

# Maternal, Fetal and Newborn Outcome with Respect to Anemic Status of Women Admitted in Maternity Ward of BPKIHS

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## ABSTRACT

**Background:** Anemia is a common problem in pregnancy particularly in developing countries. In Nepal, the prevalence of anemia in pregnancy is 48%. It is defined by WHO as hemoglobin level less than 11gm/dL in pregnancy. It leads to a number of threats to mother, fetus and newborn.

**Objectives:** The objective of the study was to assess the maternal, fetal and newborn outcome with respect to anemic status of women admitted in maternity ward of BPKIHS, Dharan, Nepal.

**Methods:** A descriptive cross-sectional study was conducted among the 20 to 35 years women admitted in maternity ward of BPKIHS. Total 193 respondents were included in the study by purposive sampling technique. Out of 193 respondents, 78 were anemic and 115 were non-anemic. Maternal, fetal and newborn outcome among all the respondents were assessed by interview and review of records. Pearson Chi-square test was used to find the association between two categorical variables.

**Results:** Maternal outcomes such as preterm delivery, mode of delivery and fetal and newborn outcomes such as abnormal fetal heart rate, IUGR, LBW, low APGAR scores at 1 minute and at 5 minutes, need for resuscitation and need for admission in ward/nursery/NICU were significantly associated with anemic status of women at p value <0.05. The prevalence of anemia among the pregnant women was 40.5%.

**Conclusion:** Maternal outcome such as preterm delivery, cesarean section were associated with anemia. Regarding the fetal and newborn outcome; abnormal fetal heart rate, IUGR, low birth weight, APGAR scores below 7, need for resuscitation, need for admission in ward/nursery/NICU were associated with anemia.

## Keywords

*Anemia, Outcome, Pregnancy.*

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## INTRODUCTION

Pregnancy and child birth is a normal physiological process, but it is associated with certain risk to the life of both mother and baby. Anemia is defined by WHO as "hemoglobin level less than 11 gm% in pregnancy. It is divided into three types viz mild degree (9 to 10.9 gm%),

moderate degree (7.0 to 8.9 gm%) and severe degree (less than 7.0 gm%).

According to World Health Organization (2008) globally, anemia affects 1.62 billion people which corresponds to 24.8% of the population. The highest prevalence is in preschool-age children and the lowest prevalence is

in men. However, the population group with the greatest number of individuals affected is pregnant women. Among the pregnant women, 41.8% are anemic while 30.2% non-pregnant women are anemic. At the national level, anemia is considered a severe public health problem when the prevalence is equal to or greater than 40 percent in a vulnerable group.<sup>1</sup>

**Table 1:** Public health significance of anemia

Anemia prevalence	Public health significance
>40%	Severe
20 - 39%	Moderate
5 - 19%	Mild
0 - 4.9%	Normal

Based on these criteria, anemia is a severe public health program in Nepal; being almost a half of the pregnant women (48%) anemic.<sup>2</sup>

Though, there are many studies on anemia in pregnancy in Nepal but relatively few studies have been done in the maternal and fetal outcome. Hence, this research will provide a new platform for the personnel of related field including the policy makers to modify the current plans and policies and develop new action plans in this field. Keeping all this in view, this study was conducted to identify maternal, fetal and newborn outcome due to anemia in pregnancy.

### Statement of the problem

A study to assess the maternal, fetal and newborn outcome with respect to anemic status of women admitted in maternity ward of BPKIHS, Dharan, Nepal.

### Objectives

- To assess the maternal, fetal and newborn outcome with respect to anemic status of women admitted in maternity ward of BPKIHS.
- To find the association between maternal, fetal and newborn outcome with selected variables.

## METHODS

### Study Design

Descriptive cross-sectional study design was adopted in order to assess the maternal, fetal and newborn outcome with respect to anemic status of women admitted in maternity ward of BPKIHS, Dharan, Nepal.

### Study Setting

Study was conducted at maternity wards of BPKIHS, Dharan, Nepal. BPKIHS is a 700 bedded tertiary level hospital. Among many facilities available at BPKIHS; Gynecology and Obstetric facility remains one of the significant facilities. In an average about 1000 to 1500 deliveries take place monthly. Postnatal mothers are shifted to different wards such as postnatal ward, MCH I, MCH II and Gynec Ward. Approximately 60 beds are allocated for postnatal mothers. Data were collected in those wards of BPKIHS where postnatal mothers were admitted.

### Study Population

All postnatal women admitted in maternity wards of BPKIHS were the population of this study.

### Sample

All postnatal women who met the eligibility criteria were the sample of this study.

### Sample Size

Total of 193 samples were taken. Among them 78 were anemic and 115 were non-anemic.

### Sampling Technique

Purposive sampling technique was adopted.

#### Eligibility criteria

#### Inclusion criteria

All postnatal women within the age group 20 to 35 years admitted in maternity wards of BPKIHS during the study period were included in the study.

#### Exclusion criteria

1. Those women who were not willing to participate in the study.

2. Those postnatal women who didn't have laboratory reports of hemoglobin test done during first trimester and third trimester of pregnancy.

3. Women who had multiple pregnancy, oligohydraminous/polyhydraminous, gestational diabetes mellitus, and antepartum hemorrhage in the present pregnancy.

4. Women who had past history of preterm delivery and pregnancy induced hypertension.

### Research Instrument

Self-developed, semi-structured and pre-tested questionnaire were used.

### Validity of the tool

A comprehensive literature search and review was done extensively to construct the tool. Validity of the tool was ascertained by consultation with guide, co-guides and other experts from Department of Maternal Health Nursing, Child Health Nursing, Medical Surgical Nursing, Mental Health Nursing, Community Health Nursing and Department of Gynecology and Obstetrics. Research tool was then translated into Nepali and checked by the subject expert.

### Pretesting of the research tool

Pretesting was done on 10% (20) participants who were admitted in maternity ward of BPKIHS, Dharan, Nepal. Few modifications were done in the research tool before data collection. Those participants who were included in the pretesting were excluded from the research study.

### Data Collection Procedure

Before data collection, permission was obtained from the concerned authority. The study participants were explained about the objectives of the study. Written informed consent was taken from the literate participants and for illiterate participants thumb print was obtained in front of their nearest literate person. Data was collected by using interview technique as well as review of records. Period of data collection was four weeks.

### Data Analysis Procedure

Data entered in Microsoft Excel 2010 sheet was analyzed using Statistical Package for Social Sciences (SPSS) version 16. Descriptive statistics like frequency, percentage, mean and standard deviation were used to describe the

characteristics of collected data. Pearson Chi-square test and Fisher's exact test was used to find out the association between two categorical variables. The confidence interval was taken as 95% P-value.

### Ethical Considerations

Ethical clearance was obtained from Institutional Review Committee (IRC), B.P. Koirala Institute of Health Sciences. Informed written consent was taken from each participant before data collection (IRC Code number: IRC/673/015). Ethical principles were considered and followed throughout the study. Every precaution was taken to protect the rights of the subjects. Respondents participated in the research voluntarily.

## RESULTS

Inferential statistics (Pearson Chi-square test and Fisher's exact test) was used to show the association between two categorical variables. P value <0.05 was considered as statistically significant.

**Table 2:** Socio-demographic characteristics of respondents (n=193)

Char-acter-istics	Category Frequency	Anemic women (n=78)		Non-anemic women (n=115)	
		Per-centage	Fre-quency	Per-centage	
Age (in years)	20 - 25	34	43.6%	30	26.1%
	25 - 30	26	33.1%	57	49.6%
	30 - 35	18	23.1%	28	24.3%
		Mean age $\pm$ SD 26.11 $\pm$ 4.07		Mean age $\pm$ SD 26.42 $\pm$ 4.05	
Ethnicity	Dalit	8	10.3%	1	0.9%
	Janajati	30	38.5%	65	56.5%
	Terai	19	24.4%	20	17.4%
	Muslim	2	2.6%	2	1.7%
	Brahmin and Chhetri	19	24.4%	27	23.5%
	Hindu	68	87.2%	102	88.7%
	Buddhist	5	6.4%	5	4.3%
Religion	Muslim	2	2.6%	1	0.9%
	Christian	1	1.3%	1	0.9%
	Kirat	2	2.6%	6	5.2%

Education	Primary Level	14	18%	32	27.9%
	Lower Secondary Level	31	39.7%	31	27%
	Higher Secondary Level and above	33	42.3%	52	45.2%
Occupation	Housewife	75	96.2%	104	90.4%
	Business	1	1.3%	5	4.3%
	Service	2	2.6%	6	5.2%
Type of family	Nuclear	41	52.6%	76	66.1%
	Joint	37	47.4%	39	33.9%
Family income (Nepali Rupees)		4	5.1%	7	6.1%
	Less than 10,000	47	60.3%	56	48.7%
	10,000 - 20,000	25	32.1%	42	36.5%
	20,000 - 30,000	1	1.3%	7	6.1%
	30,000 - 40,000	1	1.3%	3	2.6%
	More than 40,000				

Table 2 depicts that 43.6 % of the anemic women were in the age group 20 to 25 years whereas nearly a half of the non-anemic women (49.6%) were in the age group 25 to 30 years. In the anemic group, more than one third (38.5%) of the respondents were Janajatis whereas in the non-anemic group more than a half (56.5%) of the respondents were Janajatis. Majority of both anemic (87.2%) and non-anemic women (88.7%) were Hindus. Most of the both anemic (42.3%) and non-anemic women (45.2%) have studied up to higher secondary and above. Majority of both anemic (96.2%) and non-anemic women (90.4%) were housewife. More than a half (52.6%) of anemic women and 66.1% of non-anemic women lived in a nuclear family. The 60.3% of anemic women had family income between 10000 and 20000 Nepali Rupees, whereas less than a half (48.7%) of the non-anemic women had family income within 10000 and 20000 Nepali Rupees.

**Table 3:** Hemoglobin level of respondents (n=193)

Hemoglobin level	Category	Anemic women (n=78)		Non-anemic women (n=115)	
		Frequency	Percent	Frequency	Percent
Hemoglobin (first trimester)	Mild anemia	47	60.25%	0	0%
	Moderate Anemia	25	32.05%		
	Severe	6	7.6%		
Mean hemoglobin ±SD		9.3 ±1.24		12.77 ±1.29	
Hemoglobin (third trimester)	Mild anemia	39	50%	0	0%
	Moderate Anemia	31	39.74%		
	Severe	8	10.25%		
Mean hemoglobin ±SD		9.00±1.21		12.87±1.02	

Table 3 states that according to the first trimester record of hemoglobin; most (60.25%) of the anemic women had mild anemia and six percent had severe anemia. Similarly, according to the third trimester record of hemoglobin; exactly a half (50%) had mild anemia and only 10.25% had severe anemia. According to the first trimester record of hemoglobin; the mean hemoglobin level among anemic women was 9.3±1.24 whereas the mean hemoglobin level among non-anemic women was 12.77 ±1.29. Likewise, according to the third trimester record of hemoglobin; 9.00 ±1.21 was the mean hemoglobin among anemic women and 12.87 ±1.02 among non-anemic women.

**Table 4:** Maternal outcome of respondents (n=193)

Maternal Outcome	Category	Anemic women (n=78)		Non-anemic women (n=115)	
		Frequency	Percentage	Frequency	Percentage
Mode of delivery	Cesarean-Section	44	56.4%	48	41.7%
	Normal Delivery	34	43.6%	67	58.3%
Preterm delivery	Yes	20	25.6%	15	13%
	No	58	74.4%	100	87%
Pregnancy induced hypertension	Yes	4	5.1%	4	3.5%
	No	74	94.9%	111	96.5%
Post-Partum hemorrhage	Yes	3	3.8%	0	0%
	No	75	96.2%	115	100%

Table 4 shows that more than a half (56.4%) of the anemic women whereas only 41.7% of non-anemic women had cesarean section for delivery. Preterm

delivery occurred in nearly a quarter (25.6%) of anemic women and only 13% of non-anemic women. The 5.1% of anemic women had pregnancy induced hypertension on the other hand, pregnancy induced hypertension occurred in only 3.5% of non-anemic women. The 3.8% of anemic women had post-partum hemorrhage whereas none of the non-anemic women had post-partum hemorrhage.

**Table 5:** Fetal and newborn outcome of respondents (n=193)

Fetal Outcome	Category	Anemic women (n=78)		Non-anemic women (n=115)	
		Frequency	Percentage	Frequency	Percentage
Fetal heart rate	Normal Range (120-160)	69	88.5%	113	98.3%
	Abnormal range (<120 and >160 beats/min)	6	7.7%	1	0.9%
	Absent	3	3.8%	1	0.9%
Intra-uterine growth retardation	Yes	6	7.7%	1	0.9%
	No	72	92.3%	114	99.1%
Intra-uterine death	Yes	3	3.8%	1	0.9%
	No	75	96.2%	114	99.1%
Low birth weight	Yes	26	33.3%	14	12.2%
	No	52	66.7%	101	87.8%
APGAR scores <7 at 1 minute	Yes	10	12.8%	5	4.3%
	No	68	87.2%	110	95.7%
APGAR scores <7 at 5 minutes	Yes	8	10.3%	3	2.6%
	No	70	89.7%	112	97.4%
Need for resuscitation	Yes	9	11.5%	4	3.5%
	No	66	84.6%	110	95.7%
Need for admission in ward/nursery/NICU	Yes	11	14.1%	4	3.5%
	No	64	82.1%	110	95.7%

Table 5 shows that 7.7 % of anemic women’s baby had abnormal fetal heart rate whereas only 0.9% of non-anemic women’s baby had abnormal heart rate. With regard to IUGR, 7.7% of anemic women’s baby and only 0.9% of non-anemic women’s baby had intra-uterine growth retardation. Intra-uterine death occurred among 3.8% of anemic women and only 0.9% of non-anemic women.

One third (33.3%) of the anemic women’s baby had low

birth weight whereas only 12.2% of non-anemic women had low birth weight. APGAR scores <7 at 1 minute was present in 12.8% of anemic women’s babies and only 4.3% of non-anemic women’s babies. 10.3% of anemic women’s babies had APGAR scores <7 at 5 minutes whereas, only 2.6% of non-anemic women’s babies had APGAR scores <7 at 5 minutes. 11.5% of anemic and 3.5% of non-anemic women’s baby required resuscitation. Similarly, 14.1% of anemic women’s babies and 3.5% of non-anemic women’s baby required admission in ward, nursery/NICU.

**Table 6:** Association of anemic status of women with maternal, fetal and newborn outcomes (n=193)

Characteristics	Category	Anemic women (n=78)	Non anemic women (n=115)	Odds ratio	95 % CI	P value
Pregnancy induced hypertension	Yes	4	4	1.5	0.36 - 6.18	#0.57
	No	74	111			
Preterm delivery	Yes	20	15	2.2	1.093 - 4.83	*0.026
	No	58	100			
Mode of delivery	C/S	44	48	0.554	0.310 - 0.990	*0.04
	ND	34	67			
Postpartum hemorrhage	Yes	3	0	-	-	NA
	No	75	115			
	Normal range (120-160)	69	113			
Fetal Heart Rate	Abnormal range (<120 and >160)	6	1	-	-	*0.015
	Absent	3	1			
IUGR	Yes	6	1	0.10	0.012 - 0.892	#0.013
	No	72	114			
IUD	Yes	3	1	4.56	0.46 - 44.66	#0.15
	No	75	114			
Low birth weight	Yes	26	14	3.60	1.73 - 7.49	*0.000
	No	52	101			
Preterm birth	Yes	20	15	2.2	1.093 - 4.835	*0.026
	No	58	100			
APGAR scores <7 at 1 Minute	Yes	10	5	3.23	1.06 - 9.86	*0.031
	No	68	110			
APGAR scores <7 at 5 Minutes	Yes	8	3	4.26	1.095	#0.025
	No	70	112			



Need for Resuscitation	Yes	9	4	3.75	1.11-12.66	#0.024
	No	66	110			
Need for admission in ward/nursery/NICU	Yes	11	110	0.21	0.06 - 0.69	#0.005
	No	64	4			

\* Pearson chisquare test

# Fisher's exact test

Table 6 shows that there is no statistically significant association of anemic status of women with pregnancy induced hypertension and intrauterine death. The anemic status of women is significantly associated with preterm delivery ( $p=0.02$ ), mode of delivery (0.04), fetal heart rate ( $p=0.01$ ) IUGR (0.01), low birth weight ( $p<0.001$ ), premature birth (0.02), APGAR scores  $<7$  at 1 minute (0.03), APGAR scores  $<7$  at 5 minutes (0.02) need for resuscitation ( $p=0.02$ ) and need for admission in ward/nursery/NICU ( $p=0.005$ ).

## DISCUSSION

Anemia is one of the most common health problems among pregnant women. In this study, 22.25% of pregnant women had mild anemia, 14.47% had moderate anemia and 3.77% women were severely anemic. A study done in Eastern Ethiopia found that among 56.8% anemic women, 28.9% were mildly anemic, 26.7% were moderately anemic and 1.2% was severely anemic.<sup>3</sup>

Another study done in Eastern Sudan showed among 62.6% anemic women, 52.4% had mild anemia, 8.1% had moderate anemia and 2.2% had severe anemia.<sup>4</sup> In this study, the mean hemoglobin level among anemic and non-anemic group was  $9.15 \pm 1.22$  and  $12.82 \pm 1.15$  respectively. The finding of this study among anemic women is greater than the study done by Marahatta<sup>5</sup> with mean hemoglobin level 8.75 gm/dl, but lesser than the study done in Eastern Ethiopia where the mean hemoglobin level was 10.79 ( $\pm 1.47$ ) g/dl.<sup>3</sup>

With regard to socio-demographic variables, the current study showed that majority of the respondents in anemic and non-anemic group were between 20 to 25 years and 25 to 30 years respectively. The mean age among anemic women was  $26.11 \pm 4.07$  and that of non-anemic women was  $26.42 \pm 4.05$ . These findings were similar with the study done in Pakistan where the mean age of anemic women and non-anemic women was 26.85 years and

27.08 years respectively.<sup>6</sup> In a study done in Bangalore, India among the severe anemic women showed that the mean age among anemic women was  $22.81 \pm 2.79$  and non-anemic women  $23.49 \pm 2.58$ .<sup>7</sup>

In the current study, with regard to occupational status, majority of the women in both anemic and non-anemic group were housewife; this finding was similar to the study conducted in a tertiary care hospital in Pakistan.<sup>6</sup>

With regard to maternal outcome of anemia in pregnant women our study shows that the prevalence of preterm delivery among anemic women was 25.6% which is remarkably higher than the study done in Nepal Medical College Teaching Hospital, Kathmandu, Nepal.<sup>5</sup>

In the current study, pregnancy induced hypertension and post-partum hemorrhage were very minimal i.e. 5.1% among anemic and 3.5% among non-anemic women. And only 3.8% anemic and none of the non-anemic women had postpartum hemorrhage. In a study done in Nobel Medical College Teaching Hospital, Biratnagar, Nepal showed that the occurrence of pregnancy induced hypertension among severely anemic women was 36% in anemic, 10% in non-anemic and the postpartum hemorrhage was 14% in anemic and 5% in non-anemic respectively. Our study showed that the operative intervention for delivery occurred among 56.4% of anemic women and 41.7% of non-anemic women which is greater than findings of the study conducted in Biratnagar, Nepal where cesarean section occurred among 22% severely anemic and 5% non-anemic women.<sup>8</sup>

Regarding the IUGR; the current study showed that 7.7% of babies among the anemic women had IUGR and only 0.9% of babies among the non-anemic women had IUGR which is lesser than the study conducted in NMTCH, Kathmandu, Nepal where 16.6% babies had IUGR.<sup>8</sup> In our study, low birth weight occurred among 33.3% of anemic and 12.2% of non-anemic women respectively which is higher than the study done in NMTCH, Biratnagar, Nepal.

With regard to APGAR score at 1 minute and APGAR score at 5 minutes; in the current study low APGAR score at 1min occurred among 12.8% of anemic and 4.3 % of non-anemic women. And the APGAR score at 5 minutes was 10.3% among anemic and 2.6% among non-anemic women. This finding is lesser than the study conducted in NMTCH, Biratnagar, Nepal where the APGAR score at 5 minutes is 18% among severely anemic women and 5% among non-anemic women. In this study, there was no

significant difference in occurrence of IUD among anemic and non-anemic women. This finding is consistent with the study conducted in Pakistan.<sup>6</sup>

## CONCLUSION

The study concludes that anemic status of women is associated with maternal outcomes (preterm delivery, and mode of delivery), fetal and newborn outcomes (abnormal fetal heart rate, IUGR, low birth weight, preterm birth, APGAR scores below 7, need for resuscitation and need for admission in ward/nursery/NICU). The prevalence of anemia in pregnancy is more than one-third of the respondents. Anemic status of women is also associated with the socio-demographic variables like ethnicity, family income, intake of non-vegetarian diet per week, number of pregnancies, intake of iron tablets, continuity of iron tablets during pregnancy.

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