After the regression analysis, variables with a p-value < 0.05 were used as statistically significant factors and adjusted odds ratio with 95% confidence interval was used to measure strength of association.

Results: A total of 176 study subjects, 59 cases and 117 control were enrolled in the study. After performing multivariate logistic regression, four variables (distance from WKUSH, nulliparity, partograph utilization and place of labor follow up at health center) were the significant predictors of obstructed labor. Stillbirth, birth asphyxia, postpartum hemorrhage, obstetric fistula, SSI, longer hospital stay and maternal death were the major adverse perinatal outcomes identified among cases.

Conclusions: Obstructed labor was associated with increased maternal and newborn morbidity and mortality. Stillbirth, birth asphyxia, postpartum hemorrhage, SSI, longer hospital stay, obstetric fistula and maternal death were the common adverse outcomes of obstructed labor. Increasing accessibility of comprehensive obstetric care to the community, improving partograph utilization, and optimal creation of awareness in the community for birth preparedness and complication readiness may prevent occurrence of obstructed labor.

Key words: Obstructed labor, maternal complication, perinatal outcome.

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ACRONYMS

AOR-----	Adjusted odd ratio
CI-----	Confidence interval
DALY-----	Disability adjusted life years
EPMM-----	Ending preventable maternal mortality
LSCS-----	Lower segment cesarean section
MM-----	Maternal mortality
MMR-----	Maternal mortality ratio
MMRCs-----	Maternal mortality review committees
NOLG-----	Non obstructed labor group
OL -----	Obstructed labor
OLG-----	Obstructed labor group
OR-----	Odds ratio
PPH-----	Postpartum hemorrhage
RVF-----	Recto – vaginal fistula
SDG-----	Sustainable development goal
UMTH-----	University of Maiduguri teaching hospital
UR-----	Uterine rupture
UTI-----	Urinary tract infection
VVF-----	Vesico – vaginal fistula
WHO-----	World health organization
WKUSH-----	Wolkite University Specialized hospital

1. INTRODUCTION

1.1 Background

Globally, more than 303,000 women die each year from pregnancy and childbirth-related causes. Pregnancy and delivery difficulties, such as bleeding, hypertensive disorders, and obstructed labor, affect millions of women. About 86% of all maternal fatalities worldwide in 2015, for instance, were attributable to direct obstetric causes of maternal mortality (MM) [1, 2]. One of the direct obstetric causes of MM is obstructed labor (OL), which occurs when the fetus fails to descend in the delivery canal for mechanical reasons even when the uterine contractions are strong [3].

Data from CDC's national pregnancy mortality surveillance System were analyzed by maternal mortality review committees (MMRCs) in USA for preventability and factors that contributed to pregnancy-related deaths. Three in five pregnancy-related deaths were found to be preventable, and preventability did not differ significantly by race/ethnicity or timing of death. Recognizing the major causes of death by timing can help identify opportunities for intervention [2]

Nine percent of all maternal deaths worldwide are caused by obstructed labor. Common causes of obstructed labor include mal-presentation, malposition, and cephalo-pelvic disproportion, which is more common when malnutrition is widespread. Approximately one-third of maternal deaths happened in South Asia, while about half happened in sub-Saharan Africa alone [4].

One of the country having a notably high maternal death rate in sub-Saharan Africa is Ethiopia. It is among the ten nations that account for almost 60% of all maternal mortality worldwide [2]. In these nations women are thought to have a 1 in 14 probability of dying. The country has a high maternal mortality rate, with 412 deaths per 100,000 live births [5].

Similar to the majority of developing countries, infection, hemorrhage, obstructed labor, abortion, and pregnancy-related hypertension are the main causes of maternal mortality in Ethiopia. Each year, a different percentage of maternal deaths are attributed to various reasons. While the case fatality rates for abortion are constant, those for preeclampsia/eclampsia and ruptured uterus/obstructed labor show an overall upward trend. Obstructed labor accounts for 13% of maternal deaths in Ethiopia, according to the mortality estimates [6].

1.2 Statement of the problem

Urinary tract fistulas are the most common sequelae of prolonged obstructed labor (POL), affecting about 24% of women, according to a survey on a comprehensive estimation of physical and psychosocial morbidity from POL that was undertaken in Asian and African nations.

Although obstetric fistula is frequently regarded as the most severe outcome of POL, women also frequently experience prolapse (6.5%) and/or incontinence (8.6%). According to this study, 13.6% of infants with POL have the effects of intrapartum hypoxia, while 66.4% of women with POL experience a stillbirth. Anxiety, depression, and grief over a stillborn child were predicted to affect about 25% of mothers, with psychological and social sequelae being more common than the majority of physical sequelae.

The most common social sequelae is loss of income, affecting approximately 59.9% of women, followed by stigma in 43.6% of patients. The estimates obtained for acute sequela such as fistula and sepsis and chronic sequelae such as incontinence, infertility, chronic pelvic pain and foot drop, were used to determine that the current estimates of the GBD study underestimate the disability from POL by at least 38%. Poor women who cannot afford urgent emergency obstetrical care, including cesarean delivery, are disproportionately affected by POL economic effects. Following POL, income-earning activities are further reduced, and significant out-of-pocket costs make it impossible to receive fistula care. [7]

One labor problem that is completely avoidable is obstructed labor. It is very common in Ethiopia's rural areas, especially among women who give birth at home for extended periods of time. High perinatal mortality and morbidity, that is, fatal and infant deaths as well as illness and disability that develop around the time of delivery are linked to obstructed labor.

The percentage of obstructed labor varies from 2 to 8% in nations with limited resources. Research findings in Africa revealed that the prevalence of obstructed labor was higher than previously estimated; in Ethiopia and Uganda, the prevalence was reported to be 12.2% and 10.5%, respectively [8, 9].

In addition to maternal deaths, obstructed labor was associated with various fetal outcomes, including birth asphyxia, stillbirth, neonatal jaundice, and umbilical sepsis, as well as maternal

outcomes, including uterine rupture, postpartum hemorrhage, puerperal sepsis, Vesico -Vaginal fistula (VVF), and recto-vaginal fistula (RVF) [10–12]. Women who have had obstructed labor for an extended period of time may develop fistula due to pressure necrosis. In addition to their physical injuries, the main social problems of obstructed labor include divorce, separation from religious activities, and alienation from their families, which can exacerbate poverty and malnourishment [12].

Many studies conclude that obstructed labor is preventable and depends on good nutrition starting in childhood, universal coverage of antenatal care, monitoring of labor with skilled staff, pelvic assessment at 36wks, and routine use of partograph, good referral system and availing comprehensive obstetric care in health institution. [13]

Although limited studies were carried out in a few regions of the nation, the authors believe that no such published study has been done in the study area, so the goal of the current study is to identify the factors that contribute to obstructed labor and its outcome in order to direct future efforts in the prevention of obstructed labor.

1.3 Significance of the study

Obstructed labor is a preventable labor complication with deleterious perinatal outcomes.

The prevention of obstructed labor can be promoted by: managing labor and delivery by skilled manpower, nutritional education, delaying early marriage, birth preparedness and complication readiness and using the partograph for early detection and management of labor abnormality [10].

To implement these preventive strategies knowing root predictors of obstructed labor and the gap in its prevention are the basis to plan an intervention for the problem. However, so far there was no sufficient data indicating predictors of obstructed labor and the real gap in its prevention in the study area. Thus the findings of this study will identify factors associated with obstructed labor and it's maternal and perinatal outcomes in the study area and could form the basis for recommendations on prevention of obstructed labor and management practice for governmental and non-governmental organization who work on improvements of maternal health and a ground for further research in the subject area.

2. LITERATURE REVIEW

2.1.1 Factors associated with obstructed labor

Giving birth ought to be a moment of life, not death. Almost all maternal deaths occur in low- and middle-income nations, and almost all of them are avoidable. A strategy paper and consensus statement on ending preventable maternal mortality (EPMM) were produced by the World Health Organization (WHO) and its partners. SDG objective 3.1, which aims to lower the global maternal mortality ratio (MMR) to less than 70 maternal deaths per 100,000 live births by 2030, was introduced in order to achieve the ending preventable maternal mortality (EPMM) target [12].

According to WHO labor is considered obstructed when the presenting part of the fetus cannot progress into the birth canal, despite strong uterine contractions. The most frequent cause of obstructed labor is cephalo-pelvic disproportion - a mismatch between the fetal head and the mother's pelvic brim, other causes of obstructed labor are mal-presentation or malposition of the fetus (shoulder, brow or occipito - posterior). In rare cases, hydrocephalus, locked twins or pelvic tumors can cause obstruction [13]

The study on "the global burden, risk and inequality of maternal obstructed labor and uterine rupture from 1990 to 2019" indicates that during the past few decades, there has been a significant decline in the global burden of OL and UR. A drop in incidence and prevalence over the past few decades indicates a considerable reduction in the global burden of OL and UR, which could be attributed to a variety of factors. First, it's possible that developments in medical technology helped identify and treat these issues early. Second, the likelihood of these issues may have been decreased with increased prenatal testing and prenatal care. But even with these advancements, the burden of disease, as indicated by the quantity of deaths and DALYs, remains high. [7].

In low-income and developing nations like Ethiopia, neglected obstructed labor (OL) is a leading cause of morbidity and mortality among mothers and newborns. Infertility, skeletal and neurological issues, obstetric fistulae, infection and bleeding are the main causes of morbidity among mothers with obstructed labor. Both hysterectomy and Asherman syndrome can cause infertility. Fetal death from asphyxia is also common. Trauma to the bladder during vaginal or

instrumental delivery may lead to stress incontinence. By far the most severe and distressing long-term condition following obstructed labor is obstetric fistula - a hole which forms in the vaginal wall communicating into the bladder (vesico - vaginal fistula) or the rectum (recto-vaginal fistula) or both. In developing countries, fistulae are commonly the result of prolonged obstructed labor and follow pressure necrosis caused by impaction of the presenting part during difficult labor [14].

It is widely accepted that one of the clinical causes of maternal death is obstructed labor. However, because deaths following obstructed labor and its aftermath may be recorded under sepsis or bleeding, it can be challenging to record it as a death categorization. This practice is particularly problematic in situations when verbal autopsies are utilized to identify the cause of death since verbal autopsy techniques differ; the quality of the study data is impacted by inconsistent case definitions and ambiguity surrounding the hierarchical assignment of causes. In total, obstructed labor accounted for 2.8 percent (95 percent confidence interval 1.4–5.5) of all maternal deaths globally, both reported within the “other direct” category, which totals to 9.6 percent (95 percent confidence interval 6.5–14.3) [15]

According to Cross Sectional study done in Pakistan out of 9000 Total deliveries 5.2% patients found to have obstructed labor and 82% were teenagers. Mode of delivery was LSCS in 84%. The Cephalo pelvic disproportion remained the commonest reason of obstruction (66%). In the same study maternal morbidity and mortality observed were: PPH seen in 41%, 1.94% developed vesico vaginal fistula and 1.94% died of septicemia. Perinatal mortality was around 54.6% [16]

A cross-sectional study carried out in southwest Uganda found that 10.5% of the 12,463 laboring mothers who took part in the study had obstructed labor. According to this study, hydrocephalus (0.3%), mal-presentation or malposition (36.4%), and cephalo pelvic disproportion (63.3%) all contributed to obstructed labor. The mother's age group, parity, and place of residency were statistically substantially linked to the probability of obstructed labor. Additionally, it revealed that the perinatal mortality rate for women with obstructed labor was 142/1000 live births, while the rate for women without the issue was 65/1000 live births. 1.2% of cases of obstructed labor resulted in death [17].

Cephalo pelvic disproportion was the most common reason of obstructed labor, according to an Indian study (55.59%). Additional causes were myoma (0.32%), fetal congenital anomaly (1.28%), non-dilatation of the cervix (1.60%), malposition (23%), and mal presentation (18.21%). Cesarean sections were the most common delivery method (85.94%). Maternal morbidity and mortality included uterine rupture in 8 (2.56%) of cases, postpartum hemorrhage (PPH) in 33.9% of cases, urinary tract infection (UTI) in 10.9% of cases, wound infection in 7.7% of cases, sepsis in 49.8% of cases, and maternal death in 1.6% of cases. Perinatal mortality rate was 71/313 (22.68%), still birth rate was 57/313 (18.21%), and live birth rate was 256/313 (81.79%). Perinatal morbidity (in 198 cases) was most commonly due to birth asphyxia (29.68%), jaundice (16.80%), septicemia (14.84%), and meconium aspiration syndrome (9.77%). Incidence of PPH, still birth, perinatal mortality, and cesarean section was significantly higher among multiparous women [18].

According to the retrospective study conducted in Nigeria, there were 10,109 deliveries over three year at the UMTH. Out of these, 215 were complicated by obstructed labor giving the prevalence of 2.13%. During the same period, a total of 175 (10.02%) of cesarean deliveries were performed because of obstructed labor.

OLG were found to have a higher prevalence of teenage pregnancy than the NOLG (27.3% vs. 7.8%), and the difference was statistically significant (χ^2 : 26.96, $P < 0.0001$, OR: 4.44, 95% CI: 2.44–8.05). Compared to 20.96% in the NOLG, 55.12% in the OLG were nulliparous (χ^2 : 50.70, $P < 0.0001$, OR: 4.63, 95% CI: 2.99–7.15). Fifty-two percent of parturient with obstructed labor were illiterate compared to the NOLG's 16.1%. One hundred and thirty-two (64.4%) of those that had obstructed labor were unbooked, in the NOLG, only 27 (13.2%) were unbooked (χ^2 : 113.26, $P < 0.0001$ OR: 11.9, 95% CI: 7.24–19.61). The most common cause of obstructed labor was cephalo pelvic disproportion which occurred in 65.37% of cases.

Thirty-four (17.07%) cases were as a result of persistent occipito posterior position, and mal presentation was found in 11.72% of cases. Congenital abnormalities were seen in 3.9%, (six had hydrocephalus and two had abdominal tumors). Maternal complications were observed among 37.56% (77/205) of the women with obstructed labor compared to 4.39% (9/205) in women without obstructed labor (χ^2 : 73.88, $P < 0.0001$, OR: 7.56, 95% CI: 5.24–9.56). According to this study the case fatality rate was 0.98% [19].

Research done at Suhul, Shire revealed that 45.2% were rural in residence, 54% educated up to primary education, 9.5% of the participant's live distance greater than 50 km between the residence that Hospital, mothers laboring for greater than 24hrs were 8.35%. Route of delivery were 68% C/S, 20% hysterectomy, 7% destructive delivery and 5% repair of ruptured uterus and BTL are intervention done at Suhul, Shire (14). Of the mothers who experienced obstructed labor, over 89% had experienced at least one problem. For mothers with obstructed labor and other bladder injuries (18.2%), VVF (9.1%), cervical tears (4.5%), and maternal death (2.3%), the most common maternal complications were postpartum hemorrhage and puerperal infection (56.8%, 28.4%), and uterine rupture (25%). Ninety-three percent of neonate born to women who had obstructed labor had experienced at least one problem. Forty-nine percent of the newborns died right after birth or were stillborn. At Suhul, Shire, birth asphyxia (Apgar score of less than 7/10 at the first minute) affects 88.9% of live births [20].

Medical record review was done for those mothers who gave birth at Suhul general hospital from September 2012 to August 2015, and 91 cases of obstructed labor were reported. From these, about 8 (8.8%), 15 (16.5%) and 10 (11%) of them had bladder trauma, ruptured uterus and hysterectomy respectively. Additionally sepsis, post-partum hemorrhage, VVF and anemia were developed in 23 (25.3%), 10 (11%), 5 (5.5%) and 15 (16.5%) mothers respectively. [21]

Institution based cross-sectional study conducted on fetal maternal outcomes of obstructed labor and associated factors among mothers who gave birth in West Shoa Zone public Hospitals in Oromia shows that, 145(52.3%) and 157(56.7%) of the respondents had adverse maternal and fetal outcomes respectively. Mothers who were referred from the health center (AOR: 3.96, 95%CI: 1.61-9.8) and who had a trial of labor at the health center and home had a more likelihood of adverse maternal outcomes than those who were referred and had trial of labor at hospital respectively. In addition, mothers who were not followed by partograph and in labor for >24 hrs had also a more likelihood of adverse maternal outcomes than their counterparts. Likewise, newborns whom their mothers were not followed by partograph and mothers in labor for >24hrs had also a more likelihood of adverse fetal outcomes than their counterparts [22].

Women who were primipara [AOR 0.19; 95% CI 0.07, 0.52] and multigravida [AOR 0.17; 95% CI 0.07, 0.41] had lower odds of obstructed labor than grand multiparous, according to a case-control study conducted at Hawassa University hospital in Ethiopia. The risks were higher for

those with a contracted pelvis [AOR 3.98; 95% CI 1.68, 9.42], no partograph use [AOR 5.19; 95% CI 1.98, 13.6], labor lasting longer than 24 hours [AOR 7.61; 95% CI 2.98, 19.8], and an estimated distance of 10 to 50 kilometers from the hospital [AOR 3.89; 95% CI 1.14, 13.3]. Cases had higher rates of perinatal (60%) and maternal (65.2%) problems (p-value < 0.05). 39.7% of stillbirths and 8.3% of maternal fatalities were caused by obstructed labor [23].

A case–control study conducted in Amhara Region, Northwest Ethiopia revealed that, first ANC contact in third trimester pregnancy, distance from health facility, educational status of participants and their spouse, husband being a merchant, previous pregnancy related problems like abortion and still birth and CPD are significantly associated with obstructed labor. [24]

The study done at Halaba Kulito Primary Hospital, Halaba Special District, southern Ethiopia shows that lack of antenatal care follow up, mal presentation and age less than 19 years were found to be significantly associated with obstructed labor. Mothers who didn't have antenatal care follow up were nearly 3 times more likely to have obstructed labor than mothers who had antenatal care follow up (AOR=3.1, 95%CI (1.5, 6.4)). The presence of any form of mal presentation to labor were 10 times more likely to have obstructed labor than their counterparts (AOR=9.2, 95% CI (3.3, 25.6)). Additionally, mothers age less than 19 years were nearly 7 times more likely to have obstructed labor than their counterparts (AOR=6.9, 95%, CI (2.2, 21.6)) [25]

2.2. Conceptual frame work

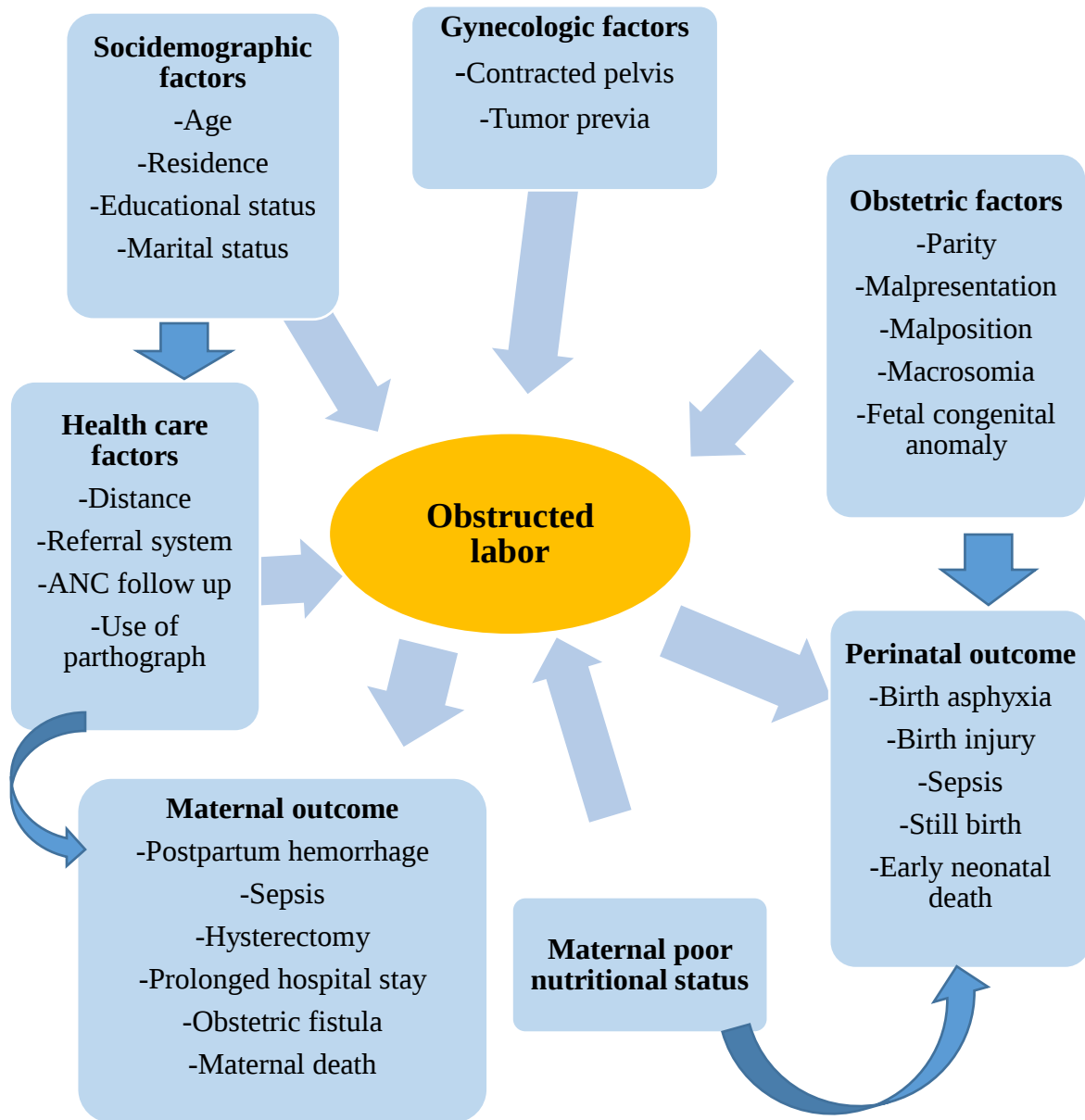


Figure 1. Conceptual frame work

3. Objectives

3.1. General objective

- To assess factors associated with obstructed labor and its maternal and perinatal outcome among mothers who gave birth in WKUSH from January, 2022 to December, 2024

3.2. Specific objectives

- To identify factors associated with obstructed labor among mothers who gave birth at WKUSH from January 2022 to December 2024
- To compare maternal outcome between mothers with obstructed labor and non-obstructed labor among deliveries at WKUSH from January 2022 to December 2024
- To compare perinatal outcome between mothers with obstructed labor and non-obstructed labor among deliveries at WKUSH from January 2022 to December 2024

4. Methodology

4.1 Study area

The study was conducted at Wolkite University comprehensive specialized hospital; which is the first and the only referral and teaching hospital in Gurage zone, Central Ethiopia region. The Hospital is located in Wolkite town at Gubrey sub-city, which is 14 km away from Wolkite town and 158 km southwest away from Addis Ababa, the capital city of Ethiopia. An altitude of the town is between 1910 meter and 1935 meter above sea level and it has sunny weather. The hospital provides health service for more than four million people living in the region and neighboring districts of the Oromia region. It was inaugurated on July 29/2011 E.C. The hospital has around 226 health care professionals and 307 administration staffs. The hospital has 350 beds, ICU, one bed for maternal intensive care unit, pharmacies, and clinical laboratory facilities. Under the Department of Obstetrics and Gynecology there are gynecology emergency, gynecology outpatient unit, gynecology referral clinic, ANC follow up unit, labor ward, postnatal care unit, maternal and child health unit, high risk and maternity ward and gynecology ward. There is also one common major operation theatre unit in the hospital.

4.2 Study period

The study was conducted from November, 2025 to December, 2025

4.3 Study design

Unmatched case - control study design was employed among cases ((mothers with obstructed labor (OLG)) and controls ((mothers with non-obstructed labor (NOLG)) who delivered in WKUSH from January, 2022 to December, 2024.

4.4 Source population

All mothers who gave birth in WKUSH from January 2022 to December 2024.

4.5 Study population

Study population were selected cases of obstructed labor and selected non obstructed labor as a control who gave birth in WKUSH from January 2022 to December 2024.

4.6. Sample size determination and sampling technique

Openepi version 3.01 software was used to calculate the 2 sample size using double population proportion formula, with the assumption of case to control ratio of 1:2, 99% confidence level, Power of 90% and least extreme odds ratio of 2.00 and the sample size is calculated based on base line study finding done at Sidama region on determinants of obstructed labor by considering the first objective cephalo-pelvic disproportion (CPD) as determinant factor of OL which provide larger sample size. According to the study, the proportion of cephalo-pelvic disproportion among cases of obstructed labor and control group was 38.5% and 11.5% respectively [26]. Accordingly the calculated sample size for cases were 59 and considering the above mentioned case to control ratio the sample size for controls were 117 making the total sample size 176. Considering the second objective similar study show that adverse maternal outcome occurred in 65 percent of cases and in 17.9 percent of control group and using this proportion with similar assumption used for the first objective, sample size for cases and controls calculated to be 25 and 50 respectively making the total sample size 75 which is lower than the sample size calculated for the first objective, so that the larger the sample size were enrolled. Labor ward delivery registration books and operation theatre record books revised to identify a total of 101 (hundred and one) cases of obstructed labor over a three year period. Out of these ninety eight cases of obstructed labor (clinically diagnosed and documented on client chart by most senior provider) retrieved from card room and listed separately by their medical record number to enroll study population of cases by simple random sampling. Using convenience sampling technique, two deliveries with non-obstructed labor next to each selected cases were taken as a control and were included in the study.

4.7. Inclusion criteria

All mothers who diagnosed with obstructed labor as a case and all mother with non-obstructed labor as a control who gave birth during the time interval set for sample selection.

4.8. Exclusion criteria

Women whose gestational age was less than 28 weeks and those with birth weight of less than 1000 gram were excluded.

4.8. Study variables

4.8.1. Dependent variables

Obstructed labor
Postpartum hemorrhage
Sepsis
Obstetric fistula
Maternal death
Birth asphyxia
Still birth
Prolonged hospital stay

4.8.2. Independent variable

Age
Place of residency
Parity
ANC follow-up
Mal-presentation
Partograph utilization
Macrosomia
Fetal congenital anomaly

4.9. Data collection tools and data collection procedure

The data was collected using structured data collection questionnaire. The data source were patient charts, delivery room records and operating theater registration books. Data collection tool were contain socio demographic characteristics of mothers, obstetric characteristics, clinical presentations, health care related factors, maternal and perinatal outcome parameters. Data collectors were BSc midwives and supervisor was MSc midwife after providing of a two day training.

4.10. Data processing and analysis

Data was checked for its completeness, cleaned, coded and entered in to Epidata V.4.7 then exported to statistical package for social science (SPSS) version 30 for analysis. Summary results was presented by frequency tables and graphs. Exploratory data analysis involved checking the data for implausible relationships, outliers and errors using frequency distributions, tables and graphs. Bar charts will also be used to compare distributions between groups. Bivariate analysis between dependent and independent variables was performed separately using binary logistic

regression. The strength and direction of the association between a dependent variable and independent variables (covariates) was expressed in odds ratio (OR) with 95% CI. Variables with a p-value of <0.25 in bivariate analysis were entered into multivariate analysis. Finally, model fitness was checked using Hosmer and Lemeshow goodness of fit test statistics, and it showed that the model was fitted ($\chi^2 = 4.63$), (p-value = 0.59). After performing multivariate logistic regression analysis, variables with a p-value < 0.05 were used as statistically significant factors and odds ratio (OR) with 95% confidence interval (CI) were used to measure the strength of association. Maternal and perinatal outcomes of obstructed labor were also analyzed with descriptive statistics.

4.11. Operational definition

Obstructed Labor: Failure of descent of fetal presenting part, in maternal pelvis despite the presence of adequate uterine contraction for mechanical reasons (27). Diagnosis was according to institutional clinical practice based on attending senior obstetrician documentation in the chart.

Obstructed labor group: Group of mothers for whom diagnosis of obstructed labor made clinically and documented in the patient chart by most senior provider.

Partograph: Indicates 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 (28)

Still birth: Birth outcome after 28 weeks of gestation with no sign of life (29)

4.12. Data quality assurance:

Data collectors and supervisors were trained for two-days on the objectives and contents of the study. Pre-testing of the questionnaire was done on 5 % of total sample size at Attat primary hospital prior to the actual data collection period to assess clarity, understandability, flow and consistency of the study tool. The data collectors were supervised by supervisors and principal investigator during data collection. The collected data was reviewed and checked for completeness, edited, cleaned and coded before data entry.

4.13. Ethical consideration

Ethical clearance was obtained from the Ethical Review Board of Wolkite University. Before the start of data collection, permission was obtained from Wolkite University Specialized Hospital clinical director office. Moreover, the name of patients were replaced with codes to avoid individual identifiers. Because secondary anonymized data were used, informed consent was waived by the ethics committee.

4.14. Finding Dissemination Plan

The result of this study was submitted to Wolkite University, College of medicine and Health sciences, WKUSH, and other concerned bodies. The study finding will also be presented on symposiums to the scientific community and finally effort will be made to publish on international scientific journals

5. Results

5.1. Socio-demographic and prenatal characteristics of the study participants

A total of 176 study subject, 59 cases and 117 controls were enrolled in the study. The mean age of the study participants was 27 years (27.0 ± 7) for cases ranging from 17 to 45 years and 25.44 (25.44 ± 4.5) for controls ranging from 20 and 38 years. Regarding residence place 38 (64.4%) of cases were from Nono and Tolay woreda of Oromia region. On the other hand 28 (23.9%) of controls were from Wolkite town, followed by 18 (15.4%) from Ezha and similarly 18 (15.4%) from Abashge woreda. About half (50.8%) and majority (75.2%) of cases and controls were in the age category of 20 -34 years respectively. Moreover, more than one third (35.6%) of cases and more than half (59%) of controls had at least one previous delivery (Table 1).

5.2. Intrapartum, fetal and health facility-related characteristics

Near total 57 (96.6%) of cases were presented as a case of referral from health facilities in the catchment area, whereas only 85 (72.6%) of controls were presented as a case of referral. About 21 (35.6%) of cases had labor duration of 25 - 36 hours and 3.4% of them had > 36 hours, whereas only 7 (6%) of controls had labor duration of 25 – 36 hours and none of them had > 36 hours. Majority 44 (74.6%) of cases reside in a distance greater than 40 kilometer from WKUSH and only 4 (6.8%) of them reside within 15 kilometer, whereas more than one third (35%) of controls reside within 15 kilometer distance and only 24 (20.5%) of them reside in a distance greater than 40 kilometer from WKUSH. Majority (93.2%) of controls were followed using partograph during their labor, but it was utilized only for 55.9% of cases. Regarding newborn birth weight, 13 (22%) of cases had birth weight ≥ 4000 gm, on the other hand only 3 (2.6%) of controls had birth weight ≥ 4000 gm. Likewise, fetal presentation among cases were vertex in 51 (86.4%) followed by compound and shoulder presentation each accounting 5.1%, similarly, 112 (95.7%) were vertex among controls, followed by breech presentation accounting 2.6%. Considering mode of delivery, in the cases 44 (74.6%), 13 (22%) and 2 (3.4%) gave birth by cesarean delivery, laparotomy and destructive delivery respectively. Procedure after laparotomy were 4 (6.8%) uterine repair without BTL, 1 (1.7%) uterine repair with BTL and 8 (13.5%) hysterectomy among cases. In the control group arm 75 (64.1%) gave birth vaginally and 42 (35.9%) gave birth by cesarean delivery. Regarding delay model, lack of transportation and

delayed referral each contributed 23 (39%) among cases. Among controls delay identified only in about 12%, delayed referral contributing 6% of them.

Table 1. Sociodemographic and perinatal characteristics of women who gave birth in WUSH from Jan, 2022 – Dec, 2025

Variable	Category	Case (OLG (%))	Control (NOLG (%))
Age	<20	15 (25.4)	21 (17.9)
	20 - 34	30 (50.8)	88 (75.2)
	≥ 35	14 (23.7)	8 (6.5)
Parity	Nullipara	21 (35.6)	40 (34.2)
	Para 1 - 4	27 (45.8)	69 (59)
	Grandmultipara	11 (18.6)	8 (6.8)
ANC contact	0	5 (8.5)	———
	1 - 4	24 (40.7)	29 (24.8)
	5 -8	30 (50.8)	77(65.8)
	≥ 9	———	11 (9.4)
Duration of labor in hours	< 12	9 (15)	36 (30.8)
	12 -24	27 (45.8)	74 (63.2)
	25 - 36	21 (35.6)	7 (6)
	≥ 36	2 (3.4)	———
Distance from WKUSH (km)	≤ 15	4 (6.8)	41 (35)
	16 - 25	6 (10.2)	8 (6.8)
	26 - 40	5 (8.5)	6 (5.1)
	> 40	44 (74.6)	24 (20.5)
Mode of delivery	Vaginal delivery	———	75 (64.1)
	Cesarean delivery	44 (74.6)	42 (35.9)
	Destructive delivery	2 (3.4)	———
	Laparotomy	13 (22)	———
Delay model	No delay	———	103 (88)

	Lack of early decision	11 (18.6)	4 (3.4)
	Lack of transportation	23 (39)	3 (2.6)
	Lack of timely care	2 (3.4)	—
	Delayed referral	23 (39)	7 (6)
Fetal birth weight (gm)	< 4000	46 (78)	114 (97.4)
	≥ 4000	13 (22)	3 (2.6)
Fetal presentation	vertex	51 (86.4)	112 (95.7)
	breech	1 (1.7)	3 (2.6)
	face	1 (1.7)	—
	shoulder	3 (5.1)	2 (1.7)
	compound	3 (5.1)	—

5.3. Predictors of obstructed labor

In bivariate analysis, 8 variables were significant and were fitted for multivariable logistic regression with a p-value of < 0.25. After controlling of confounding effect, only 4 variables (distance from WKUSH, parity, partograph utilization and place of labor follow up) were the significant predictors of obstructed labor (Table 2). Those mothers living at a distance from WKUSH greater than 40 km had odds of obstructed labor about 14 times higher than those living within 15 km from WKUSH [AOR = 13.93, 95% CI: 4.8, 40.1].

According to this study nulliparous ladies had odds of developing obstructed labor about 3.5 times higher, as compared to those multiparous mothers [AOR = 3.5, 95% CI: 1.2, 9.6].

Similarly, mothers who followed at health center during labor, were about 16 times more likely to have the chance of obstructed labor than those who followed at hospital [AOR = 16.06, 95% CI: 6.6, 38.7]. Moreover, the odds of encountering obstructed labor was increased 6 times, among those mothers for whom labor progress was not monitored with partograph as balanced with those who followed with partograph during their labor [AOR = 6.6, 95% CI: 1.3, 11.3].

Although longer duration of labor before arrival was associated with obstructed labor in the bivariate analysis, it did not remain statistically significant after adjustment for confounders.

Table 2. Predictors of obstructed labor among women who gave birth in WKUSH from Jan, 2022 – Dec, 2025

Variable	Category	Case (OLG)	Control (NOLG)	AOR (95% CI)	P - value
Distance from WKUSH (km)	≤ 15	4	41	1	
	16 - 25	6	8	3.66 (1, 13.4)	0.050
	26 - 40	5	6	1.83 (0.53, 6.31)	0.336
	> 40	44	24	13.93 (4.8, 17.3)	0.001
Parity	Para 1 - 4	21	69	1	
	Nullipara	27	40	3.51 (1.2, 9.6)	0.015
	Grandmultipara	11	8	2.62 (1.2, 7.5)	0.073
Place labor followed	Hospital	7	80	1	
	Health center	52	37	16.06 (6.6, 38.7)	0.017
Partograph utilization	Yes	33	109	1	
	No	26	8	10.7 (4.4, 25.9)	0.001

5.4. Maternal and perinatal adverse outcomes of obstructed labor

About half (50.8%) of cases had stillbirth and only 44.1% of newborn had 5 minute APGAR score ≥ 7 in the group, whereas 4.3% of controls had stillbirth and 94% of newborn had 5 minute APGAR score ≥ 7 in the group. Nearly half (45.8%) of cases had at least one form of maternal

complications, postpartum hemorrhage accounting for 32.2%, obstetric fistula 10.2% and surgical site infection 3.4%. In contrast only about 12.8% of controls had maternal complications, postpartum hemorrhage contributing 6.8%. About 62.7% of cases stayed in the hospital for about 3 – 7 days and 20.3 % of them stayed for 8 – 14 days. On the contrary about 59.8 % of controls stayed less than 24 hours. Looking for maternal outcome after giving birth one mother died due to irreversible hypovolemic shock after hysterectomy in the case group making case fatality rate 1.7%, whereas no maternal death identified in the control group.

Table 3. Maternal and neonatal outcome after delivery among cases and controls of mothers who gave birth at WKUSH from Jan, 2022 - Dec, 2024

Variable	Category	Case ((OLG (%))	Control ((NOLG (%))	X ² test (P - value)
Newborn	Alive	29 (49.2)	112 (95.7)	0.001
	stillbirth	30 (50.8)	5 (4.3)	
5 th minute APGAR score	< 7	33 (55.9)	110 (94)	0.003
	≥ 7	26 (44.1)	7 (6)	
Sex of newborn	Male	37 (62.7)	50 (42.7)	0.791
	Female	22 (37.3)	67 (57.3)	
Maternal complication	Postpartum hemorrhage	19 (32.2)	8 (6.8)	
	Obstetric fistula	6 (10.2)	-----	
	SSIs	2 (3.4)	-----	
	Maternal death	1 (1.7)	-----	
	Puerperal sepsis	-----	2 (1.7)	
Duration of hospital stay (days)	< 1 (24 hours)	1 (1.7)	70 (59.8)	0.000
	2	5 (8.5)	39 (33.3)	
	3 - 7	37 (62.7)	8 (6.8)	
	8 - 14	12 (20.3)	-----	
	> 14	4 (6.8)	-----	

6. Discussion

This study assessed factors associated with obstructed labor and its adverse maternal and perinatal outcomes in Gurage zone central Ethiopia region. Accordingly, different factors that predict the occurrence of obstructed labor and associated maternal and neonatal complications were described. Accordingly the study revealed that distant residence place from health facility where definitive management can be performed for labor abnormality was one of the major predictor of obstructed labor. Similarly study conducted in northwest Amhara region, Tigray region and Sidama region southern Ethiopia showed that, distance of 10 - 50 km from hospital highly associated with obstructed labor [21, 24, 26]. The uniformity of study finding in different regions of the country indicates the accessibility of health facility that can perform definitive management for labor abnormality is below requirement, hence increasing number of health facility with cesarean delivery service may reduce significant number of obstructed labor. In addition the study also showed that, nulliparity increases the likelihood of obstructed labor. In the same condition the study conducted in Nigeria concluded that the occurrence of obstructed labor was high in nulliparous group compared to multiparous mother with statistically significant difference [20].

This study also found that the lack of partograph utilization was significantly associated with obstructed labor. This is supported by different studies done in Ethiopia [23, 26]. This might be because partograph helps the health care provider in identifying labor abnormalities and provides an early warning signs for early referral and may also help to initiate appropriate interventions. Hence, proper partograph utilization could improve labor outcomes and reduce number of obstructed labor. Although longer duration of labor (more than 24 hours) before arrival to the health facility was associated with obstructed labor than women with shorter duration (less than 12 hours) in the bivariate analysis, it did not remain statistically significant after adjustment for confounders. This finding is inconsistent with the study done at Hawassa University referral hospital Sidama region [26]. This might be due to the fact that labor diagnosis based on patient history might be affected by its subjectivity. The study revealed that those mothers who followed at health center during labor, had increased probability of developing obstructed labor than those who followed at hospital. This was also evident in the study done at public hospitals of west Shoa zone, Oromia region [23].

The study also explored that the adverse maternal and perinatal outcomes among cases and controls. Accordingly, nearly half of women in the cases encountered at least one form of adverse maternal outcomes. This finding is modestly lower than study done in Sidama region southern Ethiopia [26]. The possible variation might be due to difference in timely evaluation and intervention depending on delivery unit work load and early discharge to decrease bed occupancy rate.

Furthermore, this study also showed that, half of delivery outcome resulted in stillbirth among cases. This finding is supported by the study conducted in Suhul general hospital in Shire, Tigray region which showed stillbirth rate of 49 % among OL cases [21]. In contrast study conducted in India reveals that, stillbirth rate among OL Cases was 18.2 % which is significantly low. This disparity is may be due to delay in referral, the difference in clinician discretion to diagnose OL, immediate intervention after diagnosing OL and the set up variation in scope of newborn care immediately after delivery. Eventually, this study found that, case fatality rate was 1.7% among cases in the study area. This result is in line with study conducted in India (mortality rate 1.6%), Nigeria (mortality rate 0.98%), Pakistan (mortality rate 1.94%), Uganda (mortality rate 1.2%) and Suhul general hospital (mortality rate 2.3%) [15, 17, 19, 20, 21].

7. Strength of the study

The study has both strengths and limitations. The unmatched case - control design allowed identification of factors associated with obstructed labor and description of maternal and perinatal outcomes using routine hospital data over a three-year period.

8. Limitation

The retrospective nature of the study and reliance on secondary data limited the availability of important variables such as maternal educational status, socioeconomic status and nutritional status. Some explanatory variables may lie on the causal pathway of obstructed labor, introducing possible temporal ambiguity and reverse causality. Selection of controls from consecutive deliveries following each selected obstructed labor cases may also introduce selection bias.

9. Conclusions

Distant residence place from health facility, nulliparity, lack of partograph utilization, and labor follow up at health center were significantly associated with obstructed labor. Obstructed labor was associated with maternal and newborn morbidity and mortality. Longer hospital stay, postpartum hemorrhage, SSIs, obstetric fistula and infertility following hysterectomy, perinatal and maternal death were observed adverse outcomes of obstructed labor.

10. Recommendation

Increasing accessibility of comprehensive obstetric care to the community, improving partograph utilization by fostering skill and knowledge of health care providers working at primary health care units, and optimal creation of awareness for birth preparedness and complication readiness may prevent occurrence of obstructed labor. Hence, research based, nationally recognized maximal distance at which every mother should access comprehensive obstetric care recommended to be set and implemented. In addition in service training for health care provider working in primary health care units, increasing accessibility of transportation and increasing scope of newborn care in hospitals also recommended.

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12. Annex: Questionnaires

Information sheet

My name is Dr. Muktar Mohammad (MD, Obstetrics and Gynecology resident). This questionnaire is developed to conduct study on factors associated with obstructed labor and its maternal and perinatal outcomes among mothers who gave birth in Wolkite university specialized hospital as a partial fulfillment of the requirements for the specialty certificate in Obstetrics and Gynecology.

Name of Data collector _____ Signature _____

Part I Socio – demographic information

1. Card number _____
2. Age in years A. ≤ 19 B. 20 -34 C. ≥ 35
3. Residence A. Urban B. Rural
4. Marital status A. Unmarried B. Married

Part II Obstetric characteristics

5. Parity A. 0 B. 1 – 4 C. ≥ 5
6. Type of pregnancy A. singleton B. twin C. higher order
7. ANC follow up A. No ANC contact at all B. 1 – 4 contact C. 5 – 8 contact D. ≥ 9 contact
8. If the mother had ANC follow up, where was the place of follow up?
A. Health center B. Private Clinic C. Public hospital
9. What is the total duration of labor in hours?

A. <12 B. 12 – 24 C. 25 – 36 D. ≥ 36
10. Where was the labor followed?

A. At Home B. Health center C. Hospital D. Private clinic

11. Was the labor followed with partograph? A. Yes B. No
12. What were the reasons for prolonged labor if labor lasted ≥ 24 hours in terms of delay models? A. Lack of decision to go to health facility B. Lack of transportation
C. Lack of timely care at health facility D. Delayed referral
13. What was the admission diagnosis? A. Obstructed labor B. None obstructed labor
14. What was the fetal presentation?
A. Vertex B. Breech C. Face D. Shoulder E. Brow
F. Compound
15. Was the mother came referred? A. Yes B. No
16. If the mother came referred, where is the referral from? A. Health center
B. Hospital
17. What was the reason for referral? Specify (reason for referral noted on the referral paper)

18. How far was the mother's residence place from WKUSH in kilometers (estimate)?

19. What was the mode of delivery?
A. SVD B. Operative vaginal delivery C. CD D. Laparotomy
E. Destructive vaginal delivery
20. If the delivery was laparotomy, what procedure done for the uterus?
A. Uterine repaire w/o BTL B. Uterine repaire with BTL C. Hysterectomy

Part III perinatal outcome

21. Fetal birth weight in grams _____
22. Fetal outcome at delivery A. Alive B. Stillbirth
23. If the fetus is alive at delivery, what was the APGAR score at 5th minute?
A. ≥ 7 B. < 7
24. Sex of the new born A. Male B. Female

