

Original Article

# Determinants of Birth Asphyxia among Newborn in a Zonal Hospital

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## ABSTRACT

**Background & Objective:** Birth asphyxia is a leading cause of brain damage. Early identification and managing of its contributing factor would change the burden of birth asphyxia. Therefore, the objective of this study was to identify the determinants of birth asphyxia among newborn in a zonal hospital, Dhanusha, Nepal.

**Material and Methods:** A case control study was carried out among 192 newborns where cases and controls were taken in the ratio of 1:1. Newborns with an APGAR score of less than 7 at 1 min and 5 min were taken as cases, and those with greater or equal to 7 were taken as controls. Case includes all asphyxiated newborns at time of data collection. There were total 96 birth asphyxiated newborn and equal number of non-asphyxiated newborn meeting the inclusion criteria were included as a control group. Data was collected by using structured interview schedule and chart review. The data was entered

into SPSS version 16. The data were analyzed by frequency, percentage, mean, standard deviation, chi-square test and odd ratio. Those variables with a p-value <0.05 were identified as significant determinants of birth asphyxia.

**Results:** Findings revealed that rural residency (79.2%), dalit ethnicity (69.6%) and joint family (92.7%) were socio-demographic determinants of birth asphyxia. Finding also revealed that primiparity (OR:3.2,95%CI:1.7-8.2), problem during pregnancy (OR:3.1,95%CI:1.5-6.6), premature rupture of membrane (OR:23.4, 95%CI: 8.7-62.7), augmentation of labour with oxytocin (OR:12.3, 95%CI:6.1-24.4), sex of newborn (OR:5.0, 95%CI:2.7-9.4), meconium stained amniotic fluid (OR:0.22,95%CI:0.00-0.05), cord round the neck (OR:19.0,95%CI:2.4-24.6) and height of mother (OR:16.2,95% CI:2.0-126.0) were significantly associated with increase odds of birth asphyxia.

**Conclusion:** Most of the identified determinants were common and familiar causes of birth asphyxia. Early detection can prevent and control birth asphyxia. Thus, every pregnant woman need for better maternal care, so creating awareness about determining factors of birth asphyxia to the midwives, careful monitoring of labour, and identifying and taking proper measures that would help in decreasing the occurrence of birth asphyxia.

**Keywords:** Birth Asphyxia, Determinants, Newborn

## INTRODUCTION

Globally, one quarter of all neonatal deaths are caused by birth asphyxia [1]. Birth asphyxia is the failure to initiate breath or breathing poorly, leads to decrease oxygen perfusion to various organs [2,3]. It is one of the leading causes of death in low and middle-income countries and the prominent cause of neonatal morbidity and mortality [4-8]. Birth asphyxia is an oxygen deficit at delivery which leads to severe hypoxicischemic organ damage in newborns. Those who survive asphyxia at birth may have chance to develop neurological complications including epilepsy, cerebral palsy and developmental delay [3,9,10].

Birth asphyxia is diagnosed with components like appearance, pulse, grimace, activity, and respiration (APGAR) score less than 7 at 1min and 5 minute. It is a indicator used to check the condition of the neonate immediately after birth [9,11]. Next way of identifying birth asphyxia is checking the acidity of the blood in the umbilical cord. If it is too acidic, it can be a sign that the baby has had a period of oxygen deprivation [12].

Leading causes of neonatal death are pre-term birth, severe infections, and asphyxia [13]. Along with prematurity and neonatal sepsis which account for 80% of neonatal deaths [7]. Three major causes deaths are serious infection (28%), complication of preterm birth (26%) and birth asphyxia (23%). This estimation implies that birth asphyxia is the cause of around one million neonatal deaths each year [14].

Study on Dhanusha District revealed that the three leading causes of neonatal deaths were birth asphyxia (37%), severe infection (30%) and 15% of prematurity or low birth weight [15]. There are many risk factors of birth asphyxia which include increasing or decreasing maternal age, parity, ANC visit, prolonged rupture of membranes, prolong second stage of labour, meconium stained amniotic fluid, multiple births, cord round the neck, preterm birth, low birth weight infants, mal-presentation, augmentation of labour with oxytocin, ante partum hemorrhage, severe eclampsia and pre-eclampsia, ante partum and intra-partum anemia [3,13-18]. Analyzing all the statistics regarding determinants of birth asphyxia it seems that there is huge gap in geographically, politically, physiologically, socioeconomically. Hence, the aim of the study was to conduct this study to identify the determinants of birth asphyxia among newborn in a zonal hospital, Dhanusha, Nepal.

## MATERIAL AND METHODS

This hospital-based case-control study was conducted among newborns delivered at Janakpur Zonal Hospital, Dhanusha, Madhesh Pradesh, Nepal in 2017 AD. This hospital is 200 bedded where approximately 900-1200 deliveries take place per month. For this study, respondents were categorized into cases and controls. Newborn with APGAR scores of <7 at first and fifth minutes after delivery was defined as having birth asphyxia, while newborns with APGAR scores of  $\geq 7$  at first and fifth minutes were considered as not having birth asphyxia. Newborns with one or multiple congenital malformations incompatible with life such as hydrops, cyanotic congenital heart defects, and anencephaly were excluded from the study. And also, respondents with incomplete

chart and those mothers who have no early ultrasound were excluded from the study. Birth asphyxia was identified using the components of the APGAR score table. The score comprised five components such as appearance (color), heart rate, grimaces (reflexes), activity (muscle tone), and respiration each of which was given a score of 0, 1, or 2. A score of  $\geq 7$  indicated a newborn was not asphyxiated and in a good condition, whereas a low score ( $< 7$ ) indicated a newborn with asphyxia [9].

All asphyxiated newborns were enrolled as cases so at time of data collection there were total 96 birth asphyxiated newborn and equal number of non-asphyxiated newborn meeting the inclusion criteria were included as a case and control group. Total sample size is 192 with 96 cases and 96 controls [19]. Data was collected by using structure interview schedule as well as chat review.

Before beginning of data collection, the ethical clearance was obtained from the National Medical College, Affiliated TU, Intuitional Review Committee, Birgunj (Ref. 185/073/074). After receiving an approval letter from medical superintendent of Janakpur Zonal Hospital, the responsible bodies at Maternity Ward and mothers of newborns were informed about the objective of the study. Written informed consent was obtained from mothers of newborns to confirm willingness. Researcher herself collect the data and were told the mother as they would have the right to participate, refuse and withdraw from the study at any time during the interview, and the failure to participate in the study did not result in a penalty.

The confidentiality of the information was assured and respondents were informed

about the duration of interview. Questionnaire were consisting of two parts i.e questions related to socio-demographic information of mothers and newborn babies and question related to determinants related to birth asphyxia. Confidentiality was maintained by not revealing the identity of respondents to anywhere in the report. After finishing the interview each respondent's queries regarding birth asphyxia and care of newborn were answered and explained.

Collected data was checked for the completeness, accuracy at daily basis at the end of the data collection. Data was edited, coded and entered statistical package for the social sciences (SPSS) 16 version. Descriptive statistics was calculated by frequency, percentage, mean and standard deviation. For the inferential statistics, Chi square test was used to find out the association between dependent and independent variable. Odds ratio was calculated. Those variables with a p-value  $< 0.05$  were identified as significant determinants of birth asphyxia.

## RESULTS

A total of 192 (92 Case and 92 control) respondents were included in the study with a 100% response rate. Table 1 depicts that the mean age of the mothers of case and control were  $23.27 \pm 4.774$  and  $23.93 \pm 4.071$  respectively. In cases, about 77 (80.2%) and in controls, about 80 (83.3%) of mothers gave birth in the same age  $\geq 20$ .

About 54 (56.3%) of the mothers of cases and 67 (69.8%) of mothers of controls had illiterate. Most (84.4%) of the mothers of cases and 86 (89.6%) of the mothers of controls were home maker. Almost three fourth of the case of mother (79.2%) and nearly half of control of mother (44.8%) came from rural areas.

**Table1: Socio-demographic characteristics among mothers' of newborn (n=192)**

Characteristic	Case (n=96)		Control (n=96)	
	Frequency	Percentage	Frequency	Percentage
<b>Age ( Years)</b>				
<20	19	19.8	16	16.7
≥20	77	80.2	80	83.3
<b>Mean age± SD</b>	23.27±4.774		23.93±4.071	
<b>Educational level</b>				
Illiterate	54	56.3	67	69.8
Primary	17	17.7	18	18.8
Secondary	19	19.8	5	5.2
Higher secondary and above	6	6.3	6	6.3
<b>Occupation</b>				
Home maker	81	84.4	86	89.6
Agriculture	15	15.6	3	3.1
Service	0	0.0	7	7.3
<b>Residence</b>				
Urban	20	20.8	53	55.2
Rural	76	79.2	43	44.8
<b>Types of Family</b>				
Nuclear	7	7.3	53	55.2
Joint	58	60.4	23	24.0
Extended	31	32.3	20	20.8
<b>Religion</b>				
Hinduism	81	84.4	84	87.5
Islamic	15	15.6	12	12.5
<b>Ethnicity</b>				
Brahmin/Chhetri	7	7.3	9	9.4
Madhesi	51	53.1	61	63.5
Adibasi/Janajati	8	8.3	7	7.3
Dalit	16	16.7	7	7.3
Muslim	14	14.6	12	12.5

**Table 2: Antenatal Characteristics of mothers of newborn related to birth ssphyxia (n=192)**

Variable	Case (n=96)		Control (n=96)	
	Frequency	Percentage	Frequency	Percentage
<b>Parity</b>				
Primi Gravida	57	59.4	30	31.3
Multi Gravida	39	40.6	66	68.8
<b>Number of ANC Visit</b>				
<4	70	72.9	2	2.1
≥4	26	27.1	94	97.9
<b>Problem during pregnancy</b>				
Yes	30	31.3	12	12.5
No	66	61.8	84	87.5
<b>Types of problem during pregnancy</b>	<b>n=30</b>		<b>n=12</b>	
Antepartum Hemorrhage	7	23.3	6	50.0
Pregnancy induce hypertension	3	10.0	2	16.7
Anemia	20	66.7	4	33.3
<b>Premature Rupture of membrane</b>				
Yes	54	56.3	5	5.2
No	42	43.8	91	94.8
<b>Duration of rupture of membrane</b>				
<24 hour	45	83.3	5	100.0
≥24 hour	9	16.7	0	0.0

**Table 3: Intrapartum characteristics of mothers of newborn associated with birth asphyxia**

Variable	Case (n=96)		Control (n=96)	
	Frequency	Percentage	Frequency	Percentage
<b>Augmentation of labour with oxytocin</b>				
Yes	71	74.0	18	18.8
No	25	26.0	78	81.3
<b>Mode of delivery</b>				
Spontaneous Vaginal Delivery	71	74.0	87	90.6
Instrumental	15	15.6	5	5.2
Cesarean section	10	10.4	4	4.2
<b>Duration of first stage of labour</b>	<b>n=86</b>		<b>n=92</b>	
<12 hours	32	37.2	60	65.2
≥12 hours	54	62.7	32	34.8
<b>Duration of second stage of labour</b>				
<30 min	10	11.6	85	92.4
30-60 min	62	72.1	7	7.6
≥60 min	14	16.3	0	0.00

Table 2 depicts antenatal characteristics of mother of newborn related to birth asphyxia. About 39 (40.6%) of mother in case and 66 (68.8%) of mother in control were multigravida. About three fourth of case of mother (72.9%) and very few 2.1% mothers of control were visited less than 4 antenatal clinic. More than half (56.3%) of mother of case and 5.2% of control have premature rupture of membrane.

Table 3 represents intrapartum characteristics of mothers of newborn associated with birth asphyxia. Majority of case of mother (74.0%) and only (18.8%) of mother of control were augmented with oxytocin drug during first stage of labour. Similarly, 15(15.5%) of case and 5 (5.2) % of control were delivered by assisted instrumental and 10.4% of case and 4.2% of control were delivered by caesarean section. However, more than half (62.7%) of case and

all most one fourth (34.8%) of control had more than 12 hours of labour.

Table 4 shows neonatal characteristics related to birth asphyxia. In terms of sex, almost three-fourth (76.04%) of the case and (38.5%) of the control were male. Almost all of the case (97.9%) was fetal heart sound in range of 100-160 beats per minute just before delivery. Almost three fourth of the case (78.1%) and very few 7.3% of the controls had presence of meconium staining amniotic fluid. The mean gestation week of newborn in case and control were  $39.20 \pm 1.607$  and  $39.00 \pm 1.536$  respectively. Less than one fourth (16.7 %) of the cases and none of the control had cord round the neck. Table 5 represents determinants of birth asphyxia among newborn. There was significant association between residence of mother and birth asphyxia ( $p=0.00$ , OR: 0.214; 95%CI: 0.113-0.403). Likewise, a significant association between ethnicity and birth

**Table 4: Newborn characteristics related to birth asphyxia**

Variables	Case (n=96)		Control (n=96)	
	Frequency	Percentage	Frequency	Percentage
<b>Sex of Newborn</b>				
Male	73	76.04	37	38.5
Female	23	23.95	59	61.5
<b>Gestational weeks</b>				
37-39wks	56	58.3	55	57.3
40-42wks	40	41.7	41	42.7
<b>Mean±SD</b>	<b>39.20±1.607</b>		<b>39.00±1.536</b>	
<b>Fetal heart sound just before delivery</b>				
<100	1	1.0	0	0.0
100-160	94	97.9	96	100
>160	1	1.0	0	0.0
<b>Presentation of fetus</b>				
Cephalic	88	91.7	96	100.0
Breech	8	8.3	0	0.0
<b>Status of amniotic fluid</b>				
Clear	21	21.9	89	92.7
Muconium Stained	75	78.1	7	7.3
<b>Cord round the neck</b>				
Yes	16	16.7	1	1.0
No	80	83.3	95	99.0
<b>Times of cord round</b>	<b>n=16</b>		<b>n=1</b>	
One	6	37.5	1	100.0
Two	10	62.5	0	0.00
<b>Cord Prolapse</b>				
Yes	1	1.0	0	0.00
No	95	99.0	96	100.0

asphyxia (p=0.051; OR: 1.143; 95%CI :0.999-1.306). Newborn belongs to dalit ethnicity were 1.1 times more likely to have birth asphyxia than their counterpart. A significant association was found between type of family and birth asphyxia (p=0.000, OR: 0.320; 95%CI:0.207-0.494).

A significant association was found between parity and birth asphyxia (p=0.000, OR: 3.215; 95%CI: 1.776-5.820). Birth asphyxia was 3.2 times more likely to occur in primigravida in comparison to their counterparts. Additionally, the risk of birth asphyxia was found to be higher in newborns whose mothers had less than four ANC visits

compared to their counterpart (p=0.000, OR:126.54,95%CI:29.062-550.968). Similarly, mother who had problem during pregnancy were 3.1 times more likely to have birth asphyxia (p=0.002, OR:3.182; 95% CI:1.5136.689). Furthermore, mother had premature rupture of membrane were 23.4 times higher to have birth asphyxia (p=0.000, OR:23.40; 95%CI: 8.726-62.752). Likewise, the risk of birth asphyxia was found to be 12.3 times higher in newborn whose mothers labour had augmented with oxytocin drug than not augmentation (p=0.000, OR:12.3;95%CI:6.1-24.4). Additionally, the prolonged first stage was a significant determinants of birth asphyxia (p=0.004, OR:0.316; 95%CI:0.171-0.583).

**Table 5: Determinants of Birth Asphyxia among Newborn (n=192)**

Variables	Category	Case (n=96)	Control (n=96)	OR (CI=95%)	p-value
Age in Years	<20	19 (19.8)	16 (16.7)	1.234(0.592-2.573)	0.575
	≥20	77 (80.2)	80 (83.3)	1	
Education Status	Illiterate	54 (56.3 %)	67 (69.8%)	0.557(0.307-1.008)	0.067
	Literate	42 (43.8%)	29 (30.2%)	1	
Residence	Urban	20 (20.8%)	53 (55.2%)	1	
	Rural	76 (79.2%)	43 (44.85)	0.214(0.113-0.403)	<b>0.000*</b>
Type of Family	Nuclear	7 (7.3%)	53 (55.2%)	0.320(0.207-0.494)	<b>0.000*</b>
	Joint	89 (92.7%)	43 (44.8%)	1	
Ethnicity	Dalit	16 (16.7%)	7 (7.3%)	1.143(0.999-1.306)	<b>0.051*</b>
	Non Dalit	80 (83.3%)	89 (97.7%)	1	
Parity	Prime	57 (59.4%)	30 (31.3%)	3.215(1.776-5.820)	<b>0.000*</b>
	Multi	39 (40.6)	66 (68.8%)	1	
ANC Visit	<4 times	70 (72.9%)	2 (2.1%)	126.54(29.062-550.968)	<b>0.000*</b>
	>4 times	26 (27.1%)	94 (97.9%)	1	
Problem during Pregnancy	Yes	30 (31.3%)	12 (12.5%)	3.182(1.513-6.689)	<b>0.002*</b>
	No	66 (68.8%)	84 (87.5%)	1	
Premature Rupture of Membrane	No	42 (43.8%)	91 (94.8%)	1	
	Yes	54 (56.3%)	5 (5.2%)	23.40(8.726-62.750)	<b>0.000*</b>
Labour Augmented	Yes	71 (74.0%)	18 (18.8%)	12.307(6.198-24.435)	<b>0.000*</b>
	No	25 (26.0%)	78 (81.3%)	1	
Mode of Delivery	SVD	71 (73.5%)	87 (90.6%)	1	
	Caesarean/ Assisted Delivery	25(26.01%)	9 (9.37%)	0.469(0.267-0.827)	<b>0.013*</b>
Duration of First Stage of Labour	<12 hour	32(37.2%)	60 (65.2%)	1	
	≥12 hour	54(62.7%)	32 (34.8%)	0.316(0.171-0.583)	<b>0.004*</b>
Duration of second stage of labour	<60 min	10 (10.5%)	85 (89.5%)	1	
	≥60min	86 (89.58%)	11 (11.4%)	0.316(0.171-0.583)	<b>0.000*</b>
Sex of Newborn	Male	73(76.04%)	37 (38.54%)	5.061(2.713-9.440)	<b>0.000*</b>
	Female	23 (23.95%)	59 (61.45%)	1	
Gestational Age	37-39 weeks	56 (58.3%)	55(57.3%)	1	0.884
	40-42 weeks	40 (41.7%)	41 (42.7%)	1.044(0.589-1.851)	
Amniotic Fluid	Clear	21 (21.87)	89 (92.70%)	1	
	Meconium	75 (78.12%)	7 (7.29%)	0.22(0.009-0.055)	<b>0.000*</b>
Cord around the neck	Yes	16 (16.66%)	1 (2.1%)	19.00(2.465- 246.423)	<b>0.005**</b>
	No	80 (83.33%)	95 (97.9%)	1	
Height of Mother	<150 cm	95 (99.0%)	82 (85.4%)	16.22(2.088-126.011)	<b>0.008**</b>
	≥150 cm	1(1.0%)	14 (14.6%)	1	

\*Significant at the level  $p < 0.05$ , \*\* Fisher Test

Furthermore, Newborn had male sex were 5 times more chance to have birth asphyxia than having female sex (OR: 5.0,95%CI: 2.7-9.4, p=0.000). Moreover, meconium stained amniotic fluid was a significant association between Birth asphyxia (p=0.000; OR: 0.22;95CI: 0.009-0.055)

Furthermore, having cord round the neck was found to be 19 times more likely to develop birth asphyxia respect to their counterpart (p=0.005, OR:19.0; 95%CI: 2.4-246.4). A significant association was found between height of mother and birth asphyxia. Height of mother less than 150 cm were 16.22 times more chance of having birth asphyxia respect of their counterpart (p=0.008, OR:16.22; 95CI: 2.088-126.011).

## DISCUSSION

This study found that mothers aged <20 years have 1.2 times lower risk to experience birth asphyxia. Similar finding was reported from a study conducted in Pakistan revealed that maternal age of 20–25 were at increased risk of birth asphyxia as compare to younger or elderly (<20 or >25) (OR:0.30, 95%CI: 0.07-1.21) [3]. In contrast to this finding, a study conducted in Nepal showed that mothers aged 20-29 years were at lower risk for birth asphyxia [20].This study showed that residence has significantly associated with birth asphyxia (OR:0.214, 95% CI:0.113-0.403,p=0.000). This finding is supported by the finding of the study conducted in Nepal which showed that strong association between rural residency and birth asphyxia [19].

Prime gravida has been found to be a one of the main determinants of developing birth asphyxia and this was consistent with the research conducted in Karachi [3], Dhulikhel Nepal [14] and Nepal [20].Furthermore,

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mothers who had visited ANC <4 times have greater risk of birth asphyxia to her newborn in compare to their counterpart. Finding was in a line with other study revealed that risk of birth asphyxia was 4.2 times greater in newborns whose mothers did not ANC visits at all when compared to those newborns whose mothers had four ANC visits (AOR = 4.26, 95% CI: 1.23,14.7) [21].In fact, asphyxia was higher among new born babies whose mothers did not receive nutritional counseling in pregnancy [22].

Premature rupture of membrane was confirmed as the determinant factor for asphyxia. Premature rupture of membrane has 23.4 times higher odds of having birth asphyxia than rupture of second stage of labour (p=0.000, OR: 23.40; 95%CI: 8.726-62.752). This finding was consistent with those studies conducted at Dhulikhel Hospital, Nepal [14], BenishangulGumuz Region Hospitals, Northwest Ethiopia [21] and University of Gondar referral hospital, Northwest Ethiopia [9].

Newborns delivered from mothers who was augmentation of labour with oxytocin drug had 12 times higher odds of birth asphyxia compare to not augmented labour (OR:12.307,95%CI:6.198-24.435, p=0.000). This Findings was a line with study done in Northwest Ethiopia revealed that newborns born from mothers who had labour augmented were 2.13 fold increased risk of developing birth asphyxia when compared to those born from mothers who did not have augmented [21].

Prolong duration of first stage of labour was a significant contributor of birth asphyxia (OR=0.31695%CI:0.171-0.583, p=0.004). Finding was supported by study conducted in Northwest Ethiopia [9], National Regional

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State Ethiopia [17] and Cameroon [23] revealed that newborns born from mothers with prolonged labor 2 to 4 times likely to have birth asphyxia.

Cesarean section and Assisted birth were confirmed as the determinant factor for asphyxia (OR=0.469,95%CI:0.267-0.827, p=0.013). A similar result was obtained from other different studies revealed that newborns delivered by cesarean section and assisted vaginal birth had 4 to 6-folds higher odds of birth asphyxia compared to those who delivered through spontaneous vaginal delivery [9,17,21,24]. The higher rate of asphyxia among newborns delivered by CS might be due to the fact that the fetus chest might be squeezed when the newborn passes through the birth canal in vaginal delivery which might evacuate secretion. This in turn reduces the chance of developing birth asphyxia, but this physiological advantage is not seen in caesarean delivery [9,21]. And also both vacuum and forceps extraction exert pressure on the newborn's brain result in intracranial hemorrhage which could in turn be in birth asphyxia from the hemorrhagic anemia [25].

This current study sex was strong determinant of birth asphyxia. Mother of male baby were 5 times higher risk of birth asphyxia (OR: 5.06195%CI:2.713-9.440, p=0.000). This finding was in line with study done in Northwest Ethiopia [9] and Dhulikhel Hospital [14].

Newborn born from mothers with history of meconium stained amniotic fluid had 0.22 times more risk for birth asphyxia. This finding was consistent with other studies showed that meconium stained liquor have more chances of getting birth asphyxia [3,9, 21, 26]. The possible reason could be that of

meconium stained amniotic fluid causes mechanical obstruction, pulmonary air leak, induces surfactant inactivation, causes pulmonary inflammation, and induces hypoxia. In healthy, well oxygenated fetuses, this diluted meconium is readily cleared from the lungs by normal physiological mechanism [9,27].

Cord round the neck is also contributing factor of birth asphyxia in this study. Newborn born by cord round the neck has 19 times higher odds of birth asphyxia. This finding was similar to study conducted in Southern Ethiopia which showed that tight nuchal cord were 3 times more likely to develop birth asphyxia respect to their counterpart (AOR=3.1; 95% CI =1.2-9.3) [28].The higher chance of birth asphyxia by newborn have cord round the neck, it might be fact that obstruction of blood flow causing hypovolemia, acidosis, anemia, or oxygen deprivation which seen with birth asphyxia [29].

Height of mother was significantly associated birth asphyxia (OR=16.220,95% CI:2.088-126.011, p=0.008). Height of mother less than 150 cm had 16.2 times risk of birth asphyxia than their counterpart. This finding was in line with study conducted in Nepal revealed that height shorter than 145 cm were 1.5 times more likely to have newborn birth asphyxia compared with mothers 145 cm or taller [30]. This could be explained by the fact that short stature increase caesarean section by means of cephalo-pelvic disproportion (CPD) leading to asphyxia.

Newborn baby had 31-33 cm of head circumference were less likely to develop birth asphyxia in compare to their counterpart (OR=0.03,95%CI:0.010-0.184, p=0.000). This finding is supported by study

done in Sarlahi, Nepal showed that asphyxia was more common among newborns with head circumference greater than 33.5 cm than those with head circumferences 32.6 to 33.5 cm (adjusted RR, 1.6; 95% CI, 1.1-2.2) [30].

In concern of birth weight majority of baby had 2.5-3.5 kg. All most all (96.9%) of asphyxiated babies have birth weight of 2.5-3.5kg. Though there is insignificant association between birth asphyxia and birth weight but relatively low birth weight babies had more prevalence of birth asphyxia.

Birth asphyxia is diagnosed by APGAR score so, it may be probability of misclassification of case and controls between health care providers. The study only calculated chi square and odd ratio but couldn't analyzed multiple logistic regression to identify predictors of birth asphyxia. Therefore, this type of study can be replicate in large scale for identifying fine predictors of birth asphyxia.

## CONCLUSION

The statistically significant predictors of birth asphyxia were identified as rural residence, dalit ethnicity, type of family, primi parity, number of ANC visits, premature rupture of membranes, prolonged first and second stages of labor, augmentation of labor with oxytocin, problem during pregnancy, sex, cord around the neck, meconium stained liquor, and height of mother. However, most of the identified determinants were common and familiar with birth asphyxia. Most of these determinants are preventable and controllable. Thus, efforts should be made to improve the quality of intra-partum care services to prevent prolonged labor, fetal complications and to identify and make a careful monitoring of fetal heart sound on

mothers with meconium stained amniotic fluid.

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*None*

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