

DETERMINANTS OF ADVERSE PREGNANCY OUTCOMES AMONG MOTHERS WHO GAVE BIRTH FROM JAN 1-DEC 31/2015 IN JIMMA UNIVERSITY SPECIALIZED HOSPITAL, CASE CONTROL STUDY, 2016

Eyosias Yeshialem, MPH¹, Mulumebet Abera, MPH, PhD², Amanuel Tesfay, MPH²

ABSTRACT

BACKGROUND: Adverse pregnancy outcomes lead to serious health consequences to the mother and/or the baby. These Adverse birth outcomes; prematurity, low birth weight and still birth represent significant problems in both developing and developed countries.

OBJECTIVE: To identify determinants of adverse pregnancy outcomes among deliveries takes place in Jimma University specialized hospital from January1 – December 31 / 2015.

METHODS: The study was a facility based unmatched case-control study design conducted by reviewing mothers and newborn cards and registration log book who delivered in Jimma university specialized hospital from January 1 /2015 to December 31/2015, southwest Ethiopia. The study was done on randomly selected 86 cases and 258 controls using structured data collection checklist. Data analysis was done by SPSS version 20 and multiple logistic regression statistical methods were used to identify the predictors.

RESULT: Most of the cases 80.2 % and controls 82.9 % were between the age group of 20-34 years. Mothers who are referred for delivery service from other area are more than five times to have adverse pregnancy outcomes than mothers who are not referred, AOR=5.49 95% CI [2.80-10.76]. And mothers who had illness during current pregnancy are seven times to develop adverse pregnancy outcomes than controls, AOR=7.22, 95% CI = 1.65-31.58]. Mothers who attend ante natal care (ANC) were 83% less likely to have adverse pregnancy outcome, than mothers who didn't attended ANC follow up, AOR = 0.17 95% CI [0.06-0.49]. Pregnant mothers who are anemic or had hemoglobin level of less than 11 gram/dl are more than seven times to have adverse pregnancy outcomes than non-anemic pregnant mothers, AOR=7.29 95% CI=[2.85-18.67]. Additionally, women who had obstetric emergencies during current pregnancy, complications during current delivery, and multiple pregnancy are more than 18 times AOR =18.40[6.12-55.37], 2 times AOR=2.65[1.38-5.11] and 7 times AOR=7.59[1.49-38.65] to have adverse pregnancy outcomes than their counterparts respectively.

CONCLUSION: According to the findings of this study; referral, illness during current pregnancy, having ANC attendance, anemia during current pregnancy, complication during delivery, multiple pregnancy and having obstetric emergencies are statistically significant predictors of adverse pregnancy outcomes.

KEY WORDS: Adverse pregnancy outcome, Jimma

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1 Public Health and Medical Sciences Faculty, Mettu University, Mettu, Ethiopia

2 Population and Family Health Department, College of Public Health, Jimma University, Jimma, Ethiopia

INTRODUCTION

Pregnancy outcomes refer to life events that occur to the newborn infant from the age of viability (28 weeks) to the first week of life. pregnancy outcomes varies from pregnancy to pregnancy which includes; normal live birth, low birth weight, prematurity in the baby, stillbirth, intrauterine fetal death, early neonatal death and late neonatal death. Adverse pregnancy outcomes are those pregnancy outcomes other than normal live birth which majorly includes preterm birth, stillbirth and low birth weight which are the major cause of neonatal morbidity, mortality and long term physical and psychological problems¹.

These Adverse birth outcomes; prematurity, low birth weight and still birth represent significant problems in both developing and developed countries. Each year, about 15 million babies in the world, more than one in 10 births, are born too prematurely. More than one million of those babies die shortly after birth; countless others suffer from lifelong physical, neurological, or educational disabilities, often at great cost to families and societies².

Among 136 million babies born every year, approximately 4 million are stillborn, and the other 4 million die in the first month of life. In 2006 Worldwide, 12% of babies are born prematurely, 8% with low birth weight, and 3% have major birth defects. Adverse pregnancy outcomes lead to serious health consequences to the mother and/or the baby³.

METHODS

Study area and period

The study was conducted in Jimma university specialized hospital. The hospital is one of the oldest public hospitals in the country located in Jimma town of Oromia Regional State, Ethiopia. The town is Located 357 km from Addis Ababa and JUSH is the only specialized teaching and referral hospital in the South Western region of Ethiopia.

The hospital has a predominantly rural catchment population of 15 million people for tertiary level care. According to 2006 fiscal year annual report, the hospital provided services for about 15, 000 inpatient, 160,000 outpatient attendants, 11,000 emergency cases and around 5000 deliveries takes placed. The hospital has about 21 units and 503 beds where around 65 beds are found in Maternity ward. The ward has around 119 health professional and supportive staffs, namely: Seven (7) Senior Obstetricians and Gynecologists, 6 BSc Nurses, 6 BSc Midwives, 5 Diploma Nurses, 32 Diploma midwives, 38 Residents, 16 Cleaners, 6 Porters and 3 Runners. The study was conducted from March 15- 30/ 2016.

Study design: Institution based case control study was conducted at JUSH in Jimma town, Oromia regional state.

Source population: All women who gave birth in JUSH from January 1, 2015 to December 31, 2015.

Study population

- For controls: selected women who gave normal live birth in JUSH from January 1, 2015 to December 31, 2015.
- For cases: selected women who gave birth with at least one adverse pregnancy outcome (preterm birth, stillbirth or low birth weight) in JUSH from January 1, 2015 to December 31, 2015.

Sampling unit: Mothers who gave normal birth for controls and mothers with at least one adverse pregnancy outcome (preterm, stillbirth, low birth weight) for cases were sampling units.

Inclusion criteria: All mothers who gave births from January 01/2015 December 30/2015 in JUSH were included.

Exclusion criteria: Mothers whose cards are missed and incomplete with outcome variable were excluded from the study.

Study variables

Dependent variables:

Adverse pregnancy outcomes: (stillbirth, preterm birth and low birth weight).

Independent variables

Socio-Demographic factors: (Age, Residence and gravidity)

Medical factors: (Previous medical illness, Illness during current pregnancy, HIV status and Anemia)

Past Obstetric and gynecologic factors: (Obstetric complications, History of adverse pregnancy outcomes, Abortion history and Family Planning history)

Current obstetric factors: (Pregnancy status, use of ANC and number of visit, TT vaccine, Obstetric emergencies and drug use during pregnancy)

Current delivery related factors: (Referred mother for delivery, status of labor, Parthograph use, Mode of delivery, Complication during delivery and multiple birth)

Operational definition

- Obstetric emergencies: obstetric complications like (APH, cord prolapse, eclampsia, fetal distress, shoulder dystocia)
- Medical illness: chronic disease like DM, hypertension, cardiac disease, HIV/AIDS...
- Adverse pregnancy outcomes: refers to a pregnancy results with at least one of the following birth outcomes (preterm birth, low birth weight and stillbirth).
- Preterm birth is any birth occurring between 28 – 37 weeks gestation.
- Still birth is any fetus born at 28 weeks gestational age or more with no heartbeat or respiratory effort.
- Birth weight: is the first weight of the fetus or newborn obtained after birth. Measured within the first hour of life before significant postnatal weight loss has been occurred by using a standard weight scale.
- Low birth weight: neonate birth weight less than 2,500 gm (up to and including 2,499 gm). 3.8.

Sample size determination

All recorded deliveries in the study period were included and Sample size was determined using the formula for two population proportion as follows.

Labor complication of last birth, complications during last pregnancy, residence (urban), Gravida (primi Gravida) and having ANC visit were considered in order

to calculate required sample size by revising different literatures. To calculate sample size all the above exposure variables were considered and complication during current pregnancy was chosen as an independent variable since it gives maximum sample size as compared to other exposure variables.

The sample size was calculated by (statistical EPI info 7.1.1) software package by considering that the percent of controls exposed among the controls is 2.7 % (main exposure variable), with 4.85 odds ratio which is taken from similar study done in mekele town public hospitals, Ethiopia, 95% CI, 80% power of the study and case to control ratio of 1:34.

Accordingly, the final sample size was 86 cases and 258 controls (a total sample size of 344) was involved in the study.

Sampling technique and data collection procedures

Simple random sampling technique was used with the following steps. A total of 1740 Births from 1st Jan to 31st Dec 2015 were identified using registration log book and 387 births were with at least one adverse pregnancy outcomes (LBW, preterm, stillbirth). Card number of identified births were coded for cases and controls. After the codes of cases and controls are entered in to SPSS version 20 software separately, 86 cases and 258 controls were selected randomly. Cards were traced and checked for completeness of the necessary information. Incomplete birth cards were excluded and replaced with another card.

The data was extracted from clinical records of mother's and newborn's (registration log books and individual cards) using a structured data collecting checklist. Selected mother's cards on registration log book were traced through the hospital's registry book. Structured checklist was prepared in English. The data was extracted by 2 diploma midwives & 2 diploma nurses and two degree Midwives as supervisor. Training was given for reviewers and supervisor before actual data collection.

Data processing and analysis

Collected Data was entered in to Epi Data version 3.1 and exported SPSS-version 20 for analysis.

Bivariate logistic regressions was used to select important

variables candidate for the multiple logistic regression. Independent variables with p value less than 0.2 were selected as a candidate for multiple logistic regression. Finally, multiple logistic regression was used to assess the relative effect of independent variables on dependent variable and to control the possible confounders and finally to select important predictors of adverse pregnancy outcomes included in the model. Odds Ratio (OR) and their 95% Confidence Interval (CI) was used to measure the association. A significance level of 0.05 was used to decide the significance of statistical tests. Finally the results is presented in text, table and graphs. Ethical considerations

Ethical clearance was obtained from Ethical review committee of college of health sciences, Jimma University to conduct the study. Further permission was obtained from Medical Director of Jimma university specialized hospital, department head of the obstetric ward and card room head for the utilization of logbooks and cards. Since the cards include the name of the mothers, confidentiality will be maintained by making the data collectors aware not to record any identification information found on the card.

RESULT AND DISCUSSION

Socio-demographic characteristics of cases and controls
A total of 86 women (cases) and 258 controls were included in the study. The mean age among the cases was 26.01 (+ SD 5.49) years (range 18 to 40), and among the controls 25.34 (+SD 5.00) years (range 16 to 40). Additionally, 214(82.9%) of controls and 69 (80.2 %) of cases are within the age group of 20-34 years. In addition, 134 (51.9 %) of the controls and 32 (37.2 %) of the cases are Gravida one. With regards to the participants residence, majority of cases 58(67.4 %) and only 84 (32.6%) controls are rural in residents.

Past Obstetric and gynecologic characteristics of cases and controls

This study shows that 1(0.4 %) of the controls and 3(3.5 %) of the cases had a recorded complication in their previous pregnancies. Additionally, 15(5.8 %)

controls and 14 (16.3 %) cases had history of abortion while 11(4.3 %) of controls and 12(14.0 %) cases had previous adverse pregnancy outcomes.

The study also indicates that 162(62.8 %) of controls and 51(59.3 %) of the cases ever used modern family planning methods where majority of controls 145(56.2 %) and cases 42(48.9%) used pills & injectable family planning methods.

The study also indicates that, six (2.33 %) of controls had previous history of early neonatal death while five (5.81%) of cases had previous history of stillbirth and low birth weight each.

Previous and current medical characteristics of cases and controls

The result of this study shows that 4(1.6 %) of the controls and 8(9.3 %) of cases had record of pre-existing medical illness where 5(5.81) of cases experience hypertension. Four (1.6 %) of controls and 12(14.0 %) of cases had medical illness during their current pregnancy. Concerning HIV/AIDS, 253(98.1%) of controls and 86 (100%) of cases are tested for HIV/AIDS where 251(99.2%) of controls and 85 (98.8%) of cases are non-reactive and all the reactive mothers among both groups are on anti- retroviral treatment (ART). Additionally, nine (3.5 %) of control and 27 (31.4%) of cases had been diagnosed as having anemia during their current pregnancy.

Current Obstetric characteristics of cases and controls
Majority of the controls, 243(94.2 %) and 75(87.2 %) cases had planned pregnancy. The proportion of women who received at least one ANC service was higher among controls 246(95.3 %) than cases 68 (79.1 %) where 173(67.1 %) and 31 (36.0 %) of controls and cases had ANC visit of four and above respectively.

Having at least one Tetanus toxoid vaccination was slightly lower among cases (50.0 %) compared to (59.7 %) controls that have got tetanus vaccination during current pregnancy. Higher proportions of cases 19(22.1 %) than controls 6 (2.3 %) had at least one obstetric emergency during their current pregnancy.

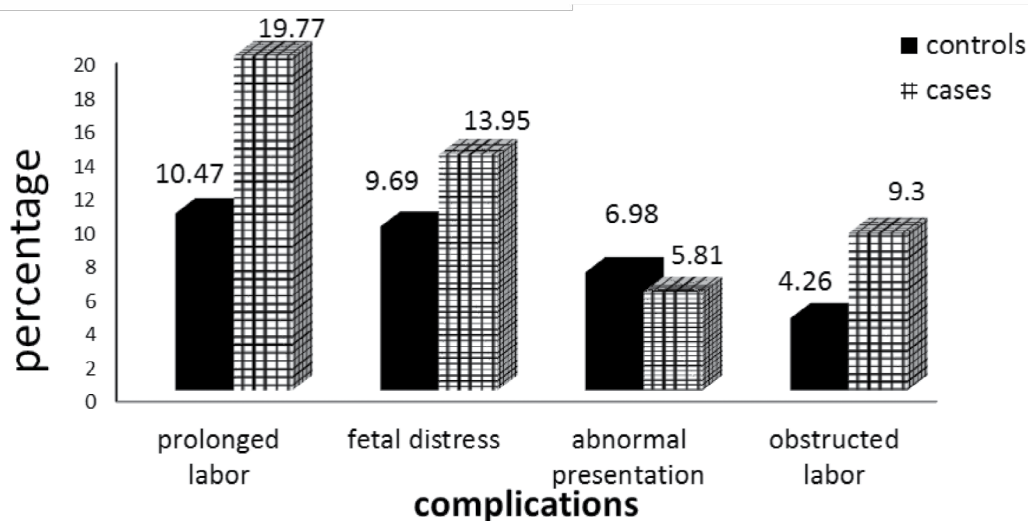


Figure 1: Distributions of current obstetric complication during labor delivery among cases and controls, at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

This study investigated that, Stillbirth comprises majority of adverse birth outcomes contributing 62.7 % of cases while low birth weight and Preterm birth take second and third respectively.

Results from bivariate and multi-variable logistic regression Analysis

Variables considered for multiple logistic regression were those with a p-value <0.2 at bivariate analysis and these included Gravida, residence, referral status, complications during previous pregnancy, abortion history, adverse pregnancy outcomes history, medical complications, illness during current pregnancy, ANC utilization, number of ANC, TT vaccine, medication received, anemia status, delivery mode, delivery complications, partograph used, multiple pregnancy, obstetric emergencies.

Accordingly; mothers who are referred for delivery service from other area are more than five times to have adverse pregnancy outcomes than mothers who are not referred, AOR=5.49 95% CI [2.80-10.76]. Additionally, mothers who had illness during current pregnancy are seven times to be case than controls, AOR=7.22, 95% CI = 1.65-31.58]. Mothers who attend ANC were 83% less

likely to have adverse pregnancy outcome, than mothers who didn't attended ANC follow up, AOR = 0.17 95% CI [0.06-0.49]. Pregnant mothers who are anemic or had hemoglobin level of less than 11 gram/dl are more than seven times to have adverse pregnancy outcomes than non-anemic pregnant mothers, AOR=7.29 95% CI=[2.85-18.67]. Additionally, women who had obstetric emergencies during current pregnancy, complications during current delivery, and multiple pregnancy are more than 18 times AOR =18.40[6.12-55.37], 2 times AOR=2.65[1.38-5.11] and 7 times AOR=7.59[1.49-38.65] to have adverse pregnancy outcomes than their counterparts respectively.

Multiple logistic regression output of this study showed that referral of mother with complication from other facility for delivery service is significantly associated with adverse pregnancy outcomes. According to findings of this study, 96% of urban mothers are not referred while 88% of referred mothers are from rural residence. This is consistent with the study done in Mekele public hospitals which indicates that mothers who lived in urban are 76 % less likely to develop adverse birth outcome as compared to those mothers who lived in rural

area⁴. This might be due to distance naturally prevents mothers from doing so even if they are knowledgeable of the benefits of antenatal care services but deprives them the opportunity for early identification and management of pregnancy related problems and may further influence their choice of place of deliver and also lack some health services on time. Additionally, 35(72.9%) of cases who are referred for delivery had obstetric complications during labor delivery time. so most of the women referred are with complication which may lead to the occurrence of the outcome variable.

Illness during current pregnancy was significantly associated with poor pregnancy outcomes [AOR 7.22 CI (1.65-31.58)]. This finding is consistent with similar study done in Kenya⁵ and this may be medical illness present during pregnancy time affect maternal health as well as fetal growth and development.

Results of this study showed that, mothers who had ANC attendance were 83% less likely to have adverse pregnancy outcome, than mothers who didn't attended ANC follow up, AOR = 0.17 95% CI [0.06-0.49]. During ANC follow up women will have access to information related to nutrition, danger signs of pregnancy, birth preparedness and complication readiness. 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 agreement with study done in Wollo⁶ and Gondar university hospital⁷ where mothers who didn't attend ANC are more than 3 and 9 times at risk to develop adverse pregnancy outcomes respectively.

Anemia is significant predictor of adverse pregnancy outcome in this study where anemic mothers are more than 7 times at high risk to develop than those who are not anemic. This is similar with study done in Tanzania which indicates that low hemoglobin level is associated with the occurrence of low birth weight⁸. This might be low Hb levels during pregnancy leads to intra-uterine oxygen inadequacy and reduced iron stores, causing infantile anemia before the age of six months.

This study shows that those mothers who developed obstetric emergencies during pregnancy are more than 18 times at risk to develop adverse birth outcomes as compared to mothers who don't develop obstetric emergencies during current pregnancy. This finding is in line with the study done in Kenya where mothers who develop obstetric emergencies are about 14 time at high risk of developing poor pregnancy outcomes compared to the controls⁵. This is because, obstetric emergencies like APH, pre-eclampsia/eclampsia, cord prolapse, and fetal distress affect both maternal and fetal conditions and usually leads to occurrence of adverse pregnancy outcomes if they are not addressed timely.

The result also shows that mothers who develop complication during labor & delivery are 2.65 times more likely to develop adverse pregnancy outcome as compared to those mothers who don't develop complication during labor and delivery AOR=2.65 CI (1.38-5.11). According to the cross tabulation result 35(72.9 %) of mothers who develop complication during labor and delivery among cases are referred from other facilities for delivery service. So those mothers who are referred with complications maybe delayed to get the right care on time leading to development of adverse pregnancy outcomes. This finding is consistent with similar study done in Mekele public hospitals which shows that mothers who had complications during pregnancy and labor delivery are 4.85 and 9.94 times more likely to develop adverse birth outcomes than mothers who did not have complications during pregnancy and labor-delivery respectively⁴. This is also similar with study done in Gondar university hospital which showed that Obstetric emergencies such as postpartum hemorrhage (PPH), antepartum hemorrhage, cord prolapse and cord presentation, uterine rupture are significantly associated with poor pregnancy outcomes⁷.

Multiple birth affects the occurrence of adverse pregnancy outcomes by 7.59 folds compared to singleton pregnancies. This finding is supported by study done in Gondar university hospital which showed that, which showed that, mothers with multiple pregnancy are 2.26 times more at risk to give low birth weight baby and

Stillbirth is significantly associated with preterm and low birth weight with AOR= 4.47 CI (1.39–14.32) and AOR = 18.21 CI (6.06 - 55.34) respectively⁷. This might be, multiple fetuses growing in the uterus will share the same supply from the mother and are at risk to be low birth weight. Additionally, multiple pregnancies are usually leading to preterm birth which is also associated with development of stillbirth.

In Contrary to the above birth outcome predictors; gravidity, residence, complication during previous pregnancy, history of abortion, history of adverse pregnancy outcomes, pre-existing medical conditions,

having tetanus injection, medication taken during current pregnancy, modes of delivery and partograph use were significant predictors by the bivariate analysis which are not significant during the multiple logistic regression analysis. This finding is different from findings of studies conducted on adverse pregnancy outcomes in other areas where these independent factors were identified to be predictors of adverse pregnancy outcomes ^{5,7,4,10}. This deviation may be due to differences in study settings which includes, time, place and study design.

Table 1: Multiple logistic regression output for socio demographic factors associated with adverse pregnancy outcomes at Jimma University specialized hospital, Jimma, Ethiopia, 2015

		Controls n=258(%)	Cases n=86(%)	COR 95 %(CI)	AOR 95 %(CI)
Gravidity	One	134(51.9)	32(37.2)	1.0	1.0
	2-4	111(43.0)	43(50.0)	0.28(0.12-0.69)*	0.92(0.255-3.32)
	≥five	13(5.0)	11(12.8)	0.46(0.19-1.1)	0.74(0.21-2.61)
Mothers residence	Urban	174(67.4)	28(32.6)	1.0	1.0
	Rural	84(32.6)	58(67.4)	4.29(2.55-7.22)*	0.48(0.12-1.88)
Medical Illnesses during current pregnancy	No	254(98.4)	74(86.0)	1.0	1.0
	Yes	4(1.6)	12(14.0)	10.29(3.23-32.88)*	7.22(1.65-31.58)**
Medical illness before pregnancy	No	254(98.4)	78(90.7)	1.0	1.0
	Yes	4(1.6)	8(9.3)	6.51(1.91-22.21)*	2.55(0.45-14.36)

Table 2: Multiple logistic regression output for obstetric and gynecologic factors associated with adverse pregnancy outcomes at Jimma University specialized hospital, Jimma, Ethiopia, 2015.

characteristics		Controls n=258(%)	Cases n=86(%)	COR 95 %((CI)	AOR 95 %((CI)
Any history of abortion?	No	243(94.2)	72(83.7)	1.0	1.0
	Yes	15(5.8)	14(16.3)	3.15(1.45-6.83) *	2.18(0.67-7.06)
APOs history	No	247(95.7)	74(86.0)	1.0	1.0
	Yes	11(4.3)	12(14.0)	3.64(1.54-8.59) *	1.85(0.45-7.59)
ANC follow-up	No	11(4.3)	17(19.8)	1.0	1.0
	Yes	246(95.3)	68(79.1)	0.179(0.08-0.40) *	0.17(0.06-0.49) **
Received TT injection?	No	12(4.7)	21(24.4)	1.0	1.0
	Yes	154(59.7)	43(50.0)	0.93(0.87-0.99) *	0.94(0.86-1.02)
Medication taken during this pregnancy(recorded)	No	256(99.2)	83(96.5)	1.0	1.0
	Yes	2(.8)	3(3.5)	4.63(0.76-28.16)	0.45(0.04-5.4)
Anemia status	non-anemic	249(96.5)	59(68.6)	1.0	1.0
	anemic	9(3.5)	27(31.4)	12.66(5.66-28.35) *	7.29(2.85-18.67) **
Obstetric Emergency at current pregnancy	No	252(97.7)	67(77.9)	1.0	1.0
	Yes	6(2.3)	19(22.1)	11.9(4.58-31.0) *	18.40(6.12-55.37) **

Table 3: Multiple logistic regression output for delivery related factors associated with adverse pregnancy outcomes at Jimma University specialized hospital, Jimma, Ethiopia, 2015

characteristics		Controls n=258(%)	Cases n=86(%)	COR(CI)	AOR(CI)	
Referred from other facility for delivery service	No	187(72.5)	24(27.9)	1.0 1.0		
	Yes	71(27.5)	62(72.1)	6.80(3.95-11.73) *	5.49(2.80-10.76) **	
	mode of current delivery	SVD	183(70.9)	49(57.0)	1.0 1.0	
		instrumental	10(3.9)	2(2.3)	0.497(0.30-0.84) *	2.06(0.81-5.23)
	C/S	65(25.2)	35(40.7)	0.37(0.08-1.79)	0.40(0.04-3.60)	
Complications during delivery?	No	177(68.6)	38(44.2)	1.0 1.0		
	Yes	81(31.4)	48(55.8)	2.76(1.67-4.55) *	2.65(1.38-5.11) **	
partograph use	No	244(94.6)	85(98.8)	1.0 1.0		
	Yes	14(5.4)	1(1.2)	0.21(0.03-1.58)	0.15(0.01-1.73)	
multiple birth	No	255(98.8)	81(94.2)	1.0 1.0		
	Yes	3(1.2)	5(5.8)	5.25(1.23-22.44) *	7.59(1.49-38.65) **	
Gender of the new born	female	100(38.8)	42(48.8)	1.0 1.0		
	male	158(61.2)	44(51.2)	0.66(0.41-1.08) *	0.61(0.31-1.20)	

NB: * shows significant in bivariate logistic regression and ** indicates variables found to be predictor of the outcome variable in multiple logistic regression.

Limitation of the study

- Unavailability of some independent variables on records which may have impact on the dependent variable (educational status, occupation, income, religion...).
- Exclusion of participants who do not have complete information could have resulted in selection bias and thus impacted on the results. Selection bias could have affected the accuracy of the data collected as the participants were sampled from hospitals.

CONCLUSION AND RECOMMENDATION

In conclusion, this study indicates that; possibly late referral of mother with complication, illness during current pregnancy, having ANC attendance, anemia during current pregnancy, complication during labor-delivery, multiple pregnancy and having obstetric emergencies were found to be statistically significant and these factors were possible predictors of adverse pregnancy outcomes. Having ANC attendance is determinant factor identified as preventive factor to adverse pregnancy outcomes.

On the other hand; gravidity, residence, complication during previous pregnancy, history of abortion, history of adverse pregnancy outcomes, pre-existing medical illnesses, having tetanus injection, medication taken during current pregnancy, modes of delivery and partograph use were not found to be associated with adverse pregnancy outcomes.

Based on the findings from our study we forward the following recommendations

- To Jimma zone health department; to monitor provision of quality focused ANC within the health facilities found in the zone and Monitor early referral in case of complications.
- For Jimma university specialized hospital; Creating good referral linkage with health facilities within its catchment areas including feedbacks provisions and Providing the most quality service for mothers coming for delivery service to decrease delay
- To researchers; to do similar research using primary data supported with qualitative findings by addressing health facility related factors contributing to adverse pregnancy outcomes.

CORRESPONDING AUTHOR:

Eyosias Yeshialem, MPH
Public Health and Medical Sciences Faculty, Mettu
University, Mettu, Ethiopia
eyosi143@gmail.com

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