

Research Article

Determinants of Adverse Birth Outcome among Mothers who Gave Birth at Hospitals in Gamo Gofa Zone, Southern Ethiopia: A Facility Based Case Control Study

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ABSTRACT

Background: The magnitude of perinatal mortality in Ethiopia was among the highest in Sub Saharan Africa. Hence, achievement of reducing perinatal and neonatal death is strongly influenced by the a number of adverse birth outcomes; and since preterm birth is the leading cause of these deaths, progress is dependent on achieving high coverage of evidence-based interventions to prevent preterm delivery and to improve survival for preterm newborns including Ethiopia. Therefore identifying those problems is a priority area to give policy insight and recommendations. The aim of the study was to determine the factors associated with adverse birth outcome among mothers who gave birth in Gamogofa zone hospitals.

Methods: An unmatched case-control study design was conducted among 420 women (158 cases and 262 controls) who gave birth in the selected hospitals using systematic random sampling technique. Data was collected through face to face interview and using data extraction sheet from delivery registration book. The data was collected by trained Midwives using a structured and pretested questionnaire. Binary and Multivariable logistic regression analysis were performed at significance level of p value ≤ 0.25 and ≤ 0.05, respectively.

Findings: In this study, 262 (62.4%) controls and 158 (37.6%) cases were involved with a response rate of 98.5%. Most of the participant's (98%) pregnancy among cases and (90.1%) controls were planned. In multivariable analysis Rural residence [AOR=3.338, 95% CI (1.055, 10.566)], Multigravida [AOR=6.65, 95% CI (1.876, 23.579)], Being male baby [AOR=26.41, 95% CI (3.149, 221.414)], Do not know danger signs during pregnancy [AOR=102.41, 95% CI (17.477,600,11)] and Do not know danger signs during Labour [AOR=14.3, 95% CI (1.951,600,12)] were significantly associated with adverse birth outcome.

Conclusion: Adverse birth outcomes (low birth weight, still birth, and preterm birth) were still a major public health problems in the study area. Rural residence, muligravida, being a male baby and lack of knowledge about danger signs during pregnancy and labor was a factor which had associations with adverse birth outcomes. Therefore, providing appropriate information on danger signs encountered during pregnancy and labour and the number of pregnancy is very important.

Keywords: Adverse birth outcome; Factors; Pre-term; Still birth; Low birth weight

Background

Birth outcomes are a category of measures that describe health at birth. These outcomes, such as low birth weight (LBW), represent a child's current and future morbidity or whether a child has a "healthy start" and serve as a health outcome related to maternal health risk [1].

The World Health Organization (WHO) estimates that more than nine million infants die before birth or in the first few weeks of life each year, and that nearly all of these deaths occur in developing countries. Most of these deaths are caused by infectious diseases; pregnancy-related complications such as placenta previa and abruptio placentae; delivery related complications, including intrapartum asphyxia, birth trauma, low birth weight and premature birth [2].

The perinatal mortality rate (PMR) is five times higher in developing than in developed regions: 10 deaths per 1000 total births in developed regions; 50 per 1000 in developing regions

and over 60 per 1000 in the least developed countries. Out of about 6 million perinatal mortalities estimated worldwide, stillbirths account for about 3.3 million and 3 million being early neonatal deaths, and more than 97% of this occur in low and middle income countries [3,4].

In urban population based cohort study in Pakistan in 2009 showed that the PMR-I (i.e., still-births plus all early neonatal deaths) and PMR- II (i.e., stillbirths plus all neonatal deaths) were 70.4 per 1000 and 82.5 per 1000 total births with a stillbirth to early neonatal mortality ratio of 1:1 [4].

The first 28 days of life are the most dangerous period, during which 44% of all deaths of children aged less than five occur. Some progress has been made in reducing deaths from birth asphyxia and birth trauma (intrapartum-related complications) (29%) and complications due to prematurity (14%) [5].

Globally, preterm-birth complications were the leading cause of under-five deaths in 2012 (17.3% of deaths), followed by pneumonia (15.2%), birth asphyxia and birth trauma (11.4%), non-communicable diseases (10.8%) and diarrhea (9.5%) [5]. Especially in Africa, the PMR is reported to be as high as 62 per 1000 total births. Specific to South Africa, stillbirth rate was in 2013 with 17 stillbirths per 1000 total births which can be attributed to the sharp decline in the number of total births in 2013 and PMR was 25 per 1000 per pregnancies [6]. A qualitative perinatal audit in Tanzania showed that the PMR was 92 per 1000 total births [7].

According to United Nation (UN), Annual number of births estimated that 2.8 million in Ethiopia [8]. In Ethiopia, Perinatal mortality rate was 46 per pregnancies, still birth rate was 16.9 per birth and Neonatal mortality rate was 29 per 1000 live births, respectively. The proportion of late neonatal death was 21% and other 79% was early neonatal death, from which 41% was died within 24 hours in Ethiopia. According to Ethiopian demographic health survey (EDHS) 2011 report, among children born with a reported birth weight in Addis Ababa, 11.4% weighed less than 2500 g [9]. Comparatively in South nation and nationalities of peoples region (SNNPR) the PMR was 39.2 per 1000 pregnancies [10]. The finding in Hawassa and Mekele revealed that adjusted perinatal mortality rate was 85/1000 per 1000 live births and 156 per 1000 live births [11,12].

Different factors contributed for adverse birth outcomes. The health status of a woman before and during pregnancy is a key determinant of pregnancy outcomes, and as such poor nutritional status and exposure to infectious diseases during pregnancy contribute to maternal as well as infant mortality [13-15]. Low Birth Weight (LBW) is known to be the most important risk factor and a strong predictor of infant mortality [16,17]. As a result, women who are underweight, anemic and harboring infections such as malaria during pregnancy are at greater risk of delivering LBW babies [14].

Compared with the highest income quintile, mothers from the lowest quintile were at increased risk of having small for gestational age neonates, low birth weight, preterm birth, low apgar score (<7) at 5 min and stillbirth [18]. In Ethiopia, Ante partum hemorrhage (APH), hypertension, history of perinatal death and lack of antenatal care follow up were significantly associated with still-birth [19].

A study in North east Ethiopia, income of mother, maternal education and human immune virus (HIV) status also associated with poor birth out comes [20]. A study in Mekelle showed that those mothers who lived in urban (76%) less likely to develop adverse birth out come as compared to those mothers who lived in rural area and primigravida mothers (21%) less likely to develop adverse birth outcome as compared to grand multigravida mothers [11]. A study done at Hawassa indicated that, having as many perinatal deaths were mainly from rural areas. In Mekelle town, those mothers who developed complication during pregnancy, during labor & delivery were more likely to develop adverse birth outcome [12]. A study in Gondar showed that Women having history of either preterm delivery or small baby were more likely to have preterm births. Similarly, history of delivering preterm or small baby, preterm birth and hypertension were associated factors with low birth weight [19].

However, there is a lack of sufficient data with which to examine the relative importance of low birth weight, small for gestational age and preterm birth in causing adverse birth outcome in study area. Therefore, this study intended to identify the magnitude of adverse birth outcomes and its contributing factors in Gamo Gofa Zone.

Methods and Materials

Study area and design

The study was conducted in three hospitals of gammo-goffa zone, from February 01/2016 to April 01/2016, SNNPR, southern Ethiopia. Arba Minch town located 505 km away from Addis Ababa and 275 km south west of Hawassa, capital city of the region. The total population of the study area is 2,019,687. Estimated number of women of reproductive age (15-49) is 470,587 from this, estimated number of delivery is 69,881 and estimated number of live birth is 69,881. In gammo-goffa zone, the skilled delivery rate is 51.2%. In the study area there are three zonal hospitals, 73 health centers, and 471 health posts. Besides 8 nongovernmental organizations (NGOs) providing health service for the community, there are private health facilities including low level clinics, medium clinics, drug store and 2 pharmacies [20]. A facility based unmatched case-control study design was conducted.

Source population

All mothers who gave birth in the three governmental hospitals were the source population. Mothers who gave live births weighed less than 2500 g, preterm and still birth were considered as cases and live births weighed 2500 g and above and normal birth as controls. Mothers who had diabetes mellitus, hypertension and severely ill were excluded.

Sample size determination and Sampling procedure/ techniques

Different variables were considered to calculate the sample

size. The sample size was computed using a formula for two population proportions and calculated by open Epinfo version 4.3 statistical software package by considering: The 36.33% of cases and 22% controls exposed (final sample size taken from family size since it is maximum [12]: OR: 2.02, CI: 95%. Power of the study: 80% and ratio of cases to controls of 1:2. With adjustment for 10% non-response rate the final sample size for cases 142 and for controls 284 and the total sample size was 426. Chencha, Sauwla and Arba Minch General Hospitals were purposely selected to get adequate number of study participants. To allocate proportional sample size for each hospital the numbers of delivery conducted in each hospital for the last year was three months report was taken as a reference. Then to allocate the sample size for each hospital PPS was applied by considering the number of skilled delivery attended performance for three months in 2007 E.C (1201) and total sample size (426). They were grouped as cases or controls based on their birth outcome after mothers who gave birth in hospitals. Both cases and controls were selected using systematic sampling technique; for one case and two controls were interviewed until the allocated sample is achieved at each hospital.

Study variables

Adverse Birth Outcome, socio-demographic factors such as: maternal age**,** marital status**,** educational level, maternal occupation, place of residence, monthly income, ANC visits, Iron intake, fertility desire, gravidity, parity, history of anemia, history of abortion, birth interval, co-morbidity, Gestational weight gains, third trimester weight, types of delivery, maternal height, maternal mid upper arm circumferences.

Operational definitions

Birth weight: The first weight of the new-born measured within 15 min after birth.

Low birth weight: Those newborns weighed less than 2500 g.

Normal weight: Those newborns with birth weight of 2500 g and above.

Preterm birth: It is a birth before a gestational age of 37 complete weeks. Multiple births refers when more than one fetus is carried to term in a single pregnancy.

Data collection/methods and instrument

Face to face interview using a pre-tested and structured questionnaire was used to collect the data. Questions extracted from DHS & other literatures served to prepare the instrument. Information extraction sheet was used to collect information form mother registration book. Measurement of height of the mother, Mid Upper Arm Circumference (MUAC) of the mother was undertaken. Pretest was done on 5% of total sample of mothers who delivered. A lesson from the pretest was used to modify the instrument. The data was collected by Diploma and Nurses. Data collectors were selected based on their experience in data collection. Supervisors were principal investigators. Training was given for data collectors and supervisors for two days.

Data processing and analysis

Data was entered by using Epidata3.1 and was exported to SPSS version 20 for analysis purpose. Frequency distribution was used to organize the data and present the responses obtained. Measures of central tendency, standard deviation, proportion and range was calculated and utilized for appropriate variables to describe the data. Bivariate logistic regression was used to see the association between one explanatory variable and outcome variable at p value<0.25. Multivariable logistic regression analysis was performed to predict factors which affect the dependent variable. Those variables with AOR and a p value $\leq$ 0.05 were considered statistically significant in multivariable analysis. Backward stepwise regression method was used to test the model fitness.

Ethical consideration

The research was approved by Ethical Review Committee of college of medicine and health sciences of Arba Minch University before the start of the study. Initially, Ethical clearance was obtained from research coordination office, college of medical and health sciences, Arab Minch University. Official letter was written to each hospital from zonal health Bureau and then informed verbal consent from study participants was sought often brief explanation of the purpose of the study. The respondents have the right to refuse participation or terminate their involvement at any point during the interview. The information provided by each respondent was kept confidential.

Results

Socio-demographic characteristics of the respondents

In this study 262 (62.4%) controls and 158 (37.6%) cases participated with a response rate of 98.5%. Majority of the study participants were in the age group of 15-24 years old in both cases and controls. In this study Gammo was dominant ethnicity. Majority of the study participants were rural residents. Most of study participants were married at age of 15-24 years as first marriage in cases and controls. Regarding to religious status, majority of the respondents were Protestants and followed by orthodox. 137 (86.7%) and 35 (13.4%) of study participants were attended higher education in cases and controls respectively. 138 (87.3%) of cases and 31 (11.8%) of controls of study participants were government employee respectively (Table 1).

The reasons for not using contraceptives among mothers were identified respectively, they do not want to give birth 130(31%), do not have information about contraceptives 9 (2.1%) and unspecified reasons 144 (34.3%). Regarding knowledge on danger sign during pregnancy and Labour, 175 (41.7%) of delivered mothers have knowledge on danger signs during pregnancy. Around quarter of mothers 309 (73.6%) were knew about danger sign during Labor.

History of current pregnancy

For current pregnancy, Most of the participants (98%) among cases and 90.1% of controls were planned pregnancy. Mothers from both controls and cases (94.6% and 98.7%, respectively)

Table 1: Socio-demographic characteristics of study participants among delivered mothers in Gamo Gofa zonal Hospitals, 2016 G.C.

Variables	Response option	Category	
		Control (%)	Case (%)
Age	15-24	144 (55)	141 (89.2)
	25-34	104 (39.7)	11 (7)
	35-44	14 (5.3)	5 (3.2)
	>=45	-	1(0.6)
Marital status	Married	245	155
	Divorced	6 (93.5)	1 (98.1)
	Separated	8 (2.3)	1 (0.6)
	Widowed	3 (1.1)	1 (0.6)
Age at first marriage	15-24	237 (90.5)	154 (97.5)
	25-34	25 (9.5)	4 (2.5)
Residence	Rural	136 (51.9)	148 (93.7)
	Urban	126 (48.1)	10 (6.3)
Educational status	Elementary	121 (46.2)	8 (5.1)
	Secondary	76 (29)	4 (2.5)
	University	35 (13.4)	137 (86.7)
	read and write	7 (2.7)	3 (1.9)
	Illiterate	22 (8.4)	4 (2.5)
	Not volunteer	1 (0.4)	2 (1.3)
Occupation	Housewife	92 (35.1)	18 (11.4)
	government employee	31 (11.8)	138 (87.3)
	Student	40 (15.3)	-
	housewife and farmer	76 (29)	1 (0.6)
	Others*	23 (8.8)	1 (0.6)

Key[1]: others*: private employee, farmer, daily worker

had a history of antenatal care follow up. 148 mothers (93.7%) cases and 176 (67.2%) controls were gave birth spontaneously. Majority of study participants were taken Iron supplementation during Ante natal care follow up 130 (49.8%) of controls and 144 (91.1%) of cases. More than half of mothers 139 (49.1%) of controls and 144 (58.8%) of cases were not utilizing contraceptives. Regarding types of contraceptives methods, the injectable type, 217 (51.7%), was more common and followed by implants 85% (20.2%) (Table 2).

History of previous pregnancy among delivered mothers

146 mothers (94.8%) among controls and 143 (98.6%) among cases had history of previous live birth. Regarding the size of the previous baby, 138 (87.3%) mothers among cases and 6 (2.3%) among controls were gave birth a baby with very small in size. Majority of delivered mothers had history of Inter birth interval less than 24 months with 86 (58.5%) among controls and 142 (98.6%) among cases. 81 (52.9%) among controls and one hundred forty five (99.3%) among cases had history of still birth. Majority of mothers have four and more than four number of pregnancies 85 (32.4%) of controls and 145 (91.8%) of cases (Table 3).

Factors associated with adverse birth outcome

In this study, the factors that were associated with Adverse

Table 2: History of current pregnancy of the respondents among mothers in Gammo Goffa zonal Hospitals, 2016

Variables	Response options	Category	
		Control (%)	Case (%)
Planned Pregnancy	Yes	236 (90.1)	156 (98.7)
	No	26 (9.9)	2 (1.3)
History of Antenatal care	Yes	246 (94.6)	156 (98.7)
	No	14 (5.4)	2 (1.3)
How many ANC	One	14 (5.3)	2 (1.3)
	Two to three	135 (51.5)	11 (7.0)
	Four	73 (27.9)	143 (90.5)
	Five and above	23 (8.8)	-
	Don't remember	2 (0.8)	-
Mode of delivery	SVD	176 (67.2)	148 (93.7)
	C/S	34 (13.0)	6 (3.8)
	Instrumental	14 (5.3)	2 (1.3)
	Induction	37 (14.1)	2 (1.3)
Iron supplementation	Yes	130 (49.8)	144 (91.1)
	No	131 (50.2)	14 (8.9)
Use of contraceptives	Yes	122 (89.7)	14 (10.3)
	No	139 (49.1)	144 (58.8)

Table 3: History of previous pregnancy among delivered mothers in Gammo Goffa zonal Hospitals, 2016 G.C.

Variables	Response options	Category	
		Controls (%)	Cases (%)
Previous baby alive	Yes	146 (94.8)	143 (98.6)
	No	8 (5.2)	2 (1.4)
Gestational age	<7 months	-	138 (94.5)
	7-9 months	146 (95.4)	8 (5.5)
	>9 months	7 (4.6)	0
Size of the baby	Very large	108 (41.2)	12 (7.6)
	Above medium	4 (1.5)	-
	Medium	18 (6.9)	-
	Below medium	5 (1.9)	1 (0.6)
	Very small	6 (2.3)	138 (87.3)
	Don't remember	8 (3.1)	1 (0.6)
	Not volunteer	5 (1.9)	-
Inter birth interval	<24 months	86 (58.5)	142 (98.6)
	24-36 months	40 (27.2)	1 (0.7)
	>36 months	21 (14.3)	1 (0.7)
History of still birth	Yes	72 (47.1)	1 (0.7)
	No	81 (52.9)	145 (99.3)
Number of pregnancy	One	120 (45.8)	2 (1.3)
	Two	24 (9.2)	6 (3.8)
	Three	33 (12.6)	5 (3.2)
	Four	85 (32.4)	145 (91.8)

Birth Outcome among participants were rural residence, Multigravida, Being male baby; do not know on danger signs during pregnancy and do not know on danger signs during Labour. The odds of Pregnant women with rural resident to have adverse birth outcome were 3 times (AOR=3.338, 95% CI:

Table 4: Bivariate and multivariable logistic regression model to identify factors associated with Adverse Birth Outcome among pregnant women in Gammo-Goffa zonal Hospitals, SNNPR, Southern Ethiopia, March-June 2016

Variables (n=420)	Adverse Birth Outcome		COR (95% CI)	AOR(95% CI)	P-value
	Cases	Controls			
1. Place of residence					
Rural	148	136	13.712 (6.914, 27.193)	3.338 (1.055, 10.566)	0.04*
Urban®	10	126	1	1	
2. Educational status					
Elementary®	8	121			
Secondary	4	76	0.796 (0.232, 2.734)		
Higher education	137	35	59.204 (26.441, 132.560)		
Others	9	30	4.537 (1.615, 12.7460)		
3. Occupational status					
House wife®	18	92	1	1	
Government	138	31	22.753 (12.022, 43.060)	2.493 (0.623, 9.971)	0.197
Students	2	139	0.074 (0.017, 0.3240)	0.067 (0.012, 0.379)	0.002
4. Husband Occupation					
Government	139	64			
Merchant	10	74	20.633 (4.665, 91.257)	1.713 (0. 113, 25.994)	0.698
Farmer	7	105	1.284 (0.259, 6.357)	1.845 (0.160, 21.290)	0.624
Others®	2	19	0.633(0.122, 3.2840)	0.697(0.059, 8.226)	0.774
5. Gravida (n=417)					
Gravid 1 & 2 ®	7	142	1	1	0.003*
Multi gravid	150	118	25.787 (11.63, 57.174)	6.65 (1.876, 23.579)	
6. Parity (n=407)					
Parity 1 & 2	150	204	4.832 (2.123, 11.000)		
Parity 3 & above®	7	46	1		
7. Age at first marriage					
15-24	154	237	0.246 (0.084, 0.721)		
25-34®	4	25	1		
8. History ANC use (n=418)					
Yes®	156	246	1		
No	2	14	4.439 (0.995, 19.797)		
9. Planned pregnancy (n=280)					
Yes®	156	236	1		
No	2	26	8.593 (2.011, 36.711)		
10. Use of contraceptive					
Yes	14	122	9.02 (4.964, 16.452)		
No®	144	139	1		
11.Iron Supplementation					
Yes®	144	130	1		
No	14	131	10.365 (5.689, 18.885)		
12. Sex of baby					
Male	141	156	5.636 (3.218, 9.871)	26.41 (3.149, 221.414)	0.003*
Female®	17	106	1		
13. know about danger sign during pregnancy n=418					
No	148	98	25.7 (12.914, 51.164)	102.41 (17.477, 600,11)	
Yes®	10	165	1	1	0.000*
14. Know about danger signs labour					
Yes®	145	164	1	1	
No	13	93	6.325 (3.396, 11.78)	14.3 (1.951, 600,12)	0.009*
15. Source of water					
Protected water	157	246	10.2 (1.341, 77, 764)	10.8 (0.873, 133, 958)	0.064
Unprotected®	1	16	1	1	
16. MUAC of mother					
Less than 23 cm	16	142	1		
Greater than 23 cm	156	106	13.1 (7.366, 23, 159)		
17. RH factors					
Positive	5	106	1		
Negative	156	153	20.8 (8.751, 52.397)		

Key: ®: reference category, Selection criteria in bivariate logistic regression at $p \leq 0.25$, the cut point for multivariable logistic regression at $p \leq 0.05$, *:-considered statistically significant at $p \leq 0.05$ in multivariable logistic regression model

1.055, 10.566) higher compared to their counter parts of women with urban residents. Pregnant women with multigravida were 7 times (AOR=6.65, 95% CI: 1.876, 23.579) more likely to have adverse birth outcome as compared to their counter parts of women with gravida one and two. Pregnant women with male baby were 26 times (AOR=26.41, 95% CI: 3.149, 221.414) more likely to have adverse birth outcome as compared to their counter parts of women with female baby. Pregnant women who do not know on danger signs during pregnancy 102 times (AOR=102.41, 95% CI: 17.477, 600, 11) more likely to have adverse birth outcome as compared to women who know danger signs during pregnancy. Pregnant women who do not know on danger signs during Labour 14 times (AOR=14.3, 95% CI: 1.951, 600, 12) more likely to have adverse birth outcome as compared to women who know danger signs during labour in final model (Table 4).

Discussion

This study was aimed to assess adverse birth outcomes and associated factors in public Hospitals of Gamo-Gofa zone, SNNPR. The finding of this study indicated that the factors that associated with Adverse Birth Outcome among pregnant mothers were rural residence, multigravida, being male baby; do not know on danger signs during pregnancy and do not know on danger signs during Labour. In this study the majority of study subjects were 15-24 years among cases and controls. But there is a little difference in mekele study mean age of the study subjects were 28.2 years for cases and 25.7 years for controls [12].

In this study, the adverse birth outcome (low birth weight, still birth, intra uterine fetal death and preterm birth) were 37.6%. This is higher than the study done in North Wollo Zone, 27.5% of mothers had faced poor birth outcomes [21]. This indicates that these are major public health problems in the study area.

This study revealed that the odds of pregnant women with rural resident to have adverse birth outcome were 3 times higher compared to their counter parts of women with urban residents. This is in line with studies in Gondar and Wollo mothers with rural resident were a significant factor. Mothers who lived in rural area encountered poor birth outcomes more than two times than mothers who lived in urban area of Wollo [22-26]. This may be due to the study area similar socio-economic status. This could be lack of access for quality pregnancy related cares in rural areas, and high burden of work at home level.

In this study, the rate of male sex baby was predominant factor for adverse birth outcome, i.e., pregnant women with male baby were 26 more likely to have adverse birth outcome as compared to their counter parts of women with female baby. This is inconsistent with studies done in Algeria and other countries; the rate of female sex was predominant among low birth Weight infants and this is attributed to the predisposition of the female sex to the other risk factors [24]. And also discrepancy between the studies in Axum and Laelay Maichew Districts and Gonder with this report, both explained that sex of the neonate being female was statistically significant with Adverse Birth outcome [27-29]. This discrepancy might be due the high number of male baby in the study area.

In this study proportion of multigravida was high among cases as compared to group controls 35.9%. This is not comparable with Gonder study shows proportion of primigravida was high among cases as compared to group control 52.34% [22]. This study shows that those pregnant women with multigravida were 7 times more likely to have adverse birth outcome as compared to their counter parts of women with primigravida mothers. This finding was similar with studies done in Mekelle town and developing countries show that those primigravida mothers 21% less likely to develop adverse birth outcome as compared to grand multigravida mothers [12]. USA Indiana showed that in 2003-2005, preterm rate was 15.4% among fourth or higher-order births compared to 13.5% among third order and 12.2% among first and second order births and also in Ghana, women with >5 births had an increased likelihood of an adverse outcome compared with women with single deliveries [30,31]. This might be due to sharing of foods, housing, maternal attention and medical care for the children with in house hold). The nutritional status of the mother may be reduced by a rapid sequence of pregnancy and repeated period of lactation. Therefore, poor maternal nutritional status increases the risk of poor birth outcomes. This point can be supported by different studies indicated that a low pre-pregnancy body mass index was significantly associated with LBW. And also found that an average weight gain of 10 kg during pregnancy period had some protective effects against the occurrence of adverse birth outcome [22,25].

Other maternal factors in this study were knowledge about danger signs during pregnancy and labour. The study found that pregnant women who do not know on danger signs during pregnancy 102 times more likely to have adverse birth outcome as compared to women who know danger signs during pregnancy. This report agrees with study in Ghana a major barrier to care seeking is failure or delay to recognize danger signs during pregnancy in the neonate by the mother [32]. This might be due to if the mother has appropriate knowledge on danger signs during pregnancy, she want to seek health care and can easily identify these problems during health facility visits. According to EDHS 2014 report presented that 53% of women were informed during an ANC visit of severe headache as a possible sign of pregnancy complications, 38% of abdominal pain, 22% of vaginal bleeding, 21% of fever, 16% of vaginal gush or fluid and 6% of blurred vision [33]. And also pregnant women who do not know on danger signs during labour 14 times more likely to have adverse birth outcome as compared to women who know danger signs during labour. This is in line the study in Uganda, Mothers who delivered in hospital had better knowledge of appropriate home care practices for low birth weight babies compared to mothers who delivered at home or in a lower level health facility [34]. This finding showed that the level on knowledge was associated with the care practices of their baby. This indicates that providing pregnancy and delivery consequences based education and information for mother has its own effect on their knowledge.

Limitations of the Study

Selection bias might be there, it could affect the accuracy

of the data collected as the participants were sampled from hospitals. This might be lead to underestimation of the prevalence of adverse birth outcome as majority of mothers who deliver at home and lower levels of health delivery or private health facility were not included in this study.

Conclusion

Adverse birth outcomes (still birth, preterm birth, intra-uterine fetal death, congenital abnormalities and low birth weight) are major public health problems in Gamo-Goffa zone Hospitals. In this study, mothers with rural residence, Multigravida, Being male baby; do not know on danger signs during pregnancy and do not know on danger signs during labour were statistically significant independent factors of Adverse Birth Outcome among pregnant mothers who gave birth in Hospitals.

Health professionals should provide structured based health education during the ANC period, knowledge of events and danger signs during pregnancy time and labour.

Health extension workers should be well informed about danger signs during pregnancy and linkage with referral system.

Health office should need to increase efforts in providing adequate reproductive health education, especially in certain target areas rural part of the zone.

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AUTHORS CONTRIBUTION

Feleke Gebremeskel, Teklemariam Gultie, Gemechu Kejela, Desta Hailu and Yinager Workneh conceived and designed the protocol, performed the data collection, contributed for data analysis, and wrote the paper. All authors read and approved the final paper. Feleke Gebremeskel, Teklemariam Gultie, Gemechu Kejela, Desta Hailu and Yinager Workneh contributed equally to this work. The funder has no role in the manuscript.

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