

MATERNAL FACTORS AFFECTING THE BIRTH OUTCOME OF NEWBORN AT BPKIHS, DHARAN, NEPAL

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Abstract

Maternal factors are the first determinants of the birth outcome of the newborn, which are closely related to perinatal morbidity and mortality. Newborn's health is related to maternal health. Maternal good health determines the good outcome of newborn. Poor birth outcomes are because of poor maternal health, inadequate care during pregnancy, and inappropriate management of complications during pregnancy and delivery, poor hygiene during delivery and the first critical hours after birth, and lack of newborn care. Hence, the objective of this study was to assess the factors affecting the birth outcome of newborn at BPKIHS.

A descriptive cross sectional study was conducted in the maternity wards of BPKIHS. A total of 200 mothers and their babies were included, who were purposively selected meeting the inclusion criteria. Semi-structured, self-developed Interview schedule was used to collect data. Data was analyzed by using SPSS 20 version. Binary logistic regression analysis was applied to assess association between maternal factors and the birth outcome of new-born at BPKIHS.

The results of the study revealed that majority of the respondents (58.5 %) were in the age group 20-25 years followed by the age group 26-30(27.5%). The birth outcomes were categorized as (low birth weight, preterm birth, low APGAR score, condition of newborn which includes (alive or not alive), need for resuscitation, admission in nursery /NICU). The incidence of low birth weight (<2.5 kg) and preterm birth were found to be 26.0% and 8.5 % respectively. Maternal factors like gestational age at delivery, Pre-pregnancy BMI, occupation, type of family, educational level, place of residence, cooking fuel, availability of separate kitchen, intake of folic acid tablets, problems during pregnancy, mode of delivery, duration of labour, chronic and co-morbid conditions were the factors affecting birth outcomes of newborn.

The study concluded that finally after binary logistic regression pre-pregnancy BMI, gestational age at delivery, occupation, educational status, mode of delivery, duration of labor, intake of folic acids, duration of calcium intake, problems with present pregnancy, chronic and co-morbid conditions were found as the significant predictors affecting birth outcome of newborn.

Keywords: Birth outcome, Maternal factors, Low birth weight, Preterm birth, APGAR score, Resuscitation, condition of newborn, BPKIHS (B.P. Koirala Institute of Health Sciences)

INTRODUCTION

Pregnancy is the time of constant change as the new baby develops in the mother's

womb.(EUFIC, 2016). Maternal factors are the first determinants of the birth outcome of newborn, which are closely related to perinatal morbidity and mortality. Mother and newborn are directly related and inseparable terms. Newborn's health is related to maternal health. Maternal good health determines the good outcome of newborn. Intrauterine growth and development is one of the most vulnerable processes in human lifecycle and its aberrations can result in lasting profound influence in later life. Growth of the fetus is influenced by maternal, environment and genetic factors. Pregnancy and childbirth have a huge impact on the physical, mental, emotional, and socioeconomic health of women and their families. Pregnancy-related health outcomes are influenced by a woman's health and other factors like race, ethnicity, age, and income. (CDC, 2016)

Birth outcome is affected to greater extent by mother's own fetal growth and her diet from pregnancy to birth. Risk factors specific to preterm were maternal age, previous pregnancy loss, and infant's length, while birth interval, maternal weight and BMI during pregnancy, and gestational age were the risk factors unique to low birth weight. ANC visit, infant's gender, APGAR score, and head circumference of infants were the common significant risk factors influencing both low birth weight and preterm.(Islam, 2013)

Poor birth outcomes are because of poor maternal health, inadequate care during pregnancy, inappropriate management of complications during pregnancy and delivery, poor hygiene during delivery and the first critical hours after birth, and lack of newborn care. Several factors such as women's status in society, their nutritional status at the time of conception, early childbearing, too many closely spaced pregnancies and harmful practices, such as smoking, alcohol consumption, unavailability of adequate resources during childbirth etc. can cause poor birth outcomes. (WHO, 2006)

Poor birth outcomes (low birth weight, preterm, IUGR, still birth, congenital defects, neonatal deaths etc.) remains as a significant public health problem more in developing countries than developed countries, and it has emerged as the central focus of infant health policy and as a leading indicator of infant health and wellbeing. (Islam, 2013)

Thus, we can conclude that, ultimately, it's the maternal factors which determine the birth outcomes of newborn. The way she lives influences her baby's health. In order to prevent negative birth outcomes, its main modifiable risk factors need to be understood. Lastly the goal of maternal and child health is to have healthy pregnancy and healthy outcome and free from every complications to mother and baby.

RESEARCH METHODOLOGY

A descriptive cross-sectional research design was selected to find out the maternal factors affecting birth outcome of the newborn at B.P. Koirala Institute of Health Sciences. The study population for the study was postnatal mothers between 20-35 years of age and their single baby at BPKIHS. The non-probability purposive sampling technique was adopted for data collection. The sample size was 200. The research instrument had three sections in which section A included socio-demographic and environmental information, section B and section C included Semi- Structured, self - developed Interview schedule to assess the maternal factors affecting birth outcomes of newborn. The questions were related the different maternal factors which lead to low birth weight, preterm, low APGAR score, resuscitation required or not, condition of newborn, admission in nursery/NICU. Regarding factors, there were total 8 socio-demographic

factors, 4 environmental factors and 22 maternal obstetric factors. The tool was prepared in English language and was translated to Nepali language. Content validity was done by a group of expertise and certain changes were done in the tool. Written permission for data collection was obtained from the Institutional Review Committee of BPKIHS and College of Nursing, BPKIHS. The study participants were explained about the objective of the study and informed written consent was taken from each participant. Descriptive statistics (frequency, percentage, mean, standard deviation) was used to describe the demographic characteristics of the respondents. The bivariate analysis (chi-square) test was used to find out the significant factors at 90% CI then the significant factors were taken into bivariate logistics regression at 95% confidence interval to find out the significant factors affecting the birth outcome of newborn.

RESULTS

Table 1: Socio-demographic variables (n=200)

VARIABLES	FREQUENCY	PERCENTAGE
Age in Years		
20-25	117	58.5
26-30	55	27.5
31-35	28	14.0
Mean age in years \pm SD = 25.52 \pm 4.220		
Religion		
Hindu	177	88.5
Kirat	7	3.5
Boudhist	9	4.5
Christain	3	1.5
Islam	4	2.0
Family Type		
Nuclear	87	43.5
Joint	109	54.5
Extended	4	2.0
Place of Residence		
Rural	103	51.5
Urban	97	48.5
Education		
Illiterate	5	2.5
Basic Education	34	17.0
Higher Secondary	143	71.5
University	18	9.0
Occupation		
Housemaker	173	86.5
Service	17	8.5
Business	5	2.5
Farmer	5	2.5
Economic status		
<15000	19	9.5
15000-25000	123	61.5
>25000	58	29

Table 2: Maternal Factors (Antenatal) affecting Birth outcome of newborn (n=200)

VARIABLES	FREQUENCY	PERCENTAGE
Gravida		
Primigravida	112	56.0
Multigravida	85	42.5
Grand multigravida	3	1.5
Planned pregnancy		
Yes	171	85.5
No	29	14.5
Pre-pregnancy BMI		

<18.5	25	12.5
18.5-24.9	144	72.0
25-29.9	22	11.0
>30	9	4.5
Birth spacing		
< 2 years	147	73.5
>=3 years	53	26.5
Number of ANC visits		
<4	14	7.0
>=4	186	93.0
Intake of folic acid		
Yes	76	38.0
No	124	62.0
Duration of intake		
Iron tablets < 6 months	21	10.5
≥ 6 months	179	89.5
Calcium tablets <6 months	26	13.0
≥ 6 months	174	87.0
Hb level of 3rd trimester		
<11gm/dl	45	22.5
≥ 11 gm/dl	155	77.5
Problems with present pregnancy		
Yes (APH, vomiting, swollen feet, abdominal pain)	52	26.0
No	148	74.0
Chronic and Co-morbid conditions		
Yes (APH,PIH , oligohydraminous , Gestational diabetes)	142	71.0
No	58	29.0
Health pattern affecting life styles		
Yes (Smoking , alcohol consumption)	6	3.0
No	194	97.0

Table 3: Maternal Factors (Intrapartum) affecting the Birth Outcome of Newborn (n=200)

VARIABLES	FREQUENCY	PERCENTAGE
Rupture of membranes		
Before 18 hours	36	18.0
During labour pain	164	82.0
Obstetric Complications during present delivery		
Yes (premature rupture of membranes, non-dilatation of cervix, preterm labour)	133	66.5
No	67	33.5
Mode of delivery		
SVD	107	53.5
Assisted vaginal delivery	7	3.5
Caesarean delivery	86	43.0
Duration of labour		
Less than 12 hours	157	78.5
More than 12 hours	43	21.5
Postpartum haemorrhage		
Yes	14	7.0
No	186	93.0

Table 4: Birth outcome of the newborn (n=200)

VARIABLES	FREQUENCY	PERCENTAGE
Birth weight		
<2.5 kg	52	26.0
>=2.5 kg	148	74.0
Gestational age		
<37 weeks	17	8.5

>=37 weeks	183	91.5
APGAR score (at 5 minute)		
<7	14	7.0
>=7	186	93.0
Condition of the newborn		
Alive	188	94.0
Not alive	12	6.0
Admission in nursery/NICU		
Yes	19	9.5
No	181	90.5
Resuscitation required		
Yes	65	32.5
No	135	67.5

Table 5: Bivariate Logistic Regression Analysis of dependent variables (n=200)

BIRTH OUTCOMES	MATERNAL FACTORS	EXP (B)	95.0% C.I FOR EXP(B)		P-VALUE
			LOWER	UPPER	
Birth weight	Occupation				
	Housewife	1	0.815	28.218	0.053*
	Others (service ,farmer)	4.795			
	Pre-pregnancy BMI				
	<24.9	1	0.420	4.642	0.0586*
	>=24.9	1.396			
Gestational age					
<37 weeks	1	4.677	130.544	<0.001	
>=37 weeks	24.709				
Preterm	Type of family				
	Nuclear	1	1.342	17.334	0.016*
	Joint	4.822			
APGAR Score (at 5 minute)	Education				
	Basic	1	1.502	1918.84	0.029*
	Higher Education	53.690			
	Mode of delivery				
	SVD	81.440	0.814	8148.27	
	Assisted	1			0.061
	CS	56	3.706	84	0.026*
	Duration of labour				
	Less than 12 hours	1			
	More than 12 hours	0.014	0.006	1.173	0.059*
	Gestational age				
<37 weeks	1				
>=37 weeks	59.159	0.990	3535.14	0.051*	
Condition of Newborn	Place of residence				
	Rural	1			
	Urban	3.307	1.353	1.084	0.033*
	Mode of delivery				
	SVD	1			0.041
	Assisted delivery	13.329	1.106	16.57	0.061
	CS	47.233	0.833	26.51	0.88
	Duration of labour				
	Less than 12 hours	1			
More than 12 hours	0.103	0.011	0.959	0.046*	
Resuscitation required	Gestational age				
	<37 weeks	1			
	>=37 weeks	8.859	1.144	68.603	0.037*
Resuscitation required	Type of family				
	Nuclear	1			
	Joint	0.286	0.133	0.615	0.001**
	Intake of folic acid tablets				
Yes	1				

	No	2.060	1.007	4.213	0.048**
	Duration of calcium				
	<6 months	1			
	>=6 months	0.283	0.088	0.912	0.035**
	Gestational age				
	<37 weeks	1			
	>=37 weeks	5.637	1.656	19.190	0.006**
Admission in Nursery/NICU	Problems with present pregnancy				
	Yes	1			
	No	0.205	0.062	0.680	0.010**
	Chronic and co-morbid conditions				
	Yes	1			
	No	0.267	0.085	0.837	0.024**
	Gestational weeks				
	<37 weeks	1			
	>=37 weeks	6.955	1.536	31.480	0.012**

*: significant, **: highly significant

DISCUSSION

The finding of the study reveals that more than half of the respondents (58.5 %) were in the age group 20-25 years followed by the age group 26-30(27.5%). Regarding the ethnicity of respondents, more than one third (42.0%) of the respondents were janjati followed by Brahmin/chhetri(31.5%), Dalit(7.0%) and Muslim (2.0%).Regarding religion ,majority (88.5%) of the respondents were Hindu followed by kirat (7.0%), Buddhist(9.0%),kirat (7.0%) and Islam (2.0 %). Most of the respondents (86.5%) were house maker by occupation followed by service (8.5%), Business and farmer (2.5%).Two -third (61.5%) of the respondents had income Rs.15000- Rs.25000 income per month whereas (29.0 %) of the respondents had income more than Rs25000. More than half (54.5%) of the respondents were from joint family followed by nuclear family(43.5%).Regarding the educational status of respondents, most of the respondents(71.5%) had completed higher secondary education and only 2.5 percent of the respondents were illiterate. Half of the respondents (51.5%) were from rural followed by urban (48.5%) as their place of residence.

Birth outcomes of newborn:

LOW BIRTH WEIGHT

Regarding birth outcome of newborn, majority (26.0%) of the newborn were less than 2.5 kg. This finding is similar to the studies done on low birth weight where the prevalence ranges from 11.9% to 39.6%. (Sharma *et al.*, 2015)

The final logistic regression model showed that, occupation of the respondents was found to be statistically significant ($p < 0.05$) with the birth weight. The respondents who were housewives were 5 times more likely to have low birth weight than those who were in others occupation (service, farmers) (OR=4.795, CI: 0.815-28.218). This is contradictory to the findings documented earlier by Anand and Garg, and Mondal. (Anand *et al.*, 2000)

Pre-pregnancy BMI was statistically significantly associated with birth weight ($P=0.0586$). The findings of the study is similar to the study done by Yucel et al where BMI was statistically significant with birth weight ($p: 0.026$).The respondents whose BMI is < 24.9 are 1.396 times more likely to have low birth weight (OR =1.396, CI; 0.420-4.642)

Weeks of gestation was found to be statistically significant with the birth weight ($p < 0.001$). Babies born before 37 weeks of gestation are 24.709 times more likely to have low birth weight babies than those born after 37 weeks of gestation.(OR=24.709,CI:4.677-130.544) Similar findings have been reported in a study conducted in India where gestational age at delivery were found significant(OR=32.47,CI: 17.06-61.81).(Thomre *et al.*, 2012)

Type of family, educational level, place of residence ,cooking fuel, availability of separate kitchen, intake of folic acid tablets, problems during pregnancy were found not to be significantly associated with the low birth weight.

PRE-TERM BIRTH

Eight percent of the newborn were preterm. This finding is somewhat similar to the study done in Norway and conducted by Jammeh and Sundry. (Jammeh *et al.*, 2011)

The final logistic regression showed that (OR =1.396, CI: 0.420-4.642) Nuclear family had four times more likely of getting preterm birth than joint family. (OR=4.822, CI: 1.342-17.334).

Other variables education, place of residence, cooking fuel, availability of separate kitchen room, intake of folic acid tablets, duration of calcium, hemoglobin level, obstetric complications were not statistically significantly associated with preterm birth($P>0.05$).

LOW APGAR SCORE

Seven percent of the newborn APGAR score was < 7 at 5 minute.32.5% of the newborn required resuscitation during birth.

The final logistic regression model showed that educational status, mode of delivery, duration of labor and gestational age were significantly associated at $p<0.05$ with APGAR score <7 at 5 minutes.

The respondents who had basic level education is 53.690 times more likely to give birth of baby with APGAR score <7 at 5 minutes than higher secondary education (OR=53.690, CI: 1.502-1918.847).The respondents whose babies were delivered via Cesarean section were 56 times more likely to give birth of baby with APGAR score <7 at 5 minutes than those delivered vaginally or assisted vaginal delivery (OR=56056.008, CI: 3.706-8478). Somewhat similar study findings were shown by in a study conducted in Sweden. (Odd *et al.*, 2008)

There was evidence that the risk of a low Apgar score decreased as the mother's level of education increased, if the infant was born by instrumental (OR 0.86 (0.74–0.99)) or caesarean section (OR 0.80 (0.68–0.93)) delivery, but not by unassisted vaginal delivery (OR 1.01 (0.92–1.10)). The respondents who had less than 12 hours of labor duration were slightly i.e. 0.014 times of having baby with APGAR score <7 at 5 minutes than those who had more than 12 hours of duration of labor.(OR=0.014: CI: 0.006-1.173)

The respondents whose weeks of gestation is less than 37 weeks were 59.159 times more likely to give birth of baby with APGAR score < 7 at 5 minutes than those who had more than 37 weeks of gestation.(OR=59.159,CI:0.990-3535.143)

Though other factors place of residence, number of ANC visit, intake of folic acid were found to be significant in bivariate analysis however those were found insignificant in logistic regression. Source of drinking water, gravida, planned pregnancy, birth spacing, rupture of membrane, obstetric complications were found to be insignificant in regression analysis.

CONDITION OF NEWBORN

Six percent of the newborn died after birth. This is similar to the study done by pandey *et al.* where perinatal mortality was 7.7 %.After adjusting for the variables, place of residence, mode of delivery, duration of labor and gestational weeks were found to be significantly associated with the condition of newborn in logistic regression($p<0.05$)

The respondents who were from the rural place were 3 times more likely to have dead baby than those whose resides in urban area.(OR=3.303;CI:1.353-1.084). This is consistent with the findings of Demelashet. (Demelashet *et al.*, 2015)

RESUSCITATION REQUIRED

The final logistic regression, type of family, intake of folic acids, duration of calcium intake, mode of delivery, weeks of gestation were significantly associated with the birth outcome(resuscitation required or not) at $p<0.05$.

The respondents who were from Joint family had 3.496 times more likely to have baby requiring resuscitation than those who had nuclear family.(OR=3.49,CI:0.133-0.615)

Those respondents who did not had folic acid tablets during pregnancy were 2.060 times more likely to have baby requiring resuscitation after birth than those who had folic acids tablets during pregnancy(OR=2.060,CI:1.007-4.213)

Those respondents who had calcium tablets less than 6 months were slightly 0.283 times more likely to have baby requiring resuscitation after birth than those who had calcium for more than 6 months.(OR=0.283,CI:0.088-0.912)

Those respondents whose had less than 37 weeks of gestation were 5.637 times more likely to have baby requiring resuscitation after birth than those more than 37weeks of gestation(OR=5.637,CI:1.656-19.190)

Though mode of delivery was found to be significantly associated in bivariate analysis, it was not found significant in logistic regression.

Other variables like source of drinking water, rupture of membrane were found not to be statistically significant with the resuscitation required or not.

ADMISSION IN NURSERY/NICU

Nine percent of the newborn required admission in nursery/NICU. This is contra indicatory to the findings from the studies done in India. (Pandey *et al.*, 2016)

The final logistic regression showed that problems with present pregnancy, chronic and co-morbid condition and gestational weeks were significantly associated with birth outcome of newborn(admission in nursery/NICU) at p=005.

The respondents who had health problems during pregnancy had 1.47 times more likely to have baby requiring admission in nursery/NICU. (OR=0.205; CI: 0.062-0.680) than those who did not had problems.

The respondents who had chronic and co-morbid conditions had 1.19 times more likely to have baby requiring admission in nursery/NICU than those who did not had chronic and co-morbid conditions(OR=0.267, CI:0.085-0.835)

The respondents who had 37 weeks of gestation had 6.955 times more likely to have baby requiring admission in nursery/NICU than those whose weeks of gestation was more than 37 weeks.(OR=6.955,CI:1.536-31.480)

CONCLUSION

This study provides empirical support for the links that exist between maternal and birth outcomes. The study revealed that education, occupational status, place of residence, type of family, number of ANC visits, pre-pregnancy BMI, intake of folic acids, duration of calcium intake, problems with present pregnancy and chronic and co-morbid conditions and gestational age are the important maternal factors affecting birth outcome. This study shows that bio-demographic and antenatal care, obstetric care has strongest influence in determining the birth outcome of newborn. The birth outcomes were categorized as (low birth weight, preterm birth, low APGAR score, condition of newborn which includes (alive or not alive), need for resuscitation, admission in nursery /NICU). The incidence of low birth weight (<2.5 kg) and preterm birth were found to be 26.0% and 8.5 % respectively. Finally after binary logistic regression pre-pregnancy BMI, gestational age at delivery, occupation, educational status, mode of delivery, duration of labor, intake of folic acids, duration of calcium intake, problems with present pregnancy, chronic and co-morbid conditions were found as the significant predictors affecting birth outcome of newborn.

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