

## Prevalence of Anemia and Factors Associated with Hemoglobin Status of Pregnant Women in Dhaka City

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### Abstract

**Introduction:** Maternal anaemia is a repeated difficulty during pregnancy, most strikingly in the world's middle-income countries. In Bangladesh, anaemia poses a foremost threat to maternal and child survival, adds to low birth weight, less conflict to infection, poor cognitive development and drop off work efficiency.

**Objectives:** The point of making inquiries is to assess the prevalence of anaemia and issues correlated with haemoglobin (Hb) status of pregnant women attending some hospitals in Dhaka.

**Method:** It is a retrospective cross-sectional study conducted on 200 pregnant women from a diverse region of Bangladesh. A well-thought-out questionnaire used to judge the anthropometric measurements, socio-demographic status, clinical and biochemical category. Basic, dependable variables and other issues are included in the questionnaire.

**Result:** After completing this study, among 200 pregnant women, 56.5% of women were anaemic in 1<sup>st</sup> trimester. The proportion of anaemia decreased to 39% at 2<sup>nd</sup> trimester. Noteworthy positive connections found between Hemoglobin status and folic acid supplement ( $r=0.167$ ,  $p=0.022$ ), calcium supplement ( $r=0.167$ ,  $p=0.022$ ), age of getting married ( $r=0.146$ ,  $p=0.042$ ) and anti-hookworm medicine ( $r=0.169$ ,  $p=0.021$ ).

**Conclusion:** The results obtained showed that the prevalence of anaemia among pregnant women is harsh in Dhaka, Bangladesh. It also suggests improving the dietetic status of pregnant women by providing free foodstuff with centre on the underprivileged and marginalized groups of people.

**Keywords:** Pregnancy anaemia; Haemoglobin status; Associated factors; Socio-demographic.

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### I. Introduction

Anaemia is a pathological provision that takes place when the concentration of haemoglobin (Hb) or hematocrit (HCT) or red blood cells (RBC) calculation is not enough than the recommended standard assortment level turning into the reduction in the oxygen-carrying capability of red blood cells to tissues to meet physiologic requirements whereas affecting almost all cluster of people, frequently pregnant women [1-5]. Women may have a medical condition with great difficulty throughout this phase as a consequence of unusual metabolic changes occurring in the body. As the fetus grows up inside the womb, several alterations take place in body composition and metabolism of the mother [6]. Piteable nutritional condition at some point in pregnancy can influence the outcome in confined fetal growth, micronutrient deficiency, barriers of intrauterine growth, premature birth, prenatal and infant metabolic disorders [7], newborn neurological complications, maternal anaemia, as well as a high mortality rate [8]. Pregnancy anaemia is a considerable public health predicament in low-income countries (56%) and developed countries (18%) such as India, Bangladesh, and Pakistan [2], [9], [10]. Anaemia, defined by the World Health Organization (WHO) as haemoglobin levels less than 11 g/dl, is surrounded by the guiding nutritional diseases prevalent in all age groups [11]. Census and other exploratory studies calculate approximately that anaemia in progress has an effect on 1.62 billion inhabitants worldwide and among those 56 million pregnant women are anaemic at the same time as contributing more than 115,000 maternal and 591,000 postnatal deaths globally every year [12-16]. Prevalence of anaemia among women of reproductive age (% of women ages 15-49) in South Asia was 49.68 as of 2016. Its highest value over the past 26 years was 55.22 in 1990, while its lowest value was 49.24 in 2014 [17].

### Purpose of the study:

Many studies make public that anaemic women as a general rule and predominantly pregnant anaemic women are the origins of most of the maternal morbidity and mortality. In Bangladesh, three different surveys previously conducted estimating the prevalence of anaemic pregnant women and the percentage (%) prevalence are found as 50%, 59% and 63% [18], [19]. As per information, no other studies have ever been carried out at

the region of Dhaka we are scrutinizing observing the prevalence of anaemia for the duration of pregnancy. Since the information on anaemia and its associated features with maternal anaemia is not accessible in this area, so our principle of this study is to explore the prevalence and to probe the associated factors of anaemia among pregnant women receiving medical facilities from different hospital.

**Objectives:**

The research intends to assess the prevalence of anaemia and factors associated with haemoglobin (Hb) status of pregnant women attending in some hospitals in Dhaka city of Bangladesh.

**II. Materials and Methods**

**Study Type:** It is a retrospective cross-sectional study.

**Sample Size:** Sample size is 200 pregnant women who are 18 weeks to 38 weeks of conception.

**Study Period:** This study accomplished from May to September of 2019.

**Study Area:** The study was performed in 4 hospitals and mother care centre in Dhaka city of Bangladesh.

**Sampling course of action:** The sampling course of action was a purposive sampling, 200 pregnant women are selected purposively.

**Inclusion criteria:** To involve her in the study, pregnant women need to fulfil the following inclusion criteria-

1. At least one haematology report of every trimester.
2. Mothers should be in the second trimester.

**Exclusion criteria:**

1. Critically ill participants.
2. Participants who do not want to provide their information.

**Questionnaire development:**

The research questionnaire assembled with two criteria-

1. Socio-demographic background.
2. Maternal conception status and medical record

**Data collection instrument:**

A pre-trialled questionnaire together with an overture regarding the study, a weighing machine, a height measurement tape, a MUAC tape used to collect information.

**Data collection procedure:**

We used a pre-trialled well thought-out questionnaire to get socio-demographic characteristics, clinical history of pregnant women. First of all, we interpreted the questionnaire into the first language Bengali then reinterpreted into English. We discussed with the selected patients in a classified study room and checked up to date medical records. We accomplished interview in a safe, secure and confidential atmosphere and then we recorded the biological test results from the patient's obstetric file. Anaemia status of pregnant women are classified to mild (10.0-10.9 g/dl), moderate (7.0-9.9 g/dl) and severe (<7.0 g/dl) following World Health Organization (WHO) [19-23]. We used Mid Upper Arm Circumference (MUAC) to find out the nutrition status of pregnant women which categorised as acute malnutrition or wasting < 21 cm, moderate 21-23 cm and standard > 23 cm [24].

**Statistical Analysis:**

We brought together this statistics by using SPSS (version 16.0). We entered and evaluated data via this software. We used descriptive studies (frequencies, cross tables) to calculate all variables. We presented values as percentage, mean and standard deviation. We applied T-test for testing independence between the two variables. We also applied one-way analysis of variance (descriptive ANOVA) to evaluate the effectiveness of age, height, weight, MUAC, various supplements etc. factors on the frequency of pregnancy anaemia.

**Assessment of anaemia:**

According to the World Health Organization, for the lower limit of the normal range of haemoglobin concentration (Hb) is 11 g/dl. Hb level below 11 g/dl is considered as anaemia in pregnancy. The classification of anaemia according to WHO is known as mild (10.0-10.9 g/dl), moderate (7.0-9.9 g/dl) and severe (<7.0 g/dl) based on the rank of haemoglobin concentration in blood.

**Ethical Consideration**

We obtained ethical clearance from BMRC and submitted a permission letter to the administrator of the selected hospital. The aim and objective of the study are illustrated clearly to pregnant women and their families. Their oral permission was taken to perform this study while preserving the information of each mother under the study confidentially.

### III. Results & Observations

In this trial, we premeditate 200 subjects to assess the prevalence of pregnancy anaemia and the determinants from the Dhaka city.

**Table 1: Anthropometric measurements of the trial partakers (n = 200)**

Participants	Minimum	Maximum	M±SD
Age (Years)	15	42	24±4
Height (cm)	140	167	153±5
Weight (kg)	33	105	56±9
MUAC(cm)	19	40	27±4

The range of Age (Years), Height (cm) and Weight (kg), MUAC (cm) are 15-42, 140-167, 33-105, 19-40 respectively. The M±SD of Age (Years), Height (cm), Weight (kg), MUAC (cm) are 24±4, 153±5, 56±9, 27±4 respectively which is demonstrated on the Table 1.

**Table 2: Socio-demographic distinctive of the trial partakers (n = 200)**

Variables	Number (n)	Percentage %
<b>Age (Years)</b>		
<26	66	33
>26	134	67
<b>Education level</b>		
Below SSC	106	53
SSC passed	38	19
HSC passed	26	13
Graduate	22	11
Post Graduate	8	4
<b>Occupation</b>		
Housewife	184	92
Self-independent	10	5
Student	6	3
<b>Family monthly income (Taka)</b>		
≤15,000	19	9.5
16,000 - 25,000	100	50
26,000 - 34,000	62	31
≥35,000	19	9.5
<b>Residential area</b>		
Urban	46	23
Rural	154	77
<b>Age at marriage (Years)</b>		
<18	92	46
>18	108	54
<b>Drinking water source</b>		
Tube-well	53	26.5
Deep tube-well	12	6
Tap water	12	6
WASA	123	61.5
<b>Sanitary bathroom</b>		
Single sanitary bathroom	114	57
Common sanitary bathroom	70	35
Common unsanitary bathroom	16	8

The trial partakers include 200 pregnant women ranging from 15 to 42 years, and most participants are over the age of 26 years (67%). 4% of participants are postgraduate, 11% of participants are graduate, 13% of participants are HSC passed, 19% of participants are SSC passed, and 53% of participants are below SSC. Table 2 demonstrates about 92% trial partakers are house-wife, 5% are worker, and 3% area student. Among the trial partakers, about 92% have 16-25 thousand monthly family income, 5% have 26-34 thousand, 9.5% have less than 15 thousand, and 9.5 % have 35 thousand-above. 46 participants (23%) are living in urban areas, whereas 154 (77%) are resident of the rural regions. About 26.5% of participants use tube-well as a drinking water source, 61.5% use WASA water, 6% use deep tube-well and 6% use tap water. About 57% trial partakers use the single sanitary bathroom; 35% use the common hygienic bathroom; 8% use the standard unsanitary toilet.

The range of SBP (mmHg) & DBP (mmHg) are 107±11 and 70±9 respectively. The ranges of Hb, according to trimesters, are 6-14, 8.3-13, 9.6-13.5, respectively and the M±SD of Hb according to trimester, are

10.79±0.95, 11.05±0.83,11.34±0.73 respectively. The ranges of RBS according to trimester, are 4-9, 4-9, and 4.1-7.9 respectively. The M±SD of RBS, according to trimester,is 4.84±0.92, 4.95±0.89, 4.93±0.72 respectively.

Among the trial partakers, 32.5% have B+ blood group, 19.5% have O+, 15.5 % have A+, 12% have AB+, and 20.5% have other blood groups. Between the trial partakers, about 27.5% had acute conditions like fever, cold, diarrhoea etc. and 72 5% didn't have any of them. About 64% of participants have chronic conditions like DM, HTN, CKD etc. and 36% didn't have any of them. Among the trial partakers, about 48% take a vitamin supplement, and 52% didn't take.

**Table 3.1: Biochemical and clinical characteristics of trial partakers (n=200)**

Variables	Minimum	Maximum	M±SD
SBP(mmHg)	80	140	107±11
DBP(mmHg)	50	90	70±9
<b>Hemoglobin(g/dl)</b>			
1 <sup>st</sup> Trimester	6	14	10.79±0.95
2 <sup>nd</sup> Trimester	8.3	13	11.05±0.83
3 <sup>rd</sup> Trimester	9.6	13.5	11.34±0.73
<b>RBS(mmol/L)</b>			
1 <sup>st</sup> Trimester	4	9	4.84±0.92
2 <sup>nd</sup> Trimester	4	9	4.95±0.89
3 <sup>rd</sup> Trimester	4.1	7.9	4.93±0.72
Age during 1 <sup>st</sup> pregnancy	14	32	20.00±3.00
Number of parity	1	5	2.00±0.75

Around 69.5% of participants consume the iron supplement, and 30.5% aren't. About 36% trial partakers take the folic acid supplement and 64% didn't. About 65.5% of participants choose a calcium supplement and 34.55% didn't. Among the trial partakers, 62% have completed 5 doses of TT vaccine, 8.5% have completed 4 doses, 13% have completed 3 doses, 11.5% have completed 2 doses, 3.5% have completed 1 dose and 1.5% never take any TT vaccine. Among the trial partakers, about 23% have taken anti-hookworm medicine, and 77% haven't considered.

Table 3.2 shows that about 4.5% study participant's Hb level is <7 g/dl, 5% participant's Hb level is between 7.0-9.9g/dl, 47% participant's Hb level is between 10.0-10.9g/dl and 43.5 % study participant's Hb level is >11g/dl in the first trimester of their pregnancy.

**Table 3.2: Biochemical and clinical characteristics of trial partakers (n=200)**

Variables	Group	Number	Percentage %
Blood group	O+	39	19.5
	A+	31	15.5
	B+	65	32.5
	AB+	24	12.0
	Others	41	20.5
Acute disease (Cold, fever, diarrhoea etc.)	Yes	55	27.5
	No	145	72.5
Chronic disease (DM, CKD,HTN etc.)	Yes	128	64
	No	72	36
Vitamin Supplement	Yes	96	48
	No	104	52
Iron Supplement	Yes	139	69.5
	No	61	30.5
Folic Acid Supplement	Yes	72	36
	No	128	64
Calcium Supplement	Yes	131	65.5
	No	69	34.55
TT vaccines (doses)	Never done	3	1.5
	1	7	3.5
	2	23	11.5
	3	26	13.0
	4	17	8.5
	5	124	62.0
Anti-hookworm medicine	Yes	46	23
	No	154	77

Hemoglobin(g/dl) 1 <sup>st</sup> Trimester	<7.0	09	4.5
	7.0-9.9	10	5.0
	10.0-10.9	94	47
	>11	87	43.5
Hemoglobin(g/dl) 2 <sup>nd</sup> Trimester	<7.0	05	2.5
	7.0-9.9	06	3
	10.0-10.9	67	33.5
	>11	122	61

About 2.5% trial partakers Hb level is <7 g/dl, 3% participant's Hb level is between 7.0-9.9g/dl,33.5% participant's Hb level is between 10.0-10.9g /dl and 61 % study participant's Hb level is>11g/dl in 2<sup>nd</sup> trimester of their pregnancy.

After this trial, 56.5% pregnant women found as anaemic according to the haemoglobin profile in blood in 1st trimester. The percentage of anaemic pregnant women decreased to 39% at 2nd trimester which shown in Table 4.

**Table 4: Distribution of pregnant women by the level of anaemia in different trimester**

Trimester	Group	Number	Percentage %
1 <sup>st</sup> Trimester	Anaemic	113	56.5
	Non-anaemic	87	43.5
2 <sup>nd</sup> Trimester	Anaemic	78	39
	Non-anaemic	122	61

Table 5 shows significant positive correlations between hemoglobin and age of getting married ( $r=0.146$ ,  $p=0.042$ ), anti-hookworm medicine ( $r=0.169$ ,  $p=0.021$ ), folic acid supplement ( $r=0.167$ ,  $p=0.022$ ) and calcium supplement ( $r=0.167$ ,  $p=0.022$ ).It also shows significant positive correlations between hemoglobin and drinking water source ( $r=0.215$ ,  $p=0.003$ ) and type of bathroom ( $r=0.171$ ,  $p=0.019$ ).

**Table 5: Factors associated with hemoglobin (Hb) status of the trial partakers**

Variable	r	p
Age of getting married	0.146	0.042
Anti-hookworm medicine	0.169	0.021
Folic acid	0.167	0.022
Calcium supplement	0.167	0.022
Drinking water source	0.215	0.003
Type of Bathroom	0.171	0.019

#### IV. Discussion

##### Prevalence:

In Bangladesh, out of 184 women, 104 women were anaemic, 15-24 age group was more anaemic (57.42%) than the 25-39 age group (55.42%), but the difference was not statistically significant  $P>0.05$ . [25].

In this study, 56.5% of pregnant women are anaemic in 1<sup>st</sup> trimester. The percentage of anaemia decreased to 39% at 2nd trimester.

##### Folic acid supplement:

A medical science journal of India showed that nutritional anaemia was seen in the 15% of the selected population due to deficiency of Folic acid. [26].

In this study, there were significant positive correlations between hemoglobin and folic acid supplement ( $r=0.167$ ,  $p=0.022$ ).

##### Calcium supplement:

Journal of bone metabolism found that Hb and anaemia status are associated with bone mineral density scores. There are partial positive associations between Hb and bone mineral density in men, but negative associations in women. [27].

In this study, there were significant positive correlations between hemoglobin and calcium supplement ( $r=0.167$ ,  $p=0.022$ ).

##### Anti-hookworm medicine:

According to a journal of the medical association in Nepal, Anemia is prevalent in pregnant women, and there is a significant correlation between anaemia and worm infestation. Among the pregnant women (n) =192; 48 (25%) had worm infestation [28].

This study shows significant positive correlations between hemoglobin and anti-hookworm medicine ( $r=0.169$ ,  $p=0.021$ ).

#### **Age of getting married:**

In Brazil, a study included 458 pregnant adolescents. The mean age was 16 years old, and the prevalence of anaemia was 41.27% (189). Mild, moderate or severe anaemia presented in 65.60%, 33.86% and 0.52%, respectively, of trial partakers. They found highly associated factors among the age of getting married and the prevalence of anaemia[29].

This study shows significant positive correlations between hemoglobin and age of getting married ( $r=0.146$ ,  $p=0.042$ ).

#### **Limitations of the study**

As like every study, this study also has a limitation. At the time of performing this study, we had to face many problems. The limitations of this study are given below:

1. The sample size was small due to time and financial constrain.
2. Haematology reports contain only Hb status, but HCT or other data are not available.
3. Respondents felt hesitate to talk about their financial situation.

#### **Recommendations:**

As our sample size was small due to our short time-frame, we can't recommend a full requirement for our trial partakers.

### **V. Conclusion**

In spite of the government's steps of extra concern and consciousness to trim down anaemia, still, anaemia is an immense public health crisis in Bangladesh. Awareness should get higher to stop the pregnancy anaemia steps should be taken from the juvenile phase when a girl can be anaemic without difficulty. If a girl becomes pregnant with anaemia, she will have a medical condition with complications, and it also influences her child too. So consciousness should take place from teenage years. A mother should take protein, iron and vitamin-rich food to provide the requirements. Iron and vitamin supplement should incorporate with diets. Transmittable diseases and infestations should be taken care off. Nutritional knowledge, appropriate dietary habits and hygiene practice can diminish the prevalence of anaemia.

Additionally, the government with relevant stakeholders should cooperate for developing policy to get better nutritional status and protect the future generations from anaemia [30].

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