

*Full Length Research Paper*

# An Assessment of Feto-Maternal Outcomes and Associated Clinical Complications of Obstructed Labor in North Ethiopia

Gebresilasea Gendisha Ukke<sup>1\*</sup>, Temesgen Worku Gudayu<sup>2</sup>, Mekdes Kondale Gurara<sup>1</sup>, Negash Wakgari Amanta<sup>3</sup> and Mulugeta Shegaze Shimbire<sup>4</sup>

<sup>1</sup>Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

<sup>2</sup>Department of Midwifery, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

<sup>3</sup>School of Nursing and Midwifery, College of Medicine and Health Sciences, Hawassa University, Hawassa, Ethiopia.

<sup>4</sup>Department of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

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Ethiopia is one of the countries with the highest maternal mortality rates, obstructed labor and its complications being the leading causes of maternal deaths in the country. This study was aimed at assessing feto-maternal outcomes in obstructed labor in Suhul General Hospital, North Ethiopia. Institution based cross-sectional study was carried out from May 1 to August 31, 2014 in Suhul General Hospital. All mothers who had given birth in the hospital during the study period were included in the study. Data were collected by using a pre tested structured questionnaire and checklists, entered into Epi Info version 7.1.2.0 and finally transported in to SPSS version 20 software package for analysis. A total of 660 mothers had given birth in the hospital during the study period out of which 44(6.7%) were diagnosed as obstructed labor cases. More than 89% of the mothers with obstructed labor and about 93% of the babies born to them had developed at least one complication. Eighteen (40.9%) of the babies were stillbirths or had died immediately after delivery. Postpartum hemorrhaged and puerperal sepsis 25(56.8%) each and uterine rupture 11(25%) were the main maternal complications among the mothers with obstructed labor. Cesarean birth (68%), hysterectomy (20%), destructive delivery (7%) and repair of the ruptured uterus with bilateral tubal ligation in 5% were interventions done for the mothers with obstructed labor. Inaccessibility of vehicle road and time the women stayed at health centers before they were referred to the hospital have shown association with poor maternal outcomes in Fisher's Exact test. Prevalence of obstructed labor in Suhul general hospital is high with high rate of maternal and fetal complications. Improving vehicle road accessibility and giving training for health centers delivery case teams on when to refer laboring mother to the hospitals is needed in order to decrease proportion of Obstructed labor and its sequelae.

**Key words:** Obstructed labor, Ethiopia, low income country, maternal mortality.

## INTRODUCTION

Obstructed labor (OL) is defined as the failure of the presenting part to descend in spite of adequate uterine

contractions (Dolea and AbouZahr, 2003). The main cause of obstructed labor is cephalo pelvic disproportion

which is usually a result of under nutrition during childhood and early childbirth resulting in small pelvis (Dolea and AbouZahr, 2003, Al-Harazi, 2006, Fantu, Segni et al. 2010, Ara 2011, Agrawal et al. 2014).

OL is an important cause of maternal death in low income countries (Dolea and AbouZahr 2003). It is also responsible for a significant short and long term maternal morbidities such as sepsis, uterine rupture, hemorrhage, secondary infertility, obstetric fistulae and other neurologic and skeletal complications (Arrowsmith et al., 1996, Wall, 2012). Moreover, the impact of obstructed labor on the lives of the fetuses is very significant and it is responsible for high proportion of perinatal death. Furthermore, survived children suffer from long-term complications like cerebral palsy and developmental disabilities (Lawn et al., 2005, Fantu et al., 2010; Kabakyenga et al., 2011; Bayou and Berhan, 2012). OL has contributed 8% to the estimated 289,000 maternal death occurred in 2013 globally, 99% of which were in low income countries (Dolea and AbouZahr, 2003; Wall et al., 2005; Gibbons et al., 2010; Khooharo et al., 2013).

Reducing maternal death resulting from obstructed labor is considered as an indication for the improvement of the obstetric care system and socio-economic status of one country (Neilson, Lavender et al., 2003). In Ethiopia, obstructed labor is now the leading cause of maternal death since complications of abortion have reduced. OL now causes 13 to 36% of all maternal deaths in the country (Abdella, 2010, Bayou and Berhan, 2012, EMoH, 2012). Despite the problem, little research has been conducted regarding OL in the country and no research has been conducted in the last decade in the study area. This study was therefore aimed at assessing feto-maternal outcomes in obstructed labor in Suhul General Hospital.

## MATERIALS AND METHODS

Institution based cross- sectional study was conducted in Suhul General Hospital from 1<sup>st</sup> of May to August 31, 2014. Sample size was determined by using a single population proportion formula:

$$n = \frac{(Za/2)^2 * (p)(1 - p)}{w^2}$$

Where,  $n$  is sample size required,  $p$  is estimated proportion of OL among laboring mothers and we took 50% (0.5) to get higher sample size,  $w$  is maximum tolerable error which is 0.04 and  $Z$  is value of standard normal distribution (Z-statistic) at 95% confidence level which is 1.96.

$$n = \frac{(1.96)^2 * (0.5)(0.5)}{0.04^2} = 600.$$

For possible non response during the data collection time, 10% was added which gave a final sample size of 660.

To get the required minimum sample size all the mothers who had given birth in the hospital from May to August 2014 were included in the study consecutively. The hospital is located in Shire town of Tigray region in north Ethiopia which is about 40 km from Eritrean boarder (14°06'51.03" N 38°18.17" E). The hospital is acting as a referral hospital for the surrounding district hospitals and health centers located in the remote areas of the zone. The proportion of women who give birth at health facilities in the region is 26.7% which relatively higher than the national average which is 16%(CSA, 2014).

Face to face interview was conducted to collect data on socio-demographic status, distance from the hospital, road or ambulance accessibility, diagnosis, maternal and fetal outcomes and interventions done using a pre tested structured questionnaire and checklist.

Three BSc midwives were participated in data collection after getting one day training on how to collect the data. One emergency surgical officer had been supervising the data collectors on a daily bases.

Pretest was conducted on 5% of mothers prior to the actual data collection period. Slight modification was then made to the questionnaire and the checklist. The principal investigator had been reviewing the questionnaires and the checklists every day. Epi info version 7.1.2.0 and SPSS version 20 software package were used for data entry and analysis respectively. Descriptive statistics such as mean and standard deviation were computed and analytic statistical analysis was performed with Fisher exact test.

Ethical clearance was obtained from Ethical Review Board of College of Medicine and Health Sciences, University of Gondar. An official letter of cooperation was written by the University to Suhul General Hospital. The hospital administrator in turn has communicated with the obstetric ward head nurse so that data could be collected in the ward. Informed consent was obtained from each study participants and each study participant was informed about the objective of the study and confidentiality of the information she is giving. The participants were also informed that they have the full right not to participate in the study or to stop participation at any time during the interview.

## Operational definitions

### *Obstructed labor*

A labor with the features of obstruction like bandle's ring, excessive fetal head molding or caput, malpresentations, vulvar edema, maternal exhaustion and dehydration in a women either referred form rural health institutions or have been in labor for a long time and diagnosed as obstructed labor by the senior obstetrician of the ward.

### *Poor maternal outcome*

**Poor maternal outcomes/complications:** Presence of at least one of the undesirable outcomes in the mother like postpartum haemorrhage (PPH), puerperal sepsis, uterine rupture, Vesico-vaginal fistula (VVF), bladder injury, perineal tear, cervical tear and maternal death.

\*Corresponding author. E-mail: gebresilasea@yahoo.com. Tel: +251934596503. Fax: +251-46-8810279.

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**Table 1.** Socio-demographic characteristics of the study participants, Suhul General Hospital, North Ethiopia in August, 2014 (n=660).

| Variable                               | Frequency | Percent |
|----------------------------------------|-----------|---------|
| Age (n= 660)                           |           |         |
| < 20 years                             | 106       | 16.1    |
| 21 – 34 years                          | 486       | 73.6    |
| ≥ 35 years                             | 68        | 10.3    |
| <b>Address District (n = 660)</b>      |           |         |
| Indasilassie                           | 279       | 42.3    |
| Tahtay Koraro                          | 51        | 7.7     |
| Laylay Adyabo                          | 67        | 10.2    |
| Tahtay Adyabo                          | 18        | 2.7     |
| Asgede Tsembla                         | 144       | 21.8    |
| Medabay Zana                           | 52        | 7.9     |
| Welqayt/ Tselemt                       | 49        | 7.4     |
| <b>Occupation (n = 660)</b>            |           |         |
| House wife                             | 542       | 82.1    |
| Private business                       | 76        | 11.5    |
| Governmental employee                  | 39        | 5.9     |
| Others*                                | 3         | 0.5     |
| <b>Educational status (n = 660)</b>    |           |         |
| Uneducated/unable to read or write     | 248       | 37.6    |
| Elementary school (Grade 1 - 4)        | 108       | 16.4    |
| Secondary school (Grade 5 - 8)         | 148       | 22.4    |
| High school (Grade 9 - 12)             | 95        | 14.4    |
| Above high school                      | 61        | 9.2     |
| <b>Age at first marriage (n = 658)</b> |           |         |
| < 18 year                              | 379       | 57.6    |
| 18 - 19 years                          | 186       | 28.3    |
| 20 year or above                       | 93        | 14.1    |

Others: Daily laborers and housemaids

### Poor fetal outcome

**Poor fetal outcome/complications:** Presence of at least one of the undesirable outcomes in the newborn like birth injury, birth asphyxia, stillbirth, or early neonatal death.

## RESULTS

Six hundred sixty mothers had given birth during the study period and participated in this study. The median age of the study participants was 25 year with inter-quartile range (IQR) of 21 to 29 years. Majority of participants, 606(91.8%) were followers of Orthodox Christianity. More than 98% of them were from *Tigré* ethnic group. Two hundred ninety eight (45.2%) were rural residents. Six hundred fifty six (99.4%) of the participants were in marital relationship. Concerning the district they came from, most of them, 279(42.3%) were from Indasilassie district followed by *Asgede Tsembla* district, 144(21.8%). Majority (542(82.1%)) of the participants economically depend on their husbands.

Nearly three fourth, 248(37.6%) of the study

participants had no formal education who cannot read and write while only 61(9.2%) have joined college or university. In case of their husbands, 188(28.7%) were uneducated while 143(21.8%) have educational level above grade 12. Five hundred ten (77.3%) were who grew up in rural area and still living there or had changed their residence to urban area and the rest 150 (22.7) have been urban residents from their childhood. The participants' median age at first marriage was 17 years with interquartile range (IQR) of 16 to 18 years. Concerning the monthly income of their husbands, 146(22.3%) have average monthly income of less than \$25 while 324 (49.4%) have a monthly income of above \$50 (Table 1).

Thirty two (4.8%) of the mothers had no direct vehicle road access to their home. The maximum distance the participants have travelled to visit the hospital was 140 km. The average time the laboring women had waited for ambulance after calling the focal persons is less than half an hour. The median time the laboring women had

**Table 2.** Distribution of the study participants in relation to utilization and access to health services, Suhul General Hospital, Shire town, North Ethiopia in August, 2014 (n=660).

| Variable                                                                        | Frequency | Percent |
|---------------------------------------------------------------------------------|-----------|---------|
| <b>Distance from the hospital (km) (n = 660)</b>                                |           |         |
| < 10                                                                            | 313       | 47.4    |
| 10 - 50                                                                         | 284       | 43.0    |
| > 50                                                                            | 63        | 9.5     |
| <b>Time to wait after calling ambulance (min) (n=628)</b>                       |           |         |
| < 30                                                                            | 598       | 95.2    |
| 30 - 60                                                                         | 22        | 3.5     |
| > 60                                                                            | 8         | 1.3     |
| <b>Time to walk on foot to reach vehicle road access (h) (n= 32)</b>            |           |         |
| < 1                                                                             | 9         | 28.1    |
| 1 - 2                                                                           | 14        | 43.8    |
| > 2                                                                             | 9         | 28.1    |
| <b>Number of ANC visits (n = 660)</b>                                           |           |         |
| Less than 4                                                                     | 125       | 18.9    |
| At least 4                                                                      | 535       | 81.1    |
| <b>Stay at home before visiting health institutions (h) (n = 589)</b>           |           |         |
| < 1 h                                                                           | 159       | 27.0    |
| 1 - 2                                                                           | 332       | 56.4    |
| > 2                                                                             | 98        | 16.6    |
| <b>Stay at health institution before referred to the hospital (h) (n = 327)</b> |           |         |
| < 8                                                                             | 238       | 72.8    |
| 8 - 12                                                                          | 49        | 15.0    |
| > 12                                                                            | 40        | 12.2    |

stayed at their home after the onset of labor before visiting health institutions was one hour with maximum time of up to 25 h. The average time the mothers who had been referred from other health institutions had stayed at the first health institution was about 4 h with some stayed for more than 70 h (Table 2).

Ten (1.5%) and 115(17.4%) of them have medical and obstetric problems or condition respectively. Post term pregnancy 28(24.3%), hypertensive disorders of pregnancy 24(20.9%), premature rupture of membranes (PROM) 22(19.1%) and ante partum hemorrhage (APH) 14(12.1%) were the main obstetric problems/conditions of the study participants. Forty four out of the 660 (6.7%) study participants were diagnosed as obstructed labor (Table 3).

Most of the participants 445(67.4%) had given birth via vaginal route. The weights of the first babies ranges from 1500 to 5200 g with mean weight of 3117 g (SD = 436.6). Six hundred seventeen (93.5%) of the babies born to the mothers were normal birth weight, 30(4.5%) low birth weight and the rest 13(2.0%) were macrosomic. Caesarean birth was the main intervention done for OL cases (Figure 1). One hundred thirty seven (20.8%) of the babies have at least one problem/complication before they had been discharged from the hospital with birth asphyxia being the main problem encountered in

106(77.3%) of the newborns (Figure 2). Thirty nine out of the 44 mothers with OL (89%) and 41(93.2%) of their babies had developed at least one complication during or after delivery (Figure 3).

### Factors associated with poor maternal outcomes

Out of the 44 women with OL, 31(70.4%) had no access to vehicle road from their homes to hospital and absence of access to vehicle road was associated with poor maternal outcomes (p value = 0.02). The second factor which have showed some association with poor maternal outcomes in women with OL is the time the women had stayed at health centers before they were referred to the hospital (p value = 0.05) (Table 4).

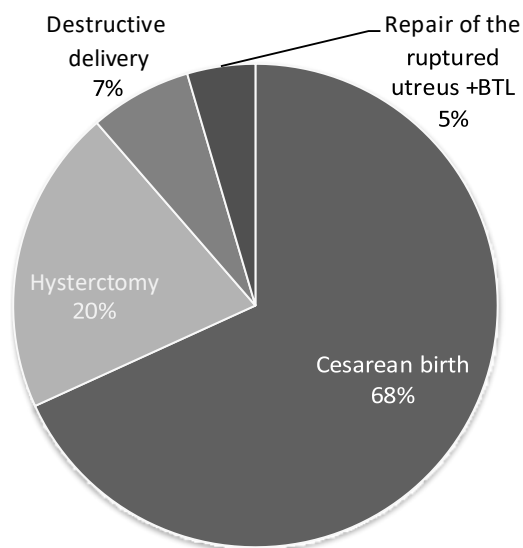
### DISCUSSION

This study has shown obstructed labor as the main contributor to poor maternal and fetal outcomes. Out of 44 mothers diagnosed with obstructed labor, 39(88.6%) of them have developed at least one complication, PPH and puerperal sepsis being the most common complication each encountered in more than half of the Pakistan where PPH was the main complication of OL

**Table 3.** Obstetric characteristics of the study participants, Suhul General Hospital, Shire town, North Ethiopia in August, 2014 (n=660).

| Variable                                                 | Frequency | Percent |
|----------------------------------------------------------|-----------|---------|
| <b>Parity (n= 660)</b>                                   |           |         |
| Primiparous                                              | 299       | 45.3    |
| Multiparous (2- 4)                                       | 251       | 38.0    |
| Grandmultiparous ( $\geq 5$ )                            | 110       | 16.7    |
| <b>GA at delivery (n = 530)</b>                          |           |         |
| Preterm                                                  | 16        | 3.0     |
| Term                                                     | 486       | 91.7    |
| Post term                                                | 28        | 5.3     |
| <b>Type of the obstetric problem/ condition (n=115)*</b> |           |         |
| APH                                                      | 14        | 12.1    |
| IUFD at admission                                        | 3         | 2.6     |
| Twin pregnancy                                           | 18        | 15.7    |
| Polyhydramnios                                           | 1         | 0.9     |
| Post term pregnancy                                      | 28        | 24.3    |
| Preterm labour                                           | 16        | 13.9    |
| PROM                                                     | 22        | 19.1    |
| Hypertensive disorders of pregnancy                      | 24        | 20.9    |
| <b>Total labour duration (h) (n = 618)</b>               |           |         |
| < 24                                                     | 567       | 91.7    |
| $\geq 24$                                                | 51        | 8.3     |
| <b>Fetal presentations (n = 660)</b>                     |           |         |
| Vertex                                                   | 573       | 86.8    |
| Breech                                                   | 62        | 9.4     |
| Face                                                     | 13        | 2.0     |
| Shoulder                                                 | 7         | 1.1     |
| Brow                                                     | 5         | 0.8     |

\*One mother can have more than one problems

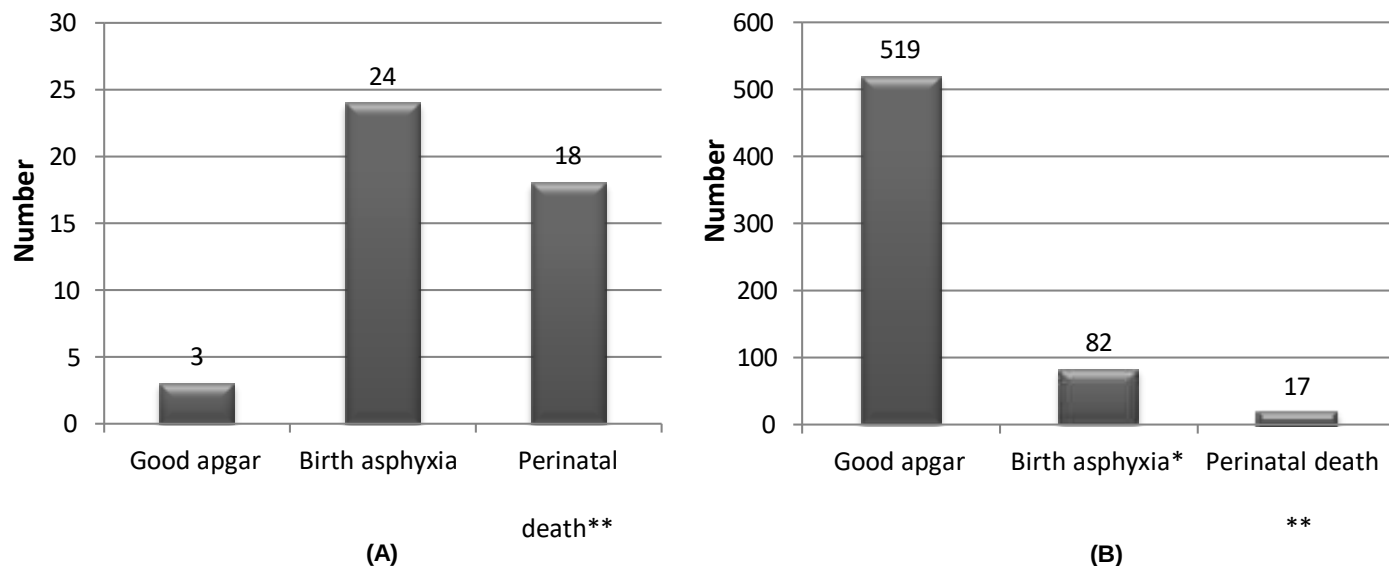


**Figure 1.** Type of intervention done to manage cases with obstructed labor, Suhul General Hospital, Shire town, North Ethiopia in August, 2014 (n = 44). BTL: Bilateral tubal ligation.

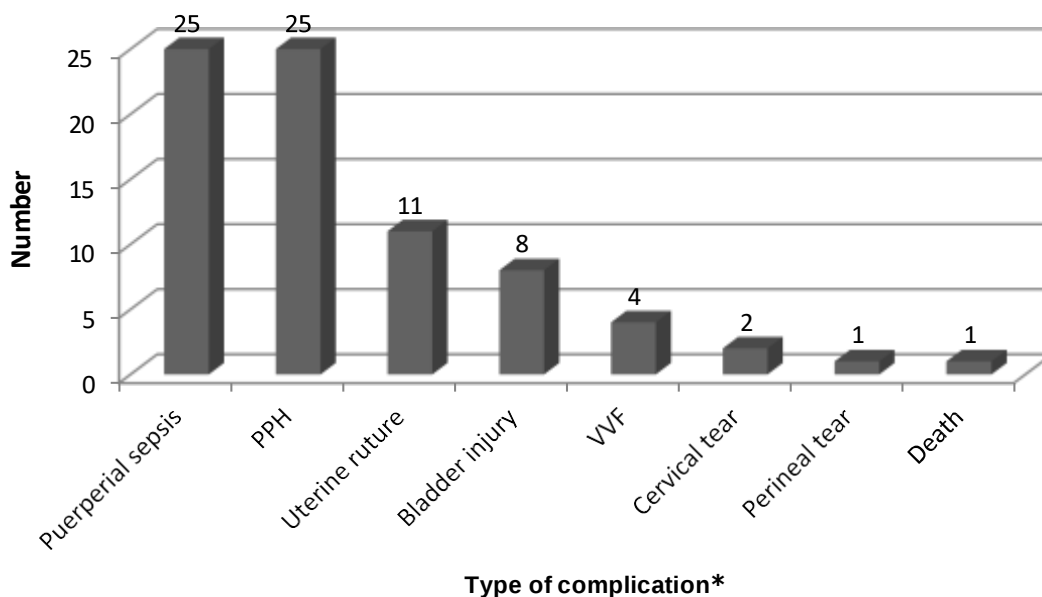
cases followed by puerperal sepsis (Shirin and Nahar 2013). It is also similar with a study done in India where PPH and puerperal sepsis were the main complication among patients with obstructed labour (Omole-Ohonsi and Belga, 2010). This could be due to the fact that women with obstructed labor had been in labor for longer periods after rupture of membrane leading to assessing infection. Manipulations done to manage the cases could also increase the risk of puerperal sepsis. Exhausted uterine muscles fails to contract after prolonged obstructed labor increasing risk of PPH. Rupture of uterus, another complication of OL could have increased rate of PPH in OL cases.

In this study uterine rupture has occurred in 11(25%) of OL cases. This figure is higher than study done in India where only 7.1% of OL cases have developed uterine rupture (Omole-Ohonsi and Belga, 2010). It is however; lower than findings from a study done in Jimma Specialized Hospital in Ethiopia, where uterine rupture has complicated 45.1% of OL cases (Fantu et al., 2010).

This can be attributed to the fact that there is improvement in transportation system in Ethiopia which



**Figure 2.** Distribution of birth outcome among the study participants, Suhul General Hospital, Shire town, North Ethiopia in August 2014. (A) OL cases; (B) Non - OL cases. \*Two neonates with birth injury included; \*\*Stillbirths + early neonatal deaths that have occurred before discharge from the hospital. One fetus can have more than one birth outcomes (birth asphyxia and neonatal death).



**Figure 3.** Complications developed by obstructed labor cases at Suhul General Hospital, Shire town, North Ethiopia in August 2014. \* One mother can develop more than one complications.

This can be attributed to the fact that there is improvement in transportation system in Ethiopia which could have increased the probability of reaching the hospitals before rupture of the uterus has occurred. The lower figure of Indian study could be due to the difference in the infrastructures from courtly to country.

From this study one mother has died making maternal mortality rate among OL cases to be 2.3%. This is similar to Pakistani study where maternal mortality rate among

OL cases was 2% (Shaikh et al., 2013). However; it is slightly higher than Nigerian study and another Pakistani studies where the rate was 1% (Omole-Ohonsi and Belga, 2010; Shazia et al., 2013). This could probably be due to the state at which the patient has admitted to the hospital or availability of drugs and blood products on the day of admission.

Four patients (9.1%) have developed Vesico Vaginal Fistula (VVF) making the rate higher than results from

**Table 4.** Fisher's exact test analysis of factors associated with poor maternal outcomes among obstructed labor cases, Suhul General Hospital, North Ethiopia in August, 2014.

| Variable                               | Maternal complication/poor outcome |           | P value |
|----------------------------------------|------------------------------------|-----------|---------|
| Access to vehicle road                 | Absent                             | Present   | 0.02    |
| Absent                                 | 1(3.2%)                            | 30(86.9%) |         |
| Present                                | 4(30.8%)                           | 9(69.2 %) |         |
| Stay at Health centers before referral |                                    |           | 0.05    |
| ≤ 20 hours                             | 4(25%)                             | 12(75%)   |         |
| >20 hours                              | 1(11.4%)                           | 27(88.6%) |         |

study done in India which was 1.4% and study done in Jimma where the rate was 4.1% (Fantu et al., 2010, Gupta and Porwal, 2012). This could be due to small number of OL cases in this study. It could also be due to difference in time of visiting the hospital after has started as VVF develops about a week after the onset of labor. Out of 44 babies born to women with obstructed labor, 41(93.2%) of the have developed at least one complication. Eighteen (40.9%) of the babies were stillbirths or died immediately after delivery. This is lower than findings from studies done in Nigeria, Pakistan and Jimma Specialized Hospital in Ethiopia where the rate of perinatal loss among OL cases ranged from 50 to 62%(Fantu et al., 2010; Omole-Ohonsi and Belga, 2010; Gupta and Porwal, 2012; Shaikh et al., 2013; Shazia, et al., 2013). However; it is higher than findings from study conducted in six Ugandan hospitals where the rate was 14% (Kabakyenga et al., 2011). This could be due to difference in sample size, differences in availability of equipment to deal with asphyxiated neonates or the status of the fetuses at admission to the hospitals or difference in skill of neonatal resuscitation.

Finding from this study have also revealed that 24(88.9%) of the babies born alive have birth asphyxia (apgar score of less than 7/10 at first minute). This finding is in line with findings from studies done in Pakistan and Jimma Specialized Hospital where 88 to 98% of babies born alive from OL cases have developed birth asphyxia (Fantu et al., 2010, Shazia et al., 2013). However, the rate of birth asphyxia from this study is higher when compared to studies done in Nigeria and India where the rates of birth asphyxia were 37.3 and 35.7%, respectively (Omole-Ohonsi and Belga 2010; Gupta and Porwal, 2012; Shazia et al., 2013). This could be due to difference in skill of assessing apgar score of the neonate's or status of the fetuses at admission or type of intervention done to alleviate the problem.

## Conclusions

Prevalence of obstructed labor among mothers who gave birth at Suhul General Hospital is high. Moreover, almost all of the cases with obstructed labor had developed maternal and/or fetal complications. Creating maternity

waiting "villages" in a culturally sensitive manner in places where ambulance can access the women so that pregnant women whose homes have no vehicle road access will be admitted to the villages at term is needed. Health professionals working in delivery case teams at health centers need to have training on when to refer/when to send laboring women to the next higher level health institutions. Moreover; strengthening the integrated emergency surgery and clinical midwifery programs to avail emergency obstetric surgeries at health centers in the remote districts of the zone and strengthening universal road access projects including mobilizing men in the community to make each and every house accessed by vehicle is suggested.

## Limitations

The first limitation of this study is that it was institution based and therefore did not address the burden of the problem among the women who had given birth at homes where more obstructed labor and its complications including maternal death are expected. Second, the total number of cases with OL is 44 which is a small number to show a reliable association between dependent and independent variables.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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