



# Adverse Birth Out Comes and Associated Factors among Delivered Mothers in Dessie Referral Hospital, North East Ethiopia

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## Abstract

**Introduction:** Though there are studies on the various forms of adverse birth outcomes particularly in developing countries, there is limited information on determinant maternal and fetal factors of adverse birth outcomes at Dessie referral hospital including north east Ethiopia.

**Objective:** To assess adverse birth outcomes and associated factors among delivered mothers in Dessie referral hospital, Dessie, Ethiopia.

**Methods:** Institutional based cross sectional study design was conducted in Dessie referral hospital from February 30-March 30, 2017. Random sampling technique was used and 462 sample size was deployed. The collected data was checked; coded and entered to Epi info 7.3 and exported to SPSS version 20 for further analysis. Bivariate logistic regression model used to determine the independent association of dependent and independent variables on the bases of COR; 95 percent of confidence level and significance level of 0.25 Those variables which had significance level of less than 0.25 transferred to multivariable logistic regression. Multivariable logistic regression also used to control the possible effects of confounder variables on the basis of AOR; 95 percent of confidence level and significance level of 0.05.

**Result:** A total of 462 delivered mothers participated in this study which yields 100% response rate. The study finding showed that the proportion of adverse birth outcome among the study participants was 32.5%. Out of 462 births 8.2% were still birth, 16.7% were low birth weight, 15.2% preterm and 8.4% were with visible birth defects. Mothers who didn't attend antenatal care were 4 times more likely to have adverse birth outcome when compared to those who attended antenatal care follow up, [AOR=4.01, 95% CI(2.8,8.3 )]. Similarly, mothers with hemoglobin level less than 11 mg/dl were encountered adverse birth outcomes 3 times more when compared to those with hemoglobin level greater or equal to 11 mg/dl [AOR=3.04, 95% CI(1.62, 5.71)]. The presence of any form of pregnancy complication to current pregnancy were 3 times more likely to result in adverse birth outcomes as compared to no complication [AOR=2.9, 95% CI (1.64, 5.15)].

**Conclusion and Recommendation:** proportion of adverse birth outcome among the study participants was high. Lack of antenatal care, hemoglobin level, and pregnancy complications, middle upper arm circumference, were predictors of adverse birth outcomes. Increasing antenatal care uptake, prevention and treatment of chronic medical illness, and anemia and improvements in quality of maternal health services require strict attention.

**Keywords:** Adverse birth outcomes; Delivered mothers; Dessie referral hospital

**Abbreviation:** APGAR - Appearance, Pulse, Grimace, Activity, Respiration, APH - Ante Partum Hemorrhage, CI - Confidence Interval, DHS - Demographic and Health Survey, DM - Diabetes Mellitus, FMOH - Federal Ministry of Health, IESO- Integrated emergency surgery and obstetrics, IUGR - Intra Uterine Growth Restriction, LBW - Low Birth Weight, OR - Odds Ratio, PIH - Pregnancy Induced Hypertension, PPH - Post Partum Hemorrhage, PROM - Premature Rupture Of Membrane, SVD - Spontaneous Vaginal Delivery, UAE - United Arab Emirates, USA - United States of America, VLBW - Very Low Birth Weight, WHO - World Health Organization, WU- Wollo University.

## Introduction

Perinatal mortality is one of the indicators of poor obstetric. The most common fetal conditions that lead to perinatal death include congenital anomalies, Intra Uterine Growth Restriction and sepsis [1]. Birth outcomes are measures of health at birth. Birth outcomes have improved dramatically worldwide in the past 40 years. Yet there is still

a large gap between the outcomes in developing and developed countries. Adverse birth outcomes such as stillbirth, low birth weight and preterm birth constituted the highest rates of all the adverse pregnancy outcomes and are common in developing countries [2]. Complications of preterm birth also outrank all other causes as the world's number one killer of young children. Complications from preterm birth caused nearly 1.1 million of the 6.3 million deaths of



children under age 5 in 2013. Of those more than 3,000 children under throughout the world, approximately 210 million women become pregnant and over 135 million of them deliver live born infants, while 75 million pregnancies end in stillbirth, preterm or spontaneous or induced abortion. We estimate that 2-6 million babies were stillborn in 2015, affecting women and their families in all settings. 98% were in low-income and middle-income countries, over two-thirds were in sub-Saharan Africa and southern Asia [3].

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The birth-weight of an infant is the single most important determinant of newborn survival; Neonatal illness in general is closely related to low birth-weight. Some epidemiological observations revealed that infants born under-weight (less than 2500gram) are approximately 20 times more likely to die than heavier babies [5].

Stillbirth rate is an important indicator of access to and quality of antenatal and delivery care. Over 2.6 million stillbirth's  $\geq 28$  weeks of gestation or 1000 g occur each year worldwide. 98% were in low-income and middle-income countries, of which over two-thirds were in sub-Saharan Africa and southern Asia [9,10]. Different studies showed that inter-pregnancy intervals one of the determinant factors for preterm birth, low birth weight, small for gestational age births and stillbirth [12].

In Ethiopia, 20% of non-first births occur less than 24 months after the preceding birth, with 8% occurring less than 18 months after the preceding birth. About 43% of women give birth at least 36 months after the previous birth [13]. Knowing the associated factors to adverse perinatal outcomes (prematurity, low birth-weight and stillbirth) will help the primary prevention employed against it to be easy, safe and cost effective. Therefore, this study aimed to assess the adverse perinatal outcome and associated among factors among delivered mothers in Dessie referral hospital.

## Method and Materials

### Study design, area and period

Institutional based cross sectional study was deployed. The study was conducted at Dessie referral hospital in Dessie administrative town, south Wollo zone. Dessie town is one of the eleven zones in Amhara Region North east Ethiopia and the city of the South Wollo Zone which is located at a distance of 401 km from Addis Ababa and at 488 km from Bahir Dar. Dessie referral hospital serves about 8 million catchment populations. The hospital has different departments and obstetric ward is the one that serves around 1500 clients per year. The ward has 31 beds and 25 staffs. The study was conducted from February 30-March 30, 2017. All deliveries in Dessie referral hospital were the source population and all deliveries in Dessie referral hospital during the study period were the study population. All deliveries with gestational age of 28 weeks or more during study period were included in the study and those critically sick mothers who cannot respond during data collection were excluded from the study.

### Sample size determination and procedure

Sample size was determined by using a single population proportion formula by considering the assumption  $Z_{\alpha/2}$  = critical value for normal distribution at 95% confidence level which equals to 1.96 (z value at  $\alpha = 0.05$ ), P (Estimated proportion) = 24.5% is taken from previous study conducted at Hosanna hospital (31), d (margin of error) = 0.04 and 10% non-response rate. A total of 462 sample size was determined. To ensure the adequacy of sample size, Epi-info was used to calculate

sample size for factors associated adverse birth outcome. Then the maximum sample size 462 was taken. Dessie referral hospital was selected purposively serving north east Ethiopia and all mothers who were eligible to the study included in the study consecutively until we achieve the required sample size by considering the assumption client flow at health facility is random by itself.

### Data collection Material, procedure and quality control

Structured pretested interview questionnaire adopted from different literatures and prepared in the context of the local situation and the aim of the study. Questionnaire translated from English to local Amharic language and back to English to make it consistent. Data was collected primarily from laboring mothers admitted to Dessie referral hospital in the study period. Data collectors were trained integrated essential emergency surgery first year students and 2 health officers' supervisors were also recruited. One day training was given to the data collectors regarding the data collection procedure; timing of data collection and organization of questionnaire. The quality of data was assured by doing pre-test on five percent of total sample or 23 delivering mothers from Borumeda hospital. Clear explanation of the study objective was given to the study participants. Regular supervision and follow up was made by principal investigator. In addition, regular check-up for completeness and consistency of the data was made on daily basis and checking of questionnaire consistency was made. Incomplete questionnaires was discarded and considered as none response rate.

**Perinatal deaths:** Pregnancy losses occurring after seven completed months of gestation (stillbirths) plus deaths to live births within the first seven days of life (early neonatal deaths).

**Live birth:** The complete expulsion or extraction of the product of conception from the mother, regardless of the duration of pregnancy, which after such a separation, breathes or shows other evidence of life (e.g. Beating of the heart, pulsation of the umbilical cord or definite movements of the involuntary muscles) whether or not the cord has been cut or placenta detached.

**Mature infant:** Infant born after 37 completed weeks of gestation up until 42 completed weeks of gestation.

**Premature infant:** One with a gestational age of 28 weeks to less than 37 weeks.

**Low birth weight:** Any infant weighing less than 2500 grams at birth.

**Fetal death (Still birth):** The absence of signs of life at birth.

**Abortion:** Fetus removed or expelled from the uterus in 28 weeks or less and weighing less than 500 gram.

**Last menstrual period:** The date of the starting of last menstruation the women had to the index pregnancy.

**Adverse birth outcomes:** Women had at least one of the following still birth, low birth weight, preterm labor, and congenital anomaly of the baby.

### Data processing and analysis

The collected data was checked; coded and entered to Epi info 3.5 and exported to SPSS version 21 for further analysis. Univariate analysis like frequency; table; mean and graphs were used to present descriptive statistics variables. Bivariable logistic regression model used to determine the independent association of dependent and independent variables on the bases of COR; 95 percent of CI and significance level of 0.2. Those variables which have significance level of less than 0.2 were transferred to multivariable logistic regression. Multivariable logistic regression was also used to control the possible effects of confounder variables on the basis of AOR; 95 percent of CI and 0.05 significance level was taken as significance predictors.

## Results



### Characteristics of Participants

A total of 462 women with 100% of response rate were involved in the study of which 328(71%) were in the age group of 20-34, followed by 68(14.7%) with mean age of 27 years and standard deviation of 6.1. Majority of the mothers 438(94.8%) were married, and 321(69.5%) were urban residents. Regarding educational status, 123(26.6%) had secondary school education and above, while 108(23.4%) primary school and. 284 women (61.5%) mothers were followers of Muslim and 159(34.4%) were Orthodox Christians [Table 1].

Variables		frequency	Present
Age	Less than or =20	68	14.7
	21-34	328	71
	Greater than or =35	66	14.3
Residence	Urban	321	69.5
	Rural	141	30.5
Marital status	Currently married	438	94.8
	Currently unmarried	24	5.2
Educational status	illiterate	80	17.3
	Only read and write	71	15.4
	primary	108	23.4
	secondary	123	26.6
religion	College and above	80	17.3
	orthodox	159	34.4
	Muslim	284	61.5
	protestant	10	2.2
	catholic	4	0.9
nation	others	5	1.1
	Amhara	395	85.5
	Oromo	42	9.1
	Afar	8	1.7
Mother occupation	Tigre	17	3.7
	housewife	281	60.8
	merchant	68	14.7
	Daily laborer	14	3
	Government employ	63	13.6
	student	12	2.6
others	24	5.2	

**Table 1:** The Socio-demographic Characteristics of women attended labor ward in Dessie referral hospital; Dessie, Ethiopia.

### Pregnancy and labor related factors

From all participants, 174 (37.7%) mothers encountered complications during recent pregnancy. Common complications reported by participants were Pregnancy induced hypertension 78 (44.8%) followed by premature rupture of membrane 33 (19%), Antepartum hemorrhage 30(17.2%), poly hydraminous 19(10.9%) and others 14(8%). Among all deliveries 97 (21%) had experienced complications. From all deliveries 161 (34.8%) neonates had Apgar score less than 7. This study indicates 322 (69.5%) participants were referred from health centers and from all study participants 97(21%) were encountered labor complication. The common labor complications were prolonged labor 73 (15.8%) followed by Malposition 15 (15%) and others 14 (14.4%). Among study participants 414(89.6%) had antenatal care follow up and 160(38.6%) had four and below four antenatal care visits.

### Medical and obstetric related factors

Among the study participants, 294 (63.6%) were multi-gravidas, 229 (77.9%) had greater than 23 months inter pregnancy interval 274 (83.8%) had antenatal care follow up and 322 (69.7%) had iron and folic acid supplement . majority of 372(80.5%) had hemoglobin level

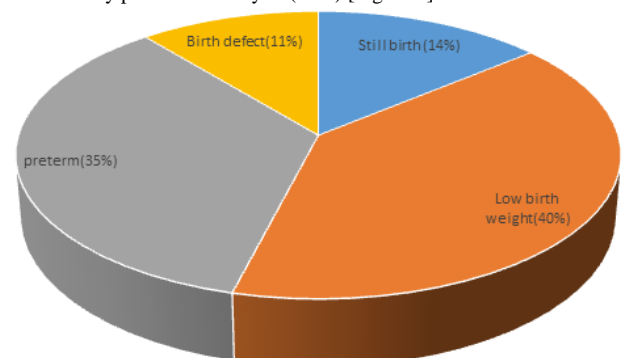
greater than 11gm/dl, 296(64.5%) mothers had middle upper arm circumference greater than 23cm , 394(85.3%) had no previous still birth , majority of respondents 376(81.4%) had used family planning [Table 2].

Variable	Categories	Frequency	percent
Status of ministrition	regular	336	72.7
	irregular	126	27.3
Inter pregnancy interval	Greater or =23month	229	77.9
	Less than 23month	65	22.1
Gravid	multigravida	294	63.6
	prime	168	36.4
Folic acid supplement	yes	322	69.7
	no	140	30.3
Chronic medical illness	yes	89	19.3
	no	373	80.7
Type of chronic medical illness	hypertension	33	37.1
	CHF	5	5.6
	HIV	32	36
	others	19	6
Maternal hemoglobin	Greater or =11gm/dl	372	80.5
	Less than 11gm/dl	90	19.5
Mothers MUAC	Greater or =23cm	296	64.5
	Less than 23cm	166	35.9
RH status	Rh negative	52	11.3
	Rh positive	410	88.7
Previous still birth	yes	68	14.7
	No	394	85.3
Family planning used before pregnancy	yes	376	81.4
	no	86	18.6
Type of family planning used	OCP	70	18.6
	Injectable	239	63.6
	Implanon	53	14.1
	IUCD	14	3.7

**Table 2:** Medical and obstetric related factors women attended labor ward during the study period in Dessie referral hospital; Dessie, Ethiopia.

### Proportion of adverse birth outcomes

The study finding showed that the prevalence of adverse birth outcome among the study participants was 150(32.5%). Out of 150 adverse birth outcomes the commonest in this study was low birth weight 60(40%) followed by preterm delivery 52(35%) [Figure 1].



**Figure 1:** Common adverse birth outcomes among delivered mothers in Dessie referral hospital, north east Ethiopia in 2017.



### Factors associated with adverse birth outcome

This study result showed Hemoglobin less than 11 gm/dl, Middle upper arm circumference less than 23 cm, do not had antenatal care follow up, Have chronic medical illness, Having current pregnancy complication and Duration of labor more than 24 hours were important predictor factors for adverse birth outcome. Mothers who didn't attend antenatal care were 4 times more likely to have adverse birth outcome when compared to those who attended antenatal care follow up, [AOR=4.01, 95% CI (2.8,8.3 )]. Similarly, mothers with hemoglobin level less than 11 mg/dl were encountered adverse birth outcomes 3 times more when compared to those with hemoglobin level greater or equal to 11 mg/dl [AOR=3.04, 95% CI(1.62, 5.71)]. The presence of any form of pregnancy complication to current pregnancy were 3 times more likely to result in adverse birth outcomes [AOR=2.9, 95% CI (1.64, 5.15)]. Furthermore, mothers whose MUAC less than 23cm encounter adverse birth outcome 3 times when compared with MUAC greater than or equal to 23cm [AOR=2.8, 95% CI (1.62-4.87)]. Participants who had chronic medical illness were three times more likely to result in adverse birth outcome [AOR=3.37, 95% CI (1.17-6.63)].

### Discussion

This study finding showed that the prevalence of adverse birth outcome among the study participants was (32.5%). Out of study participants (14%) were still birth, (40%) were LBW, (35%) preterm and (11%) were with visible birth defects. Among babies with congenital malformations 20 were still births. These figures were higher than the findings of Tanzania [14], and Ghana [15]. In which 18%, 19% had experienced adverse birth outcomes respectively. And also this figure were higher than the finding of Negest Elene Mohammed Memorial General Hospital in Hosanna Town, SNNPR, Ethiopia 24.5% ( 16). The variations between the findings may be attributable to variations in quality of maternal health services, facility and logistic parameters in respective study areas.

Mothers with complication in recent pregnancies were found to have higher odds of experiencing adverse birth outcomes (preterm births, low birth weight still birth and visible birth defect) than those without the complications. This finding was consistent with the study done in china (24), Iran (25), Pakistan (26), and Gambia (27). The link may be explained in terms of the fact that the complications that have occurred during pregnancy have affected the well-being of the fetus in the uterus.

In this study, we assessed the prevalence and associated factors of adverse birth outcomes (still birth, preterm birth, low birth weight, visible birth defect) among deliveries at dessie referral hospital. The prevalence of still birth was 82 per 1,000 total births. It is also higher than the previous reports from hosanna, Gondar, Ethiopia, Tanzania and a systemic review for sub-Saharan African studies where the prevalence of still birth ranged from 27- 33/1,000 total births (14, 17, and 16). Methodological and socio-economic variations explain differences in adverse birth outcomes (29) this result is higher than with other result. This may be most normal deliveries take place in health centers while more complicated ones are referred to the tertiary hospital contributing to higher rates of adverse birth outcomes at referral hospitals. Moreover, women who experienced obstetric complications are likely to show up to health facilities and may get referred to hospitals; higher rates of adverse birth outcomes may exist at referral hospitals.

The prevalence of preterm in this research was 15.2%.this result is higher than researches done in Tanzania 12%, Gondar, Ethiopia 14.3% and Iran 5.1%. It associated with Clients with pregnancy complications (pregnancy induced hypertension, Antepartum hemorrhage, premature rupture of fetal membranes, and poly hydramnious (14, 17, and 25).

This difference may be due to methodological and population variation on top of the socio economic and set up differences.

Women with hemoglobin level less than 11 mg/dl were also found to experience adverse birth outcomes when compared with those with Hgb level greater than 11 gm/dl. The finding was consistent with studies conducted in Pakistan (26), Tanzania (14), and Nigeria (29) and in Ethiopia (16). The reason could be linked to the effect of anemia on the oxygen bearing capacity and its transportation to the placental site for the fetus.

In this study, pregnancy complication also was found to be independent risk factors for adverse birth outcomes such as preterm birth which is in agreement with a study conducted in Gondar, Ethiopia [17]. This might be related to termination of pregnancy as a result of medical disorders of pregnancy like pre-eclampsia and other obstetrical problems. In these finding mothers with MUAC less than 23cm were also found to experience adverse birth outcomes when compared with those with MUAC greater than 23cm this result is in agreement with the result in Bangladesh (27).

The prevalence of low birth weight in this study was 16.7% this was higher than the previous findings of Tanzania 8%, Ethiopia 9.8%. This increment might be due to poor nutritional status and early termination of pregnancy in other comorbidities.

In multivariate analysis, women who did not have ANC follow up were more likely to have adverse outcomes. During ANC follow up women will have access to information related to nutrition and danger signs of pregnancy. Regular ANC follow up will also help a pregnant woman seek early treatment for her potential pregnancy related problems but if failed to showed up for ANC, she will be disadvantaged . This finding is in line with previous studies in Nigeria (28) and Ethiopia (29).

Variables		Adverse Birth Outcome		COR (95%CI)	AOR (95% CI)
		Yes	No		
Hemoglobin	<11 gm/dl	58	32	5.52 (3.37-9.02)*	3.04 (1.62-5.71)**
	>=11 gm/dl	92	280	1	
MUAC of mother	<23CM	92	74	5.1 (3.3-7.7) *	2.81 (1.62-4.87)**
	>=23CM	58	238	1	
ANC follow up	no	18	30	2.07 (2-10)*	4.01 (2.8-8.3)**
	yes	93	321	1	
Resident	rural	70	71	2.97 (1.9-4.5)*	1.16 (0.52-2.6)
	urban	80	241		
Folic acid supplement	no	68	72	2.76 (1.8-4.1)*	1.83 (0.99-3.8)
	yes	82	240	1	
Chronic medical illness	YES	54	35	4.45 (2.7-7.2)*	3.37 (1.718-6.63)**
	NO	96	277	1	
Marital status	Single	14	10	3.1 (1.3-7.1)*	0.727 (0.13-4.00)
	Currently married	136	302		
Current pregnancy complication	yes	91	83	4.26 (2.8-6.4)*	2.9 (1.64-5.15)**
	no	59	229	1	
Duration of labor	>=24hr	40	33	3.07 (1.4-5.1)*	2.15 (1.03-4.47)**

\*reference \*\*p<0.05 \*\*p<0.01



**Table 3:** Bivariate and multivariate analysis factors associated with adverse birth outcomes among delivered mothers in Dessie referral hospital, north east Ethiopia, 2017.

In multivariate analysis, women with duration of labor greater than 24hr were more likely to have adverse birth outcome when we compare women with duration of labor less than 24hr. this might be due to when the labor prolongs the fetus may be at risk for aspiration and fetal heart beat abnormalities.

## Conclusion

The magnitude of adverse birth outcome in this research was high and from the adverse birth outcomes low birth weight and preterm delivery covers the highest. Antenatal care follow up, Middle upper arm circumference, hemoglobin level, chronic medical illness and current labor complication were significantly associated with adverse birth outcome.

## Recommendations

### Minister of health

Strategies and policies should focus on prevention and control of chronic disease through primary health care system and community participation.

### South Wollo Zone health department

Despite high ANC follow up rate there is still high proportion of adverse birth outcome. Supportive supervisions should be provided for health professional working in antenatal care clinic and labor & delivery ward to increase their capacity for identifying and managing associated factor and labor complication for adverse birth outcome.

### For Dessie referral hospital

Strength formal referral linkage with peripheral health facilities to prevent long duration of labour.

### Health professionals

Awareness creation on supplementation and proper taking of Iron and folic acid supplementation based on the standard guideline for all pregnant mothers. Besides this focus on early detection of complications with appropriate action should be taken before the labor prolonged.

### For researchers

Additional investigation should be conducted on quality of antenatal care, delivery and post-natal care at health facilities and traditional pregnancy care practices in the community.

## Ethical Approval

Ethical approval obtained from wollo university- medical faculty. Permission was obtained from head of Dessie referral hospital. To ensure confidentiality interview was held in private. Confidentiality was ensured throughout the process. Advice was given for mothers with deliveries of adverse birth outcomes. Verbal consent was taken from selected participant to confirm willingness to participate in the study they have got full information what to do next to their baby if found being under weight and premature. Vaccination to the baby and birth control methods for the mother was given.

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