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Risk Factors Associated with Low Birth Weight

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ABSTRACT

Background: Babies with a birth weight of less than 2500 grams, irrespective of the period of their gestation are termed as Low Birth Weight (LBW) babies.1 Despite consistent efforts to improve the quality of maternal and child health, more than twenty million low birth-weight (LBW) babies are born every year throughout the world. Though, the health situation of Nepal has improved substantially over the years, the low birth-weight (LBW) rate still high. The present study was to explore the effects of various maternal risk factors associated with low birth-weight of institutionally delivered newborns.

Methods: A cross sectional hospital based study was conducted in Obstetrics and Gynaecology ward of Janakpur Zonal Hospital, Janakpur, Nepal from December 2009 to January 2010. Altogether 306 respondents were taken and respondents were mothers who have delivered newborns in hospital.

Results: A total of 1426 birth occurred during the study period (December 2009 to January 2010), of which 306 met the study criteria. Among which 66(21.56%) were low birth weight (LBW) and 240 were normal birth weight (NBW). Overall mean birth weight was found to be 2.75 $\pm$ 0.639 kg. Out of total 21.56 % newborns were weighing less than 2.50 kg and mean birth weight was 1.96 $\pm$ 0.409 kg.The study also shows that majority 73 (86%) of the research centers didn't start the research yet.

Conclusions: This study suggests that there are several factors interplaying which lead to LBW babies. Socio-demographic factors (maternal age, educational level and economic status) and antenatal care are more important.

Keywords: antenatal care, low birth weight, maternal and child health services, maternal risk factors, newborn.

INTRODUCTION

Low birth-weight is a weight at birth less than 2,500 grams irrespective of gestational age.[1] More than 20 million infants worldwide, representing 15.5 percent of all births are born with low birth-weight (LBW), 95.6 percent of them in developing countries. Half of all low birth-weight babies are born in South-central Asia, where more than a quarter (27 per cent) of all infants weighs less than 2,500 gram at birth.[2] In Nepal, 21% and 14% of low birth-weight babies was reported in DHS 2001 and 2006 respectively.[3] This is based on epidemiological observations that infants weighing less than 2,500 grams are approximately 20 times more likely to die than heavier (normal babies). A child's birth weight is an important indicator of a child's vulnerability to the risk of childhood illness and the chances of survival.

LBW has been associated with higher probabilities of infection, malnutrition and handicapped conditions during childhood, mental deficiencies and problems related to behavior and learning during childhood.[4,5] Children who survive LBW have a higher incidence of diseases, retardation in cognitive development and undernourishment. There is also evidence that LBW or its determinant factors are associated with a predisposition

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to higher rates of diabetes, cardiac diseases and other future chronic health problems.[6, 7]

The present study was to explore the effects of various maternal risk factors associated with low birth-weight of institutionally delivered newborns.

METHODS

A hospital based cross sectional study was conducted in the Gynaecology and Obstetrics ward in Janakpur Zonal Hospital, Janakpur, Nepal from December 2009 to January 2010. The ethical approval was taken from Pokhara University. Also the approval was taken from Janakpur Zonal Hospital, Janakpur, Nepal to conduct the study. Consent was obtained from participants prior the data collection. Study population was comprised of mothers along with newborns delivered.

By taking confidence interval of 95% and permissible error of 0.05 and "P" as 0.28 the number of sample size was 306.

Mothers along with single live newborn delivered in hospital were included in the study. Mothers who had given multiple births or still birth baby and mother having disease during pregnancy and refusing to give consent were excluded from the study.

A pretested schedule was used to record the information. Record review format was used for reviewing antenatal care cards. A spring type weighing machine scale was used to measure birth weight of the babies. Each questionnaire was completed and birth weight was taken within 24 hrs of birth. Maternal nutritional status was assessed by post partum weight and hemoglobin level recorded before delivery. Information about maternal hemoglobin, gestational age and morbidity during pregnancy and other required data were taken from the medical records.

In this study information was collected regarding medical and non medical maternal risk factors associated with low birth-weight. Quality of data was cross-checked at various stages of study. First questionnaire was completed then thoroughly checked by the research assistant. These questionnaires were brought to Pokhara University for further checking, coding, processing, data entry and analysis. Data was coded, compiled in Statistical Package for Social Sciences (SPSS) software and analyzed. Simple descriptive analysis, chi-square test was used to determine the risk factors. Logistic regression analysis was used to assess relationship between LBW and maternal risk factors. Logistic regression results were reported as odds ratio and 95% confidence interval along with P- value.

RESULTS

A total of 1426 birth occurred during the study period (December 2009 to January 2010), of which 306 met the study criteria. Among which 66 were low birth weight (LBW) and 240 were normal birth weight (NBW). Hence, the prevalence of low birth weight newborns in the present study was found 21.56 %. Overall mean birth weight was found to be 2.75 ± 0.639 kg. Out of total 21.56 % newborns were weighing less than 2.50 kg and mean birth weight was 1.96 ± 0.409 kg (Table 1).

Table 1. Newborns by their birth weight.

Birth Weight (in grams)	No. of Newborns
<1000	0
1000-1499	7(2.3)
1500-2499	59(19.3)
≥ 2500	240(78.4)

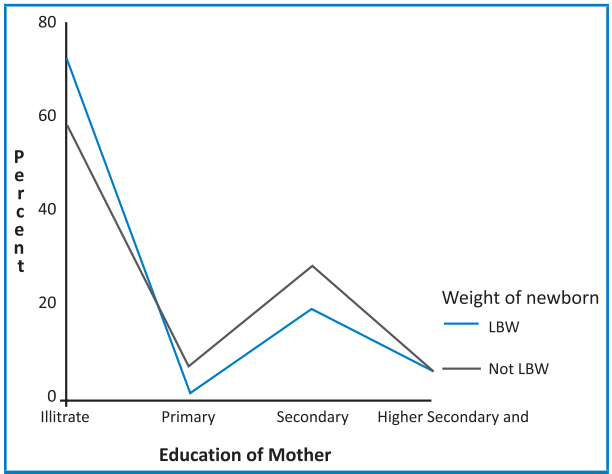

Figure 1. Mother's education Vs LBW.

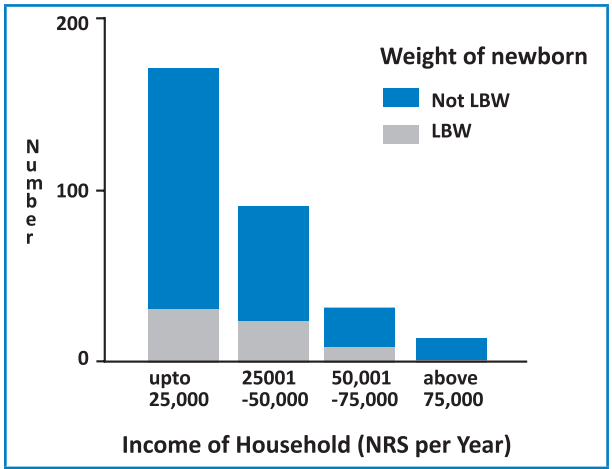

Figure 2. Income Vs LBW.

Table 2. Effects of maternal socio-economic factors on birth weight of newborn.

Variables	LBW babies (n = 66)	NBW babies (n = 240)	Newborn Babies (n= 306)	P value
Age				
20-29 Years	37(17.45)	175(82.55)	212	x2= 6.911
< 19 and ≥ 30	29(30.85)	65(69.15)	94	p=0.009
Religion				
Hindu	62(22.32)	216(77.68)	278	NS
Muslim	4(14.29)	24(85.71)	28	
Residence				
Urban	10(20.83)	38(79.17)	48	NS
Rural	56(21.71)	202(78.29)	258	
Education				
No	48(25.53)	140(74.47)	188	x2= 4.527
Primary, secondary and above	18(15.25)	100(84.75)	118	p=0.033
Occupation				
Housewife	62(21.53)	226(78.47)	288	NS
Working	4(22.22)	14(77.78)	18	
Family Members				
≤ 5	50(19.16)	211(80.84)	261	x2= 6.101
>5	16(35.56)	29(64.44)	45	p= 0.014
Family Type				
Nuclear	22(25.29)	65(74.71)	87	NS
Joint	44(20.09)	175(79.91)	219	
Family Yearly Income				
Up to 25000	32(18.71)	139(81.29)	171	
25001-50000	24(26.67)	66(73.33)	90	
50001-75000	9(28.12)	23(71.88)	32	NS
Above 75000	1(7.70)	12(92.30)	13	

Table 3. Maternal reproductive factors affecting birth weight.

Variables	LBW babies (n = 66)	NBW babies (n = 240)	Newborn Babies(n= 306)	P value
Gravida				
1st and ≥ 4	51(25.76)	147(74.24)	198	x2= 5.189
2 - 3	15(13.89)	93(86.11)	108	p= 0.016
Birth to conception interval				
≥ 24 months	10(17.54)	47(82.46)	57	NS
≤ 23 months	18(17.65)	84(82.35)	102	
Previous Still birth				
No	63(22.67)	215(77.33)	278	NS
Yes	3(10.71)	25(89.29)	28	
Previous Abortion				
No	64(21.92)	228(78.08)	292	NS
Yes	2(14.29)	12(85.71)	14	
Death of previous children				
No	64(22.38)	222(77.62)	286	NS
Yes	2(10)	18(90)	20	
ANC in this pregnancy				
No	14(42.42)	19(57.58)	33	x2= 9.511
Yes	52(19.04)	221(80.96)	273	p= 0.002
Total Antenatal visit				
< 4	27(17.31)	129(82.69)	156	NS
≥ 4	25(21.37)	92(78.63)	117	
Gestational age at 1st ANC visit				
1st trimester	40(18.43)	177(81.57)	217	
2nd trimester	10(24.39)	31(75.61)	41	NS
3rd trimester	2(14.29)	12(85.71)	14	

Table 2 and 3 depicts the results of univariate analysis of maternal factors associated with LBW. The factors associate with LBW included age, education, family members, gravida and antenatal care. The following variables were found insignificant: religion, residence, occupation, family type, birth to conception interval, still birth, abortion, death of previous children, total antenatal visit and gestational age at 1st ANC visit.

Table 4. Multiple logistic regression analysis of maternal factors associated with LBW.

Variables	Odd ratios	95% confidence interval	Regression coefficient
Age of the mothers 0 = 20-29 Years, 1 = < 19 and ≥ 30	0.474	0.270-0.832	1.169
Mother's education 0=Educated, 1 =no education	1.905	1.046-3.469	0.766
Antenatal Care 0 =No, 1 =Yes	0.319	0.15-0.678	1.609

Multivariate analysis (multiple logistic regression) revealed that significant factors were age and education of mother and antenatal care and taking LBW as 0, NBW as 1.

Table 2 and 3 depicts the results LBW babies mostly come from the mother of <19 and ≥ 30 years age group and 31% that age group women delivered low birth weight babies while minimum (17%) LBW babies delivered from mother of 20 – 29 years age group.

26% of babies born to illiterate mothers and 22% of babies born to mothers who were housewife by occupation were of LBW. Proportion of LBW babies was minimum 8% in mothers of high income group (per capita income of family more than NRs. 75000 per year). Association between family members and birth weight was found to be significant.

The utilization of antenatal care was in 89% mothers. Proportion of LBW was maximum 42% in mothers who didn't receive any antenatal care, followed by those who received antenatal care, in whom LBW proportion was 19%. There was significant association between birth weight and utilization of antenatal care by mothers.

Out of 159 births, birth interval in relation to previous birth was found to be ≤23 months in 65% mothers. In these mothers 18% of newborns were LBW and similar findings was found in mothers who had birth interval ≥ 24 months.

Table 5. Ante-partum hemorrhage and birth weight.

Ante-partum hemorrhage	LBW	NLBW	Total	P Value
Yes	7(46.67)	8(53.33)	15	x2= 6.072
No	59(20.27)	232(79.73)	291	p= 0.04
Total	66	240	306	

Table 6. Maternal hemoglobin before delivery and birth weight.

Maternal hemoglobin (g/dl)	LBW	NLBW	Total	P Value
8-9	31(34.44)	59(65.56)	90	
9.5-10.8	23(16.67)	115(83.33)	138	x2= 12.54
11-14	12(15.38)	66(84.62)	78	p= 0.002
Total	66	240	306	

Out of 306, 121(40%) mothers had significant illness during their pregnancy. Of these mothers 53%delivered LBW babies. Out of 54 newborns delivered by anemic mothers and 31% were LBW. There is significant association between anemia and LBW (x2=12.5; df= 2; p=0.002) (Table 7).

Out of total, 69(23%) mothers had some complication during pregnancy and 22(32%) newborns delivered by them were LBW. 47 and 26 % of LBW newborns delivered mothers were suffering from ante-partum hemorrhage and swelling legs or body. The association between ante-partum hemorrhage in present pregnancy and LBW was found to be statistically significant (x2=6.072; df=2; p=0.04) (Table 6).

Out of 306, 51(17%) mothers were not consuming extra meal during pregnancy. Of these mothers 55% delivered LBW babies. There is statistical significant between extra meal taken during pregnancy and LBW (x2= 9.314; df=2; p=0.009).

Out of 306, 16(5%) mothers who had no mid day rest during their pregnancy and 5%, out of them 44% LBW babies were delivered by these mothers. There is statistical significant between mid day rest during pregnancy and LBW (x2= 13.754; df =2; p=0.003).

DISCUSSION

LBW is a public health problem linked to a wide range of possible predictors, sometimes those are difficult to handle. Despite efforts to decrease the proportion of newborns with LBW, success has been quite limited and the problem persists in both developing and developed countries.[23]

There are number of studies around the world done on this subject by using different methodologies. Either they

evaluate the effects of the factors in isolation through cross tabulations or, utilizing statistical techniques to see the individual factors in presence of others. The later is more likely to give a better indication of the contribution to low birth weight of each of the various risk factors. Both ways were followed in this study. Some of the information of this study was collected from the mother by interviewing her and some by reviewing the records. If it was possible to cross check the mother's answer with that of records would have been better. It was one of the other limitations of the study. Moreover, the study was done in an urban hospital and there was in total 258(84%) mothers who come from rural area. So, the studied population represented the rural areas.

Most of the mother of LBW babies in this study belongs to the <19 and ≥30 years whereas, it was 20-29 years for the mother with normal birth weight babies. Thus, the maternal age of 20-29 years was found to be the most suitable age group for giving birth to normal weight babies. The finding of the study agrees with many similar studies in developing countries.[24,25] There was insignificant association between residence and birth weight. Both groups are equally facilitated to enjoy the MCH services.

It was observed that 61% mothers were illiterate and 26% of them delivered LBW babies. The finding is with earlier reports by Kiran A et al [26] and Mavalankar DV et al.[27] This may be explained by increased awareness of educated women regarding health services. While literate mothers delivered LBW babies were few in numbers 15%.

Household head educational status also influences the birth weight of baby. In this study household head education had significant association with birth weight (x2=5.819; df=1; p=0.01). While parental education had insignificant with birth weight.

The present study shows that there was no significant association between birth weight and religion. Similar findings observed by Joshi Hs et al.[18] The proportion of LBW babies decreased with increase in the per capita income of the family. These findings are in accordance with other studies.[27, 28]

Birth to conception interval has insignificant association with birth weight. Similar studies done by Khatun S et al.[22] It may be happen because it is not only the interval, some more, especially nutritional factor responsible for birth weight of baby. If a woman could regain her nutritional status before the conception of baby and could keep it for the period next, it may be possible to get a normal weight baby. The insignificant association between previous pregnancy abortion, stillbirth and neonatal death in present pregnancy and birth weight in the present study might follow the logic of the above.

Primiparous women in this study also had more number 27% of LBW babies as found in other studies done by Kiran A et al [26] and Mavalankar DV et al.[27] An increase in LBW was found after forth parity (50%). Joshi Hs et al [29] documented 51.28% LBW after 4th parity. There is statistical significant between parity of mother and LBW (x2=19.725; df=3; p=.0001).

In the present study 40% mothers had significant illness. Of them, 23% had some complication during their pregnancy. Among all maternal illness proportion of LBW was maximum 53% and also proportion of LBW 23% in mothers with anemia similar study by Idris et al,[28] and Deswel et al.[29]

CONCLUSIONS

This study suggests that there are several factors interplaying which lead to LBW babies. Socio-demographic factors (maternal age, educational level and economic status) and antenatal care are more important.

The present study suggests that improvements in maternal nutrition during pregnancy, avoiding close birth spacing, delayed child bearing in young females (<19 years), universal coverage of adequate antenatal care, early recognition of maternal illness and complications are essential for reducing the LBW in newborns. This can be achieved by to strengthen MCH services, by giving more emphasis on the factors identified in the present study.

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