Prevalence of Anemia among Working Pregnant Women and Their Pregnancy Outcome

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ARTICLE INFO	ABSTRACT
Published Online: 02 February 2023	The main focus of this study was to discover prevalence of anemia among working pregnant women and their pregnancy outcome in Bangladesh. A cross-sectional observational study methodology and a multi-stage random sampling technique were chosen to select the study place. Estimated sample size was 410. A prepared and pre-tested questionnaire was used for data collection. Data was analyzed by Statistical Package for Social Sciences (SPSS) version 20. Both analytical and descriptive components were used for analysis. Chi-square test was used to find the association. The results were presented with some tabular form as well as in a descriptive manner. About three-fourth of the pregnancies resulted in normal pregnancy outcome, while 23.6% of the surveyed pregnant women experienced abnormal pregnancy outcomes i.e., preterm delivery (0.5%), low-birth weight baby (22.9%) and stillbirth (0.2%). Prevalence of anemia was 65.9%, with 45.4%, 19.8% and 0.5% of the women being mildly, moderately and severely anemic. Analysis reveals that abnormal pregnancy (i.e. Low birth weight, preterm delivery and still birth) outcomes were relatively higher among older mothers and women having lower level of educational qualifications. Severity of anemia during pregnancy had a statistically significant association with abnormal pregnancy outcomes (p=.000). Positive correlation was also found between monthly family income and weight of the baby which was statistically significant (p=0.011).
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I. INTRODUCTION:

Pregnancy is a biological phenomenon of a women's life. Nutrition is an important factor for proper growth of the fetus of a pregnant woman. Insufficient and imbalanced nutrition during pregnancy causes serious conditions that affect both fetus and mother. Nutrition influences a women's predetermination nutritional status which consequently influence the pregnancy outcome as well as health of the fetus. Proper nutritional status of a pregnant mother is the indicating factor for successful pregnancy outcome of equally mother and also offspring. Nutrition of the mother from the instant period of conception is an essential factor for development of the neonatal metabolic pathway and future wellbeing. It is estimated that about 24% of new born babies have low birth weight as a consequence of improper maternal nutrition [1].

Nutrition is essential for proper maintenance of maternal health and for the growing fetus. Nutrition also requires for the strength and vitality of a woman during labour and successful lactation. That's why the diet should be adequate during pregnancy period. Women need to gain weight throughout pregnancy period. Pre-pregnancy weight influences weight gain during pregnancy of a woman. A proper weight gain occurs is in between 11-15 kg for most of the pregnant women. During different trimester, a pregnant woman has different nutritional requirement to meet extra demand and to meet also an extra caloric requirement.

A normal weighted woman needs around 2000-2500 kcal energy per day. But during pregnancy she needs extra 300 kcal per day. During 2nd and 3rd trimester of pregnancy energy requirement is more for maximum growth of the fetus. During pregnancy all essential nutrients are required to a greater extent for personal requirement of the mother as well as well-being of the fetus and successful lactation [2].

A pregnant woman needs vitamins and minerals during pregnancy. During pregnancy a woman can get vitamins and minerals from consuming fruits and vegetables. Vitamin C and folic acid is important for pregnancy period. Daily at least 70 mg of vitamin C needed for pregnant women. Vitamin C and folic acid and also other vitamins come from different fruits like oranges, guavas, lemon, etc. and vegetables like

broccoli, tomatoes, potatoes, peppers, etc. Calcium is also important during pregnancy. At least 1000mg/day calcium is needed to carry a pregnancy. Calcium is necessary for building strong teeth and bones, prevention of pre-eclampsia and eclampsia, normal blood clotting, normal muscle and nerve functions. A significant amount of calcium is necessary for developing a baby. Dairy products such as milk, cheese, yogurt, cream soups, and puddings are the good sources of calcium.

The double burden of nutrition is also a problem for the pregnant mother as well as the fetus. Nutritional status is the result of complex interaction of food intake and care practices. In Bangladesh 19 percent ever married women is undernourished (BDHS, 2014). Malnourished children have lower resistance to infection and they are more likely to die from common childhood diseases, such as diarrheal diseases, respiratory tract infections, measles, malaria etc.

Anemia is a worldwide public health crisis especially for women at all stages of their life cycle. But during pregnancy the burden of anemia is higher. Globally, 20% maternal deaths occur due to anemia. Anemia may also be responsible for premature births, fetal mutilation, low birth weight, and infant deaths [3]. During pregnancy due to hyper dynamic circulation there is an elevation in both plasma volume and red blood cell mass to accommodate the requirements of growing uterus and fetus. As a result, the total number of red cells increases and also the blood viscosity decreases due to drop in hemoglobin concentration. Enhancement of the placental perfusion provides a better maternal-fetal gas and nutrient exchange [1]. Globally, iron deficiency is the most common cause of anemia during pregnancy. The common dietary causes of anemia include iron deficiency, folate deficiency, and vitamin B12 deficiency. The other causes of anemia are bone marrow suppression, hemolytic diseases, malaria, chronic blood loss, and underlying malignancies.

Anemia is also one of the principal causes of maternal morbidity and mortality. Anemia is also responsible for poor birth outcomes. The cause of anemia during pregnancy is multifactorial and it includes micronutrient deficiencies i.e. iron, folic acid and vitamin B12deficiencies; parasitic infestations like malaria and hookworm and also infectious diseases i.e. STDs [4].

Maternal anemia is major concern for miscarriages, premature births and low birth weights. Because anemia is directly associated with different consequences such as increased risk of miscarriages, stillbirths, premature births and also low birth weight of the infant as well as neonatal and maternal mortality [5]. Globally, greater than 40% of pregnant women are anemic. On the other hand, in Bangladesh prevalence of anemia among pregnant women is 46 % [6].

In pregnancy, anemia can be prevented by taking iron folic acid (IFA) supplementations, increased dietary diversity, sleeping under bed net, taking intermittent preventive treatment for malaria, hand washing and also taking deworming tablets.

II. METHODS

2.1 Study design: This study was cross sectional one. Data was collected by a structured questionnaire. Female interviewers were collected data by face to face interview. Mobile telephone number of every respondent was recorded for any query and blood hemoglobin status was collected from their blood report. Pregnancy outcomes were confirmed through delivery modalities. Data was collected after getting proper approval of the authority or respondent herself.

2.2 Study areas: Selected garments industries, private and public facilities, selected govt. and private hospitals of urban and sub-urban areas of Bangladesh.

2.3 Study period: December 2021 to August 2022.

2.4 Study population: Married women aged between18-35 years that are currently pregnant and also working in either in public or in private sectors. Working pregnant women who were working in the study area and attending antenatal care in the government and/or private health facilities were the participants of the study.

2.5 Sampling:
   i) **Inclusion criteria:**
   - Pregnant working women aged between18-35 years

2.6   Sample size:
Purposive sampling technique was used. Sample size of the study was 410 & it was calculated by using the following Cochran formula. n=(z2pq)/d2, Where n is the desired sample size, Z is the standard normal deviate usually set at 1.96, which corresponds to the 95% of confidence interval (CI). p is the proportion of pregnant women with anemia, q is complementary proportion equivalent to one (1) minus p; that is, $(1 - 0.5)$. d is the degree of accuracy desired (absolute precision), which is 5.0% (0.05).

2.7 Ethical consideration: Ethical clearance was taken from Bangladesh Medical Research Council (BMRC) for conducting the study. Informed consent form was used during data collection. Respondents were informed about the objectives of the study, methods, techniques and confidentiality.

III. RESULT AND DISCUSSION
A. RESULT
Table 1 illustrates that 410 pregnant working women participated in the study. Among them highest 34% of women were between 25 to 29 years and 11% were under 20 years. On the other hand 29% and 26% of the respondents were age between 20-24 and 30-35, respectively. Most (94%) of the women were muslim and live in non-slum residence. It is found that 46 percent of the respondent was below SSC pass, 32 percent was HSC pass and 22 percent had qualification

graduate and above. In consideration of occupation of the respondents, it is found that among the respondents' 16% was garment worker, 11% involved in business, 15% working in government sector, 29% in private sector, 5% was day labourer and 24% was involved in different professions. It is also found that 32% had family income <20000Tk/month, 29% had 20001-30000Tk, 13% had 30001-40000Tk, 13% had 40000-50000Tk and 13% had >50000Tk/month. Most of the pregnant women use sanitary latrine (85%), whereas only 14% use semi pacca toiltet.

Table 1. Distribution of demographic characteristics of pregnant working women (N=410)

Variables	N	%
Age in years: Min-18, Max-35, Mean-26.02, SD-4.73		
under 20	45	11%
20 – 24	117	29%
25 – 29	141	34%
30 – 35	107	26%
Religion:		
Islam	384	94
Hindu	25	6
Others	1	0
Resident:		
Slum	25	6
Non slum	385	94
Educational qualification:		
1 - 5 passed	69	17
6 - 10 passed	118	29
HSC passed	132	32
Graduate passed	43	10
Post graduate passed	48	12
Occupation:		
Garment worker	66	16
Business	45	11
Govt. service	62	15
Private service	118	29
Day laborer	19	5
Others	100	24
Monthly family Income: BDT, Mean-34060.98		
<20000	131	32
20001-30000	119	29
30001-40000	54	13
40001-50000	54	13
>50000	52	13
Toilet facility:		
Kacha	3	1
Semi pacca	60	15
Sanitary toilet	347	84
ANC visit: (no. of visit)		
1	46	11
2	68	17
3	93	22
>4	203	50

Table 2 shows that 76% babies born with normal weight, where as 24% babies born with low birth weight.

Table 2: Birth outcome of the working pregnant women (N=409)

Baby weight categories	N	%
Below 2000g	4	1
2000g to 2500g	92	22
2501g to 3000g	184	45
Above 3000g	129	31
Total	409	100

Table 3 illustrates that among respondents of the study, 45.4% were mild anemic, 19.8% were moderate anemic and 34% had no anemia during their pregnancy.

Table 3: Severity of anemia among the respondents (N=410)

Level of anemia	N	%
Mild anemia (10.00 - 10.9 g/dL)	186	45.4
Moderate anemia (7.00 - 9.9 g/dL)	82	19.8
Severe anemia (<7 g/dL)	2	.5
No anemia (>11g.dL)	140	34.1
Total	410	100.0

Table 4: Association between income category and ANC visit during pregnancy

			Income category					Total
			10000-20000	20001-30000	30001-40001	40001-50000	>50001	
ANC during pregnancy	Yes	No.	118	106	53	53	50	380
		%	90.1%	89.1%	98.1%	98.1%	96.2%	92.7%
	No	No.	13	13	1	1	2	30
		%	9.9%	10.9%	1.9%	1.9%	3.8%	7.3%
Total		No.	131	119	54	54	52	410
		%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

A Chi-Square test was run to determine the relationship between no. of ANC visits and their monthly family income. This tells us that there is a statistically significant association between no. of ANC visits and their monthly family income. When reading this table, we see here the "Pearson Chi-Square" row that χ (1) = 13.358, p = .020. From the above table, we can conclude participants visited for ANC more whose monthly family income was more. Again, there is a statistically significant association between the no. of ANC visit and their monthly family income.

Table 5: Association between educational qualification of the respondents and pregnancy outcome

Pregnancy outcome			Respondent's educational qualification					Total
			1 - 5 passed	6 - 10 passed	HSC passed	Graduate passed	Post graduate passed	
Pregnancy outcome	Abnormal baby	No.	22	42	17	8	7	96
		% Within Pregnancy outcome	22.9%	43.8%	17.7%	8.3%	7.3%	100.0%
	Normal Baby	No.	47	75	115	35	41	313
		% Within Pregnancy outcome	15.0%	24.0%	36.7%	11.2%	13.1%	100.0%
Total		No.	69	117	132	43	48	409
		% Within Pregnancy outcome	16.9%	28.6%	32.3%	10.5%	11.7%	100.0%

A Chi-Square test was run to determine the relationship between the pregnancy outcome and education of the mothers. When reading this table, we can see here the **"Pearson Chi-Square"** row that χ (1) = 23.699, p = .000. This tells us that there is statistically significant association between the pregnancy outcome and the age of mothers.

That's mean p-value is less than our chosen significance level (α = 0.05), we may reject the null hypothesis. Rather, we may conclude that there is enough evidence to suggest an association between mother's level of education and their pregnancy outcome.

Table 6: Association between severity of anemia and pregnancy outcome

Birth weight of the baby		Grading of severity of anemia Pregnant mother				Total
		Mild anemia (10.00 - 10.9 g/dL)	Moderate anemia (7.00 - 9.9 g/dL)	Severe anemia (<7 g/dL)	No anemia (>11.0g/dL)	
Baby weight categories	Below 2000	2	3	0	0	5
	2000 to 2499	44	35	1	12	92
	2500 to 3000	93	35	1	53	182
	Above 3000	47	7	0	75	129
Total		186	80	2	140	408

A Chi-Square test was run to determine the relationship between baby's weight categories and the severity of Anemia. We can see here the "Pearson Chi-Square" row that χ (1) = 58.889, p = .000. This tells us that there was a statistically significant association between baby's weight categories and the severity of Anemia. That's mean p-value is less than our chosen significance level (α = 0.05), we may reject the null hypothesis. Rather, we can conclude that there was enough evidence to suggest an association between baby's weight categories and the severity of Anemia.

B) DISCUSSION

Anemia is the most common nutritional deficiency disorder in the world. There is predominance of iron deficiency anemia (nutritional anemia). In pregnancy, it is one of the leading causes responsible for maternal morbidity and mortality. Study revealed that among the respondents majority had mild anemia. A total of 410 cases were included in the study, out of 410 respondents 96 mothers had abnormal pregnancy outcomes i.e. low birth-weight baby, preterm delivery & still birth, 31.2%, 28.1% and 24.0% belonged to age group 25-29, 20-24 and 30-35 years, respectively. Similarly, study done in India, Pakistan and Tanzania showed that the adverse perinatal outcomes in anemic pregnant women were stillbirth, low birth weight, small for gestational age as the common adverse perinatal outcomes in anemic pregnant women [7].

Study found that 65.9% of pregnant women were anemic to some extent. Majority (45.4%) of them were mildly anemic. It was reported that among mother social aspects, education is considered the most powerful determinant of health. Low levels of education and maternal birthplace are important factors associated with adverse neonatal outcomes. Our Study found that there are positive relationship between maternal education and selected neonatal outcomes like low birth weight (LBW), Pre-term birth, still birth, etc. This finding is consistent with studies conducted in Italy showing the influence of educational status on preterm birth, small for gestational age and other neonatal outcomes.

Italian study found that 19, 22, 18, and 16% decreased risk of preterm birth, low birth weight, small for gestational age and respiratory distress, respectively compared to mothers with lower levels of education, those with high levels of education [8].

LBW among children is a serious public health concern that contributes to child morbidity and mortality worldwide. We investigated the association between ANC attendance and child birth weight within the Bangladesh context. We did not found any significant association between number of ANC visits and LBW. This finding did not consistent with that of [9] which demonstrates that women who completed the recommended eight ANC contacts had a significantly reduced likelihood of giving birth to a child with LBW. The finding is further supported by [10] who found that women with less than eight ANC visits were more likely to give birth to children with LBW.

Anemia in pregnancy has a recognizable association with fetal outcome. Increased incidence of low birth weight babies is seen if the mother is anemic in her third trimester only. Increased incidence of preterm deliveries is seen if the mother is anemic in her second and third trimesters. Our figures showed more than half of the mothers were anemic. Similar figures are quoted in other studies as well [11].

Anemia in pregnancy has adverse maternal outcome in the form of maternal morbidity, preterm labour, and increased incidence of operative delivery. Studies have reported adverse maternal and perinatal outcomes associated with anemia during pregnancy, the associations may vary when the severity of anemia is considered [11]. Our result shows a statistically significant positive association between mother's severity of anemia during pregnancy and low birth-weight of baby. Findings consisted with study done in China , three of the adverse outcomes that they observed placental abruption, preterm birth, and severe postpartum hemorrhage were associated with anemia during pregnancy regardless of the severity [11].

LBW is a major public health problem, and it is associated with increased risk of newborn morbidity and mortality. The birth weight of the newborn is an indicator of the mother's nutritional status [12]. This study was to assess the effect of maternal nutritional status and fetal outcome. This study revealed that nutritional status of pregnant women was positively associated with birth weight of the newborn.

According to the WHO, anemia is a health condition of moderate public health significance [13]. Prenatal anemia continues to be a problem among pregnant women adding to maternal and child outcomes such as gestational hypertension, pre-eclampsia, obstructed labor, PPH, low birth weight, premature delivery and stillbirth. The current study findings that is maternal anemia on the prevalence of anemia is nearly comparable with a similar study done in Uganda (prevalence of 25.8%) [7]. On the other hand the prevalence of anemia in this study is lower than studies conducted using nationwide data from Ethiopia (prevalence of 41%) [14]. The above difference from national database may be due to inclusion of more institutional based studies at which prevalence of anemia is lower than in community setting. It could also be due to incorporation of low prevalence reports from most recent studies. The result of current study is also lower than the report of studies from other countries; 40.8% in Ghana, 53% in Sudan, and 54.5% in Nigeria. This may be attributed to a difference in participant's socio-demographic background, maternal health services, and factors that determine the nutrition and wellbeing of women.

IV. CONCLUSION

Anemia in pregnancy has adverse maternal outcome in the form of maternal morbidity, preterm labour and also low birth weight (LBW) baby. LBW is a major public health problem, and it is associated with increased risk of newborn morbidity and mortality. LBW baby suffers long run in the life span. It is not only the health risk of death in neonates but also is at increased long term disability. It is found in the study anemia during pregnancy is associated with low birth weight baby, preterm delivery as well as still birth. So a working pregnant mother should be non-anemic during pregnancy which will help to get a healthy pregnancy outcome. It is suggested that proper nutrition and health care should be ensured during pregnancy of working pregnant women for better pregnancy outcome.

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