Pregnancy outcomes among women who gave birth at health institutions: A cross-sectional study

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Abstract

Background and Aims: Although global birth outcomes have improved considerably in the last 40 years, there are disparities in underdeveloped countries, particularly Ethiopia, remain significant. However, there was inadequate data about the adverse outcome in the study area. This study aimed to assess the proportion and associated factors of adverse birth outcomes among women who gave birth at South Gondar Health Institutions in 2021.

Methods: The multistage sampling technique was used to select 928 participants from December 15, 2020, to February 2, 2021. Face-to-face interviewer-administered questionnaires and card reviews were used. The data were entered into Epi-Data 4.2 and analyzed by SPSS version 23. The statistical association was determined using the odds ratio, 95% confidence interval (CI), and a p-value of less than 0.05.

Results: The proportion of fetal and maternal adverse birth outcomes were 26.7%, and 12.3%, respectively. Previous history of abortion (adjusted odds ratio [AOR] = 2.10, 95% CI = 1.31, 3.66), antenatal care (ANC) follow up (AOR = 3.30, 95% CI = 1.67, 6.58), premature rupture of membrane and hyperemesis (AOR = 3.27, 95% CI = 1.55, 5.89), obstructed labor and meconium-stained amniotic fluid (AOR = 2.31, 95% CI = 1.21, 4.39), and cesarean birth (AOR = 0.50, 95% CI = 0.28, 0.88) were significantly associated fetal adverse birth outcome. Antepartum hemorrhage during the latest pregnancy was associated with maternal adverse birth outcomes (AOR = 1.87, 95% CI = 1.03, 3.38).

Conclusion: The proportion of adverse birth outcomes in this study was high. Provide community-based health information about ANC follow-up, and community mobilization to reduce abortion. Appropriately manage premature rapture of the membrane after hospital admission.

KEYWORDS
fetal birth outcome, hospitals, institutional birth, maternal birth outcome

1 | INTRODUCTION

Adverse fetal birth outcomes include low birth weight (LBW; birth weight less than 2500 g), preterm birth (PTB; gestational age less than 37 weeks at delivery), stillbirth (fetal death at or after 28 gestational weeks), and immediate neonatal mortality (death of a neonate within 24 h of birth).[1–4] The adverse birth outcomes of a fetus are a prevalent and serious health concern that affects both developing and developed countries.[5] Pregnancy is normally a joyous time for most women and their families, but it may also be a time of stress and worry for some women. Some women lose their fetuses during early or late pregnancy, give birth earlier than expected or have babies with LBW.[6]

LBW neonates (birth weight less than 2500 g) are more likely to develop respiratory distress, sleep apnea, heart issues, jaundice, anemia, chronic lung illnesses, and infections.[7] LBW is strongly associated with increased pregnancy and neonatal mortality, morbidity, and growth retardation and cognitive development, as well as a higher risk of developing chronic diseases later in life. More than 20 million infants are born LBW worldwide, accounting for 15.5%, 64 of all births, with 95.6% occurring in developing nations.[8] According to a cross-sectional study conducted in Nigeria, 40.0% of women delivered LBW 66 babies.[9] A similar study conducted in the Gambia indicated that LBW and PTB rates were 10.5% and 10.9%, respectively.[10]

Stillbirth is the loss of a pregnancy or the birth neonate that is dead in the uterus after having survived through at least the first 28 weeks of pregnancy or more.[11] Perinatal mortality is five times higher in developing countries than in developed countries: In developed regions, there are 10 deaths per 1000 overall births; in developing regions, there are 50 deaths per 1000 births.[12] Almost all stillbirths (98%) happened in low- and middle-income countries. South Asia accounts for approximately three-quarters (77%) of all stillbirths. Almost half of all stillbirths (1.3 million) occurred during labor and delivery.[11]

PTB is a live birth that occurs before 37 weeks of gestation.[8] Preterm delivery complications are the leading cause of newborn mortality, accounting for an estimated 27% of all neonatal deaths.[13] Every year, around 15 million babies are born prematurely around the world, accounting for more than 1 in every 10 births. More than a million of those newborns die soon after birth, and countless others have lifelong physical, neurological, or educational problems.[14] Globally, out of 7.6 million deaths of under the age of 5 children, 17% are due to prematurity.[15] South Asia and Sub-Saharan Africa account for more than 60% of all PTBs.[16] PTB was also the main cause of death among children under the age of 5 (accounting for around 17.3% of all deaths), followed by pneumonia (15.2%), birth asphyxia and birth trauma (11.4%), no communicable diseases (10.8%), and diarrhea (9.5%).[17]

Adverse fetal birth outcomes account for about 24.5% and the common adverse birth outcomes were stillbirth (8.6%), preterm (8.6%), and LBW (9.8%).[7] A cross-sectional study conducted in Tanzania showed that the proportion of adverse birth outcomes was 18%, among these 2.7% were stillbirth, 12% preterm, and 8% LBW[8] and in Ghana, the proportion of adverse birth outcomes was 19%.[9] Another study conducted at Gondar University teaching hospital indicated that about 23% of women had adverse birth outcomes, of which 14.3% were preterm, 11.2% had LBW, and 7.1% had a stillbirth.[10]

Emergency obstetric care, and skilled birth attendants, are the primary pathways to reducing maternal near-misses and maternal deaths.[18] A study done in the North Wollo zone showed that 27.5% of the laboring mother had adverse birth outcomes of which 9.8% were stillbirth, 7.5 preterm, and 12.8 were LBW.[11] A comparative retrospective cross-sectional study at Felege Hiwot Referal Hospital revealed that immediate newborn death was higher in cesarean delivery vaginal delivery. Ten of the 13 neonates who died during the immediate postnatal period were born via cesarean section.[19] A cross-sectional study showed visible congenital anomalies were 8.4% at Dessie Hospital.[20]

According to a study conducted in South India, the incidence of birth abnormalities was 12.5 per 1000 live births. Various abnormalities involving multiple systems were 18.1%. Musculoskeletal abnormalities were the most prevalent, followed by cranioverteral anomalies. Meningomyelocele and/or encephaloceles accounted for 36.9% of cranioverteral abnormalities, followed by anencephaly (34%).[21]

Various studies have shown that sociodemographic features such as residence,[22] age, marital status, education,[23] occupations,[24] low socioeconomic status,[25] parity, gravidity, birth interval,[26] pregnancy plan,[27] maternal nutritional conditions,[28] the experience of stillbirth, age of sexual initiation,[24] protracted and obstructed labor,[29] cesarean delivery,[30] histories of PTB, antepartum hemorrhage (APH), history of perinatal death,[22,25] and lack of antenatal care (ANC) follow-up[25,31,32] predictors of adverse birth outcomes. Being a government employee, lack of ANC, rural residence, hemoglobin level, malarial infection, age, and pregnancy complications, were associated with adverse birth outcomes.[33]

According to the 2016 Ethiopia Demographic and Health Survey in Ethiopia,[34] the pregnancy-related mortality rate is estimated to be around 412 deaths per 100,000 live births. One of the sustainable development goals (SDGs) is to reduce global maternal mortality to less than 70 deaths per 100,000 live births by 2030.[35]

According to reports from various nations, maternal mortality and morbidity are still the most critical public health problem in Sub-Saharan Africa.[36] Almost all-maternal mortality (99%) occurs in low-income countries, with Sub-Saharan Africa accounting for 66% of these deaths.[37] About three-quarters of maternal deaths globally are due to direct causes such as hemorrhage, hypertensive disorders, obstructed labor, and sepsis.[38,39]

Although global birth outcomes have improved considerably in the last 40 years, the gap in developing nations continues to expand. Pregnancy complications are still a major public health issue in Ethiopia. By expanding intuitional delivery coverage and skilled birth attendants, the Ethiopian Ministry of Health attempted to reduce maternal and child mortality. However, progress in achieving child

and maternal mortality has a huge impact on the achievement of SDGs.

In general, the magnitude and risk factors of adverse birth outcomes are essential for developing countries to the planning of maternal and child healthcare services. Despite studies on adverse birth outcomes in developing nations and a few areas of Ethiopia, there is inadequate data at the country and study area levels. Furthermore, there were significant disparities and inconsistent outcomes among the studies.

As a result, the purpose of this study is to determine the prevalence and risk factors for adverse childbirth outcomes among women who gave birth at Health institutions in South Gondar Zone, Northwest Ethiopia, in 2021.

2 | METHODS

2.1 | Study period and design

This study was conducted in health facilities in South Gondar Zone, Amhara Regional State Northwest Ethiopia from December 15, 2020 to February 2, 2021. South Gondar is one of the Eleven Zonal districts of the Amhara regional state. It is divided into 15 districts and Debre Tabor is its capital city, which is located 666 km from Addis Ababa (capital city of Ethiopia). According to the 2007 population census, the zone has a total population of 2,051,738. It has one specialized hospital, 8 primary district hospitals, 96 health centers, and 394 health posts.

2.2 | Study population and eligibility criteria

All mothers who gave birth at 28 weeks or greater gestation at a selected health institution in the South Gondar Zone.

2.3 | Sample size determination

Single population proportion formula was used to calculate sample size with confidence interval (CI) of 95% assuming 4% marginal error and proportion of adverse birth outcome was: $p = 0.23$.[31] $n = (z^a/2)^2$ $(p$ $(1 - p)/d2 = (1.96)^2$ $(0.23$ $(1-0.23)/(0.04 \times 0.04) = 0.681/0.0016 = 272.1–426$. $n =$ sample size; $z =$ confidence coefficient; $d =$ marginal error; $p =$ proportion. By adding two‐design effect, 10%, nonresponse rate final sample size was $(426 + 43) \times 2 = 934$.

2.4 | Sampling technique and procedure

To select study participants, a multistage sampling technique was used. Four hospitals were selected by simple random sampling methods among eight hospitals. The proportionate allocation technique was then used to choose study participants from each

hospital. Finally, using a systematic sampling technique, women who gave birth at each hospital were picked.

2.5 | Variable of the study

Dependent variable: Maternal and fetal adverse birth outcomes.

Independent variable: Sociodemographic variable (sex, age, marital status, educational status, religion, ethnicity, occupation, and family size). Obstetric‐related characteristics (pregnancy status, birth interval, ANC, previous perinatal outcome, age at first pregnancy mode of delivery in preceding pregnancy, neonatal death, and destructive or instrumental delivery), pregnancy and labor‐related problems (current pregnancy complication, type of complication during pregnancy, type of complication during labor, mode of delivery and medical illness, and substance use).

Operational definition of variable:

Terms	Definition of terms
Fetal adverse birth outcome	A woman who experienced at least one of the following events: Stillbirth, low birth weight, preterm delivery, immediate neonatal loss (before discharge), and visible neonatal birth abnormality.
Stillbirth:	A baby born at or after 28 weeks gestation who shows no signs of life.
Low birth weight	Any newborn weighing less than 2500 g at birth.
Preterm delivery	A newborn is born between the gestational ages of 28 and 37 weeks.
Visible birth defect	A newborn has a defect in his or her external physical structure.
Immediate neonatal loss:	Neonates had the sign of life, but death occurred within 24 h after giving birth.
Maternal adverse birth outcome	Admitted women with at least one of the following obstetric diagnoses: Pre‐eclampsia or eclampsia, antepartum hemorrhage, postpartum hemorrhage, uterine rupture, maternal death, diagnosis of sepsis, obstructed labor, and severe anemia (hemoglobin < 7 g/dl) after 28 weeks of gestation during birth.

2.6 | Data collection procedures

The data were collected in the postnatal ward upon discharge using a structured questionnaire by a face‐to‐face interview and a client chart review. To maintain consistency, the questionnaire was written in English, translated into Amharic, and then returned to English by language experts. Two health extension workers and two BSc nurses who were familiar with the local language and culture were hired as data collectors and supervisors, respectively. Data collectors and

TABLE 1 Sociodemographic characteristics of the respondents who gave birth at South Gondar Zone Hospitals, Ethiopia, 2019 (n = 928)

Variables	Frequency	Percentage
Age of respondents in years		
≤20	64	6.9
21–25	306	33.0
26–30	392	42.2
31–35	124	13.4
≥36	42	4.5
Place of residency		
Rural	318	34.3
Urban	610	65.7
Ethnicity		
Amhara	900	96.9
Others[a]	28	3.1
Religion		
Orthodox	830	89.4
Muslim	64	6.9
Catholic/protestant	34	3.7
Marital status		
Married	862	92.9
Divorced/widowed/separated	66	7.1
The educational level of the mother		
Unable to read and write	336	36.2
Read and write	52	5.6
Primary (1–8)	236	25.4
Secondary (9–12)	256	27.6
College and above	48	5.2
Occupational status of mothers		
Housewife	388	41.8
Self-employee	196	21.1
Government employee	228	24.6
Merchant	74	8.0
Daily labor	42	4.5
Husband's educational level		
Unable to read and write	48	5.2
Read and write	426	45.9
Primary (1–8)	124	13.4
Secondary (9–12)	274	29.5
College and above	56	6.0

TABLE 1 (Continued)

Variables	Frequency	Percentage
Husband's occupational (n = 862)		
Farmer	246	28.5
Self-employee	178	20.6
Gov.t employee	192	22.3
Merchant	246	28.6

[a]Tigrie, awi.

supervisors received 1-day training on data collection procedures, interview strategies, and maintaining the confidentiality of the information gathered from respondents.

2.7 | Data quality assurance

Data quality was assured during data collection, input, and analysis. A pretest on 5% of the sample was conducted before the main research, and modifications were made. The principal investigator and supervisors conducted daily onsite monitoring during the data collecting period. At the end of each day, the supervisors and investigators checked the questionnaires for correctness.

2.8 | Data analysis procedure

The data was entered into Epi-Data version 4.2 after coding and then exported to SPSS version 23 for analysis. The crude relationship of variables with adverse birth outcomes was addressed using bivariate analysis. Finally, factors associated with an adverse birth outcome in the bivariable analysis were picked as candidates for multivariable analysis, and the independent effect of predictors on the adverse birth result was calculated. The statistical association was measured using the odds ratio and the 95% CI. The statistical significance of the tests was determined using a P-Value of less than 0.05. Finally, the findings were presented in the form of texts, tables, and graphs.

3 | RESULTS

This study was carried out by 928 immediate postpartum child-bearing age women who gave birth at selected hospitals with a response rate of 99.4%. The majority of the respondents 900 (96.9%) were from Amhara ethnicity. The mean age of the study participants was 26.6 years (SD = ±4.3). The majority of the respondents 830 (89.4%) of the study participants were Orthodox Christian followers and almost all 862 (92.9%) of thex respondents were married women (Table 1).

TABLE 2 Reproductive and obstetric-related characteristics of the respondents who gave birth at South Gondar Zone Hospitals, Ethiopia, 2019 (n = 928)

Variables	Frequency	Percent
Parity		
1	252	27.2
2–4	570	61.4
≥5	106	11.4
Number of alive children (including immediate newborns babies)		
≤3	822	88.6
≥4	106	11.4
History of abortion		
Yes	158	17.0
No	770	83.0
Previous history of stillbirth (n = 676)		
Yes	74	8.0
No	854	92.0
Previous history of early neonatal loss (n = 676)		
Yes	52	5.6
No	876	94.4
The birth interval between the latest two consecutive birth (n = 676)		
<2 years	238	25.6
2–4 years	496	53.4
≥5 years	194	20.9
Previous history of LBW		
Yes	44	4.7
No	410	44.2
Unknown	474	51.1
Previous history of preterm birth (n = 648)		
Yes	30	4.6
No	76	11.7
Unknown	542	83.6
Prepregnancy contraceptive use		
Yes	526	56.7
No	402	43.3
Previous place of delivery (n = 676)		
Health institution	466	68.9
Home	210	30.1
Number of ANC visits during the latest pregnancy		
No, follow up	280	30.2
1 time	368	39.7

(Continues)

TABLE 2 (Continued)

Variables	Frequency	Percent
2–3 times	216	23.3
≥4 times	64	6.9
Danger sign counseling during ANC follow-up (n = 648)		
Yes	424	65.4
No	224	34.6
Latest pregnancy plan		
Yes	588	63.4
No	340	36.6
Multiple gestations in latest pregnancy		
Yes	32	3.4
No	896	96.6
Iron/folic acid supplementation during latest pregnancy (n = 648)		
Yes	326	50.3
No	322	49.7
Did you take the Tetanus Toxoid vaccine (at least two doses)		
Yes	322	34.2
No	620	65.8
Weight increment in latest pregnancy		
≤12 kg	336	35.7
≥13 kg	264	28.0
Unknown	342	36.3
Decision-maker during pregnancy for birth preparedness		
Parent	66	7.1
Father/mother in low	40	4.3
Herself	510	55.0
Husband	312	33.6
Partner involvement during ANC follow-up/labor		
Yes	484	52.2
No	444	47.8
Problem during pregnancy		
No problem	562	60.6
PIH	110	11.9
APH	72	7.8
PROM	116	12.5
Hyper emesis	68	7.3
Onset of labor		
Spontaneous	820	88.4
Induced	108	11.6

(Continues)

TABLE 2 (Continued)

Variables	Frequency	Percent
Duration of labor		
≤20 h	600	64.7
≥21 h	328	35.3
Abnormal labor		
Yes	242	26.1
No	686	73.9
Type of abnormal labor (n = 242)		
Obstructed labor	34	3.7
Mal presentation	68	7.3
Malposition	78	8.4
Meconium-stained amniotic fluid	62	6.7
The birth was attended by		
Midwives	770	83.0
Doctors/IESO	158	17.0
The latest birth mode of delivery	732	78.9
Spontaneous vaginal delivery		
Instrumental-assisted vaginal delivery	18	1.9
Vaginal birth assisted with augmentation	38	4.1
Cesarean section	136	14.7
Destructive delivery	4	0.4

Abbreviations: ANC, antenatal care; APH, antepartum hemorrhage; IESO, integrated emrgency surgical officer; LBW, low birth weight; PIH, pregnancy-induced hypertension; PROM, premature rupture of membrane.

3.1 | Obstetric and reproductive health characteristics of respondents

Among the total respondents, 676 (72.8%) had two or more children (multigravida). The majority of the respondents, 910 (96.6%) and 820 (88.4%) were singleton pregnant and had spontaneous onset of labor, respectively. About 280 (30.2%) of the women had no antenatal follow-up in the latest pregnancy and 328 (35.3%) of women had greater than or equal to 21 h duration of labor in the latest birth. About 732 (78.9%) respondents had spontaneous vertex delivery and 136 (14.7%) of respondents had a cesarean delivery in the latest birth (Table 2).

3.2 | A medical condition during the last pregnancy

The majority of participants 918 (98.9%) reported that they did not have gestational or chronic diabetes mellitus during the latest pregnancy. Three hundred thirty-four (36.0%) participants' hemoglobin was unknown, four (0.4%) participants have malaria

TABLE 3 The medical condition of the study participants who gave birth at South Gondar Zone Hospitals, Ethiopia, 2019 (n = 928)

Variables	Frequency	Percentage
Diabetes mellitus during latest pregnancy		
Yes	10	1.1
No	918	98.9
Chronic hypertension (hypertension before and during pregnancy)		
Yes	6	0.6
No	922	99.4
Asthma during latest pregnancy		
Yes	18	1.9
No	910	98.1
Any psychological problem during the latest pregnancy		
Yes	28	3.0
No	900	97.0
Anemia (during latest pregnancy/ hemoglobin <11/dl)		
Yes	38	4.1
No	556	59.9
Unknown	334	36.0
Maternal HIV status		
Positive	12	1.3
Negative	916	98.7
UTI/STI during latest pregnancy		
Yes	52	5.6
No	876	94.4
Chorioamnitis during latest pregnancy		
Yes	6	0.6
No	922	99.4
Malaria during latest pregnancy		
Yes	4	0.4
No	924	99.6

Abbreviations: STI, sexually transmitted infection; UTI, urinary tract infection.

during the latest pregnancy, and the majority of participants, 910 (98.1%) did not have asthma during the latest pregnancy (Table 3).

3.3 | Personal characteristics of participants

All participants did not have smoking and chat chewing, respectively. The majority of the respondents 582 (62.7%) drank coffee. Less than

one-third of the respondents 240 (25. %) drank locally prepared beer alcohol, which is called "Tela" during pregnancy (Table 4).

3.4 | Fetal birth outcome

This study finding showed that the proportion of fetal adverse birth outcomes among the study participants was 246 (26.5%). Out of 928 births, 122 (13.1%) were a low birth outcome, 164 (17.7%) were

TABLE 4 Personal history of the respondents who gave birth at South Gondar Zone Hospitals, Ethiopia, 2019 (*n* = 928)

Alcohol ("Tela") taken during pregnancy		
Yes	240	25.9
No	688	74.1
Chat chewing		
Yes	0	0.0
No	928	100.00
Smoking		
Yes	0	0.0
No	928	100
Did you drink caffeine (coffee) took during pregnancy		
Yes	582	62.7
No	346	37.3
Illicit drug use		
Yes	54	5.8
No	874	94.2

preterm, 24 (2.6%) had a stillbirth, early neonatal loss 26 (2.8%), and 8 (0.9%) had a visible birth defect (Figure 1 and Table 5).

3.5 | Maternal birth outcome

This study finding showed that the proportion of maternal adverse birth outcomes among the study participants was 114 (12.3%). Out of total births, 78 (8.4%) were pregnancy-induced hypertension, 18 (1.9%) had a postpartum hemorrhage, and 14 (1.50%) had obstructed labor (Figure 2).

3.6 | Factors associated with fetal adverse birth outcomes

In binary logistic regression maternal age, the previous history of abortion, ANC follow-up, associated problems during pregnancy, abnormal labor during the latest birth, route/mode of delivery, and alcohol intake during the latest pregnancy were significantly associated with adverse birth outcomes. In multivariable binary logistic regression analysis, only previous history of abortion, ANC follow-up, associated problems during pregnancy, abnormal labor during the latest birth, and route/mode of delivery have remained statistically significant with the adverse birth outcome.

On the basis of our findings, respondents who had a previous history of abortion were nearly two times more likely to have an adverse birth outcome (adjusted odds ratio [AOR] = 2.10, 95% CI = 1.31, 3.66) as compared to those who did not have a previous history of abortion. Similarly, study participants who had only one ANC follow-up during the latest pregnancy were three times more likely to have an adverse birth outcome (AOR = 3.30, 95%
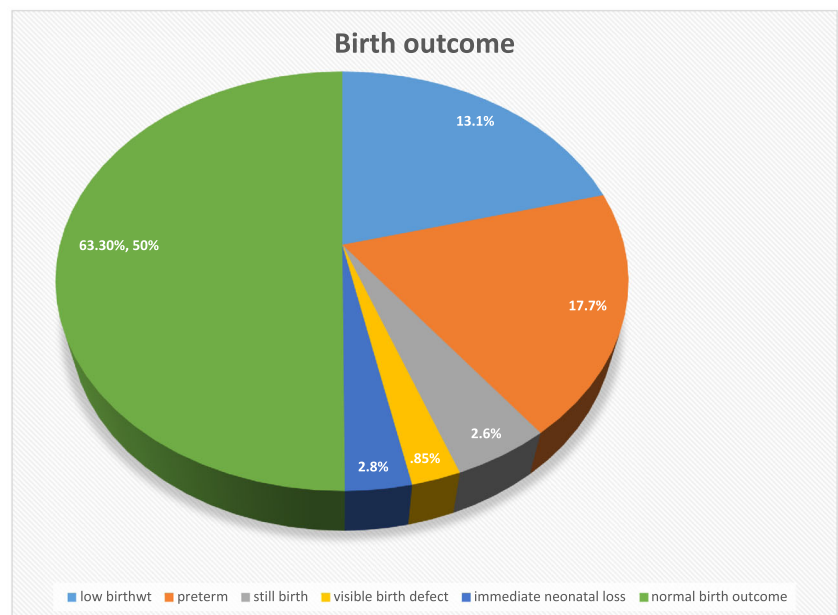
FIGURE 1 Fetal adverse outcomes among women who gave birth at South Gondar Hospitals, Ethiopia 2021.

TABLE 5 The fetal birth outcome of the respondents who gave birth at South Gondar Zone Hospitals, Ethiopia, 2019 (n = 928)

Variables	Neonatal sex	Frequency	Percentage
Latest pregnancy sill birth			
Yes	Male	10	1.1
	Female	14	1.5
No	Male	422	45.5
	Female	482	51.9
Immediate/early neonatal loss			
Yes	Male	16	1.7
	Female	10	1.1
No	Male	416	44.8
	Female	486	52.4
Gestational age at latest birth			
<37 weeks		164	17.7
37–42 weeks		734	79.1
≥42 weeks		30	3.2
Birth weight of newborn			
LBW (<2.50 kg)	Male	52	5.6
	Female	70	7.5
Normal (2.50–4.00 kg)	Male	370	39.9
	female	422	45.5
Macrosomia (≥4.00 kg)	Male	10	1.1
	Female	4	0.4
Visible congenital anomalies (hydrocephalous and anencephaly)			
Yes	Male	6	0.65
	Female	2	0.2
No	Male	426	45.9
	Female	494	53.2

Abbreviation: LBW, low birth weight.

CI = 1.67, 6.58) as compared to those who had four and above ANC follow-up. Moreover, participants who had pregnancy-associated problems (the premature rupture of membrane and hyperemesis) were directly correlated with adverse birth outcomes (AOR = 3.27, 95% CI = 1.55, 5.89) as compared to participants who did not have any known problems during the latest pregnancy.

Participants who had abnormal labor (obstructed labor and meconium-stained amniotic fluid) were nearly 2-times more likely to have an adverse birth outcome (AOR = 2.31, 95% CI = 1.21, 4.39) as compared to those who had normal labor. Study participants who gave birth by cesarean delivery were inversely correlated with adverse birth outcomes (AOR = 0.50, 95% CI = 0.28, 0.88) as

compared to those participants who gave birth by spontaneous vaginal birth. (Table 6).

3.7 | Factors associated with maternal adverse birth outcomes

In binary logistic regression maternal age, pregnancy problem during the latest birth, and alcohol intake during the latest pregnancy was significantly associated with maternal adverse birth outcome. In multivariable binary logistic regression analysis, only pregnancy problem (APH) during the latest pregnancy has remained statistically significant with the maternal adverse birth outcome. Study participants who had APH during the latest pregnancy were directly associated with maternal adverse birth outcomes (AOR = 1.87, 95% CI = 1.03, 3.38) as compared to those participants who did not have any pregnancy problems (Table 7).

4 | DISCUSSION

Ethiopia has recently made enormous progress in reducing maternal and infant mortality. However, the country's pattern of neonatal mortality continues to be a public health issue. This study assessed the proportion and factors associated with fetal adverse birth outcomes among mothers who gave birth at South Gondar Hospitals, Ethiopia. The proportion of adverse birth outcomes in this study was 26.5% among which 2.6% were stillbirth, 17.7% preterm, 13.1% LBW, and 2.6% were early neonatal loss. The results revealed that the previous history of abortion, ANC follow-up, the premature rupture of membrane and hyperemesis, obstructed labor, and meconium-stained amniotic fluid and cesarean delivery were independently associated with fetal adverse birth outcomes.

The proportion of maternal adverse birth outcomes among the mothers who gave birth at selected hospitals during the time of discharge was 12.3%. Mothers who had an APH in the latest pregnancy were directly associated with maternal adverse birth outcomes. The proportion of this study was less than the finding of Gamo Gofa Zone 37.6%[40] and Dessie referral hospital 32.5%.[20] However, this finding is higher than the finding of Ghana, 19%.[41] On the other hand, this finding was in line with studies at Hosanna, Gondar, and Tigray, 22.6%, 24.5%,[31,33,42] respectively. This variation might be because of study settings, study population, and study period.

The proportion of stillbirths in this study was 2.6%. This study was less than the study conducted in Dessie hospital (8.2%),[20] Gondar teaching hospitals (7.1%),[31] Negest Elene Mohammed Memorial Hospital (8.6%),[33] but in line with the study conducted in Tanzania (2.7%).[43] The difference might be due to the study period and improvement of maternal and child healthcare quality across the country.
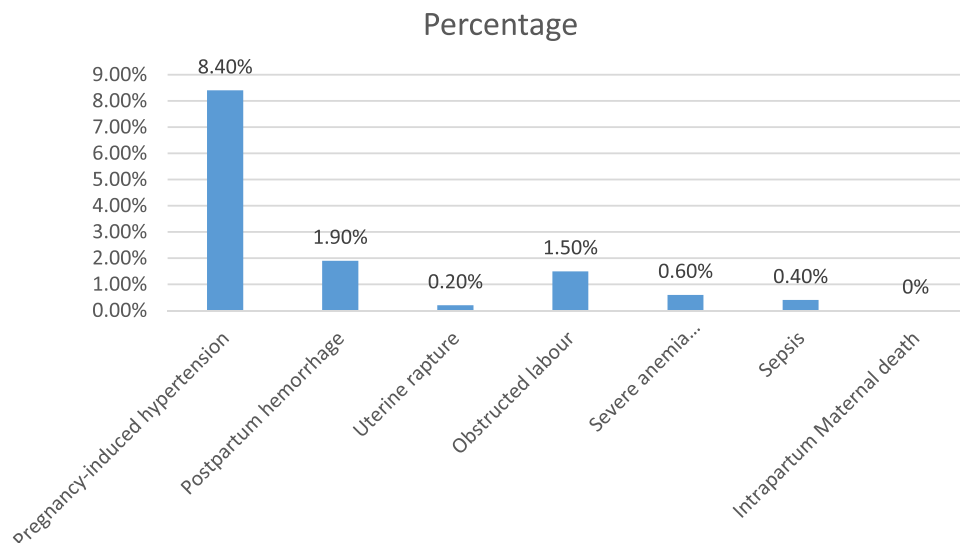
FIGURE 2   Maternal birth outcome of the respondents who gave birth at South Gondar Zone Hospitals, Ethiopia, 2019 (n = 928).

The proportion of PTB was 17.7% and this figure is in line with studies conducted at Dessie hospital (15.2%)[20] and Gondar teaching hospital (14.3%).[31] But this finding was higher than studies conducted at Tanzania (12.00%)[43] and Negest Elene Mohammed Memorial Hospital (8.6%).[33] The prevalence of LBW was 13.1% and this is in line with studies conducted at Dessie hospital (16.7%),[20] Gondar (11.2%)[31] and higher than in Tanzania (8.0%),[43] Negest Elene Hospital (9.8%).[33] The difference might be due to the study period. The proportion of immediate neonatal death (within 24 h after delivery) was 2.6%. This might be explained by due to prolonged labor, non-reassuring fatal rate pattern, LBW, and PTB.

The prevalence of the maternal adverse birth outcome in this study was 12.3%. Pregnancy-induced hypertension (8.4%) and postpartum hemorrhage (1.9%) were the common problems of maternal adverse birth outcomes.

Mothers who had a history of abortion were found to be two times more likely to have fetal adverse birth outcomes than mothers who had no history of abortion. The reason explained by pregnancy after miscarriage might be related to long-term pregnancy-related complications because of biological reactions and/or psychosocial depression. Mothers with current pregnancy-associated complications (the premature rupture of membrane and hyperemesis) were found to have three times higher odds of experiencing fetal adverse birth outcomes than those who had no complications. This finding was consistent with the study done in Ardabil Iran,[44] Tehran Iran,[45] and Hosanna.[33] The reason may be explained in terms of the fact that the complications that have occurred during pregnancy have affected the health of the fetus in the uterus. This also might be related to the termination of pregnancy because of the worsening of the complication before reaching full-term pregnancy.

Women who had one ANC visit were 3.3 more likely to have adverse birth outcomes as compared to those who had four and more ANC follow-ups. This finding is in line with those of studies in Dessie,[20] Gondar,[31] and Tanzania.[43] This might be because attending focused ANC helps women to have an awareness of the danger signs during pregnancy, delivery, and postnatal period. It also improves health-seeking behavior, orients women on potential complications, and birth readiness, and helps them to identify pregnancy-related problems.

Mothers who had obstructed or meconium-stained amniotic fluids were found to have 2.3 times higher odds of experiencing adverse birth outcomes than those mothers who had a normal birth. This might be because obstructed labor is associated with an increased risk for meconium-stained amniotic fluid and long- and short-term fetal outcomes are affected by meconium-stained amniotic fluid, including increased rates of neonatal resuscitation, respiratory distress, lower Apgar score, and neonatal death. Study participants who gave birth by cesarean delivery were inversely correlated with the adverse birth outcome as compared to those participants who gave birth by spontaneous vaginal birth. This is because cesarean delivery lowers the risk of intrauterine fetal death in the case of oligohydramnios and postern pregnancy and reduces birth injuries such as asphyxia, shoulder dystocia, and fractures.

Women who had APH were more likely to have maternal adverse birth outcomes as compared to those who did not have any problem during the latest pregnancy. This might be APH caused by postpartum hemorrhage and the risk of anemia.

5 | LIMITATION

This study focuses on the quantitative approach, which could not address the "why," questions in detail.

TABLE 6 Bivariate and multivariate analysis Factors associated with fetal adverse birth outcomes among women who gave birth at South Gondar Zone Hospitals, Ethiopia, 2019 (n = 928)

| Variables | Fetal Adverse birth outcome | | COR (95% CI) | AOR (95% CI) | p-Value |
	Yes (246, 6.5%)	No (682, 73.5%)			
Maternal age					
<20 and ≥36 years	14 (5.7)	90 (13.2)	2.05 (0.76, 5.49)*		
21–25 years	88 (35.8)	218 (32.0)	0.79 (0.40,1.55)		
26–30 years	114 (46.3)	280 (41.1)	0.78 (0.40,1.51)		
31–35 years	30 (12.2)	94 (13.7)	1		
Abortion					
Yes	182 (74.0)	588 (86.2)	2.20 (1.32, 3.652)*	2.10 (1.31,3.66)	0.002
No	64 (26.0)	94 (13.8)	1		
ANC visit in latest pregnancy					
No, follow up	112 (45.5)	252 (37.0)	1.00 (0.62, 1.62)	1.00 (0.61, 1.62)	<0.001
1 time	26 (10.6)	202 (29.6)	3.47 (1.75, 6.86)*	3.30 (1.67,6.58)	
2–3 times	24 (9.8)	40 (5.7)	0.74 (0.33, 1.66)	0.72 (0.32,1.62)	
≥4 times	84 (34.1)	188 (27.6)	1		
Problem during pregnancy					
No problem	166 (67.5)	396 (58.1)	1		<0.001
PIH	38 (15.4)	72 (10.6)	0.79 (0.43, 1.46)		
APH	22 (8.9)	50 (7.3)	0.95 (0.44, 2.02)	0.90 (0.41, 0.96)	
PROM/ hyperemesis	20 (8.1)	164 (24.0)	3.43 (1.69, 6.95)*	3.27 (1.55, 5.89)	
Abnormal labor					
Obstructed labor/MSAF	38 (15.4)	58 (8.5)	2.26 (1.20, 4.25)*	2.31(1.21, 4.39)	0.003
Mal presentation	22 (8.9)	46 (6.7)	0.94 (0.39, 2.22)	0.90 (0.39, 2.30)	
Malposition	32 (13.0)	46 (6.7)	1.37 (0.54, 3.44)	1.30 (0.55,3.58)	
Normal labor	154 (62.6)	532 (78.0)	1	1	
Mode of delivery					
SVD	182 (74.0)	552 (80.9)	1	1	0.02
CS	50 (20.3)	86 (12.6)	0.56 (0.32, 0.98)*	0.50 (0.28, 0.88)	
Others[a]	14 (5.7)	44 (6.5)	1.03 (0.42, 2.50)	1.89 (0.72,4.93)	
Alcohol is taken during pregnancy					
Yes	46 (18.7)	194 (28.4)	1.72 (1.03, 2.88)*		
No	200 (81.3)	488 (71.6)	1		

Abbreviations: ANC, antenatal care;AOR, adjusted odds ratio; APH, antepartum hemorrhage; CI, confidence interval; COR, crude odds ratio; CS, cesarean section; MSAF, meconium-stained amniotic fluid; PIH, pregnancy-induced hypertension; PROM, premature rupture of membrane; SVD, spontaneous vaginal delivery.

[a]Husband/parent/father/mother-in-law. Instrumental delivery, augmentation, and destructive delivery.

*Significantly association of bivariate logistic regression at p < 0.05.

TABLE 7 Bivariate and multivariate analysis Factors associated with maternal adverse birth outcomes among women who gave birth at South Gondar Zone Hospitals, Ethiopia, 2019 (n = 928)

Variables	Maternal adverse birth outcome		COR (95% CI)	AOR (95% CI)	p-Value
	Yes (114, 12.3%)	No (814, 87.7%)			
Maternal age					
<20 and ≥36 years	14	90	2.25 (0.62, 8.18)*		
21–25 years	44	262	2.43 (0.80, 7.38)		
26–30 years	48	346	2.01 (0.67, 6.04)		
31–35 years	8	116	1		
Problem during pregnancy					
No problem	60	502	1		0.01
APH	20	52	2.03 (1.13, 3.62)*	1.87 (1.03,3.38)	
PROM/PIH/hyperemesis	34	260	0.31 (0.07, 1.360)	0.29 (0.06, 1.29)	
Alcohol intake during pregnancy					
Yes	44	196	1.98 (1.11, 3.53)*		
No	70	618	1		

Abbreviations: AOR, adjusted odds ratio; APH, antepartum hemorrhage; CI, confidence interval; COR, crude odds ratio; PIH, pregnancy-induced hypertension; PROM, premature rupture of membrane.

*Significantly association of bivariate logistic regression at p < 0.05.

6 | CONCLUSION

The adverse birth outcome proportion was high. The previous history of abortion, premature rupture of membrane and hyperemesis, obstructed labor, and meconium-stained amniotic fluid was directly associated with adverse birth outcomes but cesarean delivery was inversely associated with adverse birth outcomes. Therefore, healthcare providers and health extension workers should strengthen community-based health information about ANC follow-up, community mobilization to reduce abortion and provide psychotherapy for women after abortion. Appropriately manage premature rapture of the membrane after hospital admission and counseling danger signs during ANC follow-up. Women should give birth in a hospital where a cesarean section is performed.

AUTHOR CONTRIBUTIONS

Gedefaye Nibret Mihretie: Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; software; supervision; validation; writing – original draft; and writing – review and editing. **Abirham Habitamu**: Conceptualization; data curation; formal analysis; funding acquisition; methodology; project administration; and supervision.

DATA AVAILABILITY STATEMENT

All relevant data are available within the manuscript. Both authors have read and approved the final version of the manuscript and take complete responsibility for the integrity of the data and the accuracy of the data analysis.

ETHICS STATEMENT

Ethical clearance was obtained from the ethical review committee of Debre Tabor University College of health sciences. The supporting letter was obtained from the selected hospital head offices. Written informed consent was taken from the study participants after explaining the purpose and objective of the study. Respondents were also informed that all the data obtained from them were kept confidential and anonymous. All methods were done under the relevant guidelines and regulations.

TRANSPARENCY STATEMENT

The lead author Gedefaye N. Mihretie affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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