

Proportion of Anemia and Associated Factors Among Pregnant Women in A Selected Community of Mymensingh City, Bangladesh

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Abstract: Anemia is a major cause of maternal mortality in Bangladesh. Anemia in pregnancy is associated with adverse consequences both for the mother and the fetus. Studies have shown that the adverse consequences of maternal anemia may affect not only the neonate and infant but also increase the risk of non-communicable diseases when the child grows into an adult and at risk of low birth weight in the next generation. The objective of this study is to know the factors associated with anemia among pregnant women in Mymensingh City, Bangladesh. The study design decided upon a cross sectional one with the sample size 200 and ability illicit to response regarding the main variables and the limitation of time and resources; mainly explaining the knowledge and practice about anemia in pregnant women. The result of the study revealed that majority 56.25% mother's gestational age were 32-35 weeks, 25% were more than 35 weeks and 18.75% were 28-31 weeks of gestational age. Mean Hb level for anemic respondent is 10.17 (± 0.77) and 12.01 (± 0.879) for non-anemic. 83% of respondent were mild anemic in 1st trimester. Majority 80% were mild anemic in 2nd trimester and it increased to 95% at 3rdtrimester. 28% were moderate anemic in 1st trimester. 62% were moderate anemic in 2nd trimester and it decreased to 60% at 3rd trimester. 30% were severe anemic in 1st trimester and it decreased to 16% at 2nd trimester and again increased 29% at 3rd trimester. Majority of respondents (61.25%) were in normal health, 22.5% were under weight and 15% were overweight. Only 1.25% were mild obese but no obese was found. 26% were anemic and 74% were non anemic belong to 18-23yrs aged group. 32% were anemic and 68% were non anemic belong to 24-28yrs aged group. 30% were anemic and 70% were non anemic belong to 32-35yrs aged group. The study revealed that higher percentage (29%) of participants were anemic in 3rd trimester during pregnancy period, although majority of them were in normal health. Anemic condition is higher in 18-23yrs aged group although most of the respondents were SSC level educated and majority of the respondents were service holder. The result also shows that most of the mothers had taken IFA tablet during pregnancy period.

Keywords: Anemia, Pregnant Women, Maternal anemia, Public health.

INTRODUCTION

Anemia is a major public health problem all over the world in both developing and non- developing countries. It has a great impact on health as well as social and economic development. It occurs at all stages of life cycle but mainly occurs in pregnant woman and young children (De Benoist, B. *et al.*, 2008). In Bangladesh it poses a major threat to maternal and child survival, contributes to low birth weight, lowered resistance to infection, poor cognitive development and decreased work productivity (Institute of Public Health Nutrition, Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh). In Bangladesh, anemia affects 46% pregnant women, 64% of children aged 6-23 months, 42% of children aged 24-59 months, 30% of adolescent girls and 33% of non-pregnant women. According to international criteria, it is a severe public health problem (defined as a prevalence 40%) in preschool children and pregnant women and a moderate public health problem (defined as prevalence 20-39%) in adolescent girls and non-pregnant women of reproductive age. The prevalence of anemia is particularly high among children aged 6- 23

months and pregnant women because their nutritional requirements for growth and reproduction are relatively high. However, adult males may be at risk, especially where there is inadequate food intake, and/or frequent parasitic infestations, a situation that is common in the developing countries.

The estimated prevalence of anemia for this group are 18% and 3% in the developing and developed countries, respectively (De Maeyer & Adiels-Tegman, 1985). The causes of anemia are multiple, but iron deficiency is by far the most important nutritional anemia worldwide (Massawe, S. N. 2002).

Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period. While motherhood is often a positive and fulfilling experience, for too many women it is associated with suffering, ill-health and even death. The major direct causes of maternal morbidity and mortality include hemorrhage, infection, high blood pressure, unsafe abortion, and obstructed labor (WHO-2000)¹. Maternal mortality data is said to be an important indicator

of overall health system quality because pregnant women survive in sanitary, safe, well-staffed and stocked facilities. If new mothers are thriving, it indicates that the health care system is doing its job. If not, problems likely exist (Country Comparison: Maternal Mortality Rate in The CIS World Factbook, 2010)². Children's health encompasses the physical, mental, emotional and social wellbeing of children from infancy through adolescence (Pasquariello & Patrick, 1999)³. According to the World Health Organization, malnutrition is the biggest contributor to child mortality, present in half of all cases. Six million children die of hunger every year ("U.N. chief: Hunger kills 17,000 kids daily", 2009)⁴. Socioeconomic status is commonly conceptualized as the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation. Examinations of socioeconomic status often reveal inequities in access to resources, plus issues related to privilege, power and control (American Psychological Association)⁵. Socioeconomic status is typically broken into three categories (high SES, middle SES, and low SES) to describe the three areas a family or an individual may fall into. When placing a family or individual into one of these categories, any or all of the three variables (income, education, and occupation) can be assessed⁶. Families with higher and expendable income can accumulate wealth and focus on meeting immediate needs while being able to consume and enjoy luxuries and weather crises (Boushey et al, 2005)⁷. Education also plays a role in income. Median earnings increase with each level of education. As conveyed in the chart, the highest degrees, professional and doctoral degrees, make the highest weekly earnings while those without a high school diploma earn less. Higher levels of education are associated with better economic and psychological outcomes i.e.: more income, more control, and greater social support and networking (American Psychological Association, 2007)⁸. Occupation is the most difficult factor to measure because so many exist, and there are so many competing scales. Many scales rank occupations based on the level of skill involved, from unskilled to skilled manual labor to professional, or use a combined measure using the education level needed and income involved.

In sum, the majority of researchers agree that income, education and occupation together best represent SES, while some others feel that changes

in family structure should also be considered. With the definition of SES more clearly defined, it is now important to discuss the effects of SES on students' cognitive abilities and academic success. Several researchers have found that SES affects students' abilities (Milneand Plourde, 2006)⁹.

Access to quality of health care varies by socioeconomic status. Among adults, 40 percent of those who have not graduated from high school are uninsured, compared with only 10 percent of college graduates; more than 60 percent of the uninsured are in low-income families (A.C Monheit & Vistnes, 2000)¹⁰.

The term 'nutritional anthropometry' first appeared in "Body Measurement and Human Nutrition" and has been defined by Jelliffe (1966)¹¹ as: "measurements of the variations of the physical dimensions and the gross composition of the human body at different age levels and degrees of nutrition." Anthropometric measurements are widely used in the assessment of nutritional status, particularly when a chronic imbalance between intakes of protein and energy occurs. Such disturbances modify the patterns of physical growth and the relative proportions of body tissues such as fat, muscle and total body water¹².

Anthropometric measurements are of two types: Growth measurements and body composition measurements. Body composition measurements can be further subdivided into the measurements of body fat and the measurements of fat free mass.

Maternal health status, habits, and environment during and even before pregnancy profoundly impact the health and well-being of a child. Thus, achieving optimal child health is dependent upon optimizing the health and well-being of a child's mother. Child health is foundational to adult health and well-being. When children's health is nurtured and supported and there is an absence of physical and mental abuse, or other intentional childhood trauma; and there exists opportunities to gain habits that support good health during childhood, the stage is set for a healthy adulthood less likely to include chronic health problems such as overweight/obesity, poor oral health, diabetes and other chronic physical and mental health problems. The last few decades have brought significant improvements in child health in Bangladesh. The mortality rate in children under-five declined from 152 deaths per 1,000 live births to 94 deaths per 1,000 live births, but these rates are still high, and

have remained constant for several years. Pneumonia, diarrhea, measles, malaria, malnutrition, injuries and the high number of neonatal deaths, and poor care-seeking behavior, all contribute to the high levels of child mortality. Malnutrition is the major cause of disease burden in developing countries and is a principal factor inhibiting further rapid declines in child mortality. Approximately 70% of world's malnourished children live in Asia, resulting in the region having the highest concentration of childhood malnutrition. Prevalence of stunting and underweight are high in South Asia where one in every two preschool children is stunted. In fact, Bangladesh has the highest prevalence of child underweight of all countries in the world except North Korea, and only seven countries have a higher prevalence of child stunting than that of Bangladesh.¹³ Family income, mother's education, sex and birth order of children are the important determinant of malnutrition.¹⁴ Poor breastfeeding habits—only 37% of children are exclusively breastfed for first 6 months of life—encourage wasting. Discrimination against women leaves mothers unable to make decisions in their own households regarding the food and health of themselves and their children. In the face of rising food prices, insufficient nutritious food and illness continue to set the stage for malnutrition. Malnutrition is commonest in the poorest communities and in households of low educational status. Floods and other natural disasters severely compromise food security in rural areas¹⁵. Rural mothers in Bangladesh lack adequate knowledge about malnutrition risk factors. Forty-one percent of children under five are underweight and 43 percent are stunted due to malnutrition. The lack of awareness among rural mothers in our country is alarming. Few are conscious about the proper diet of an infant but many were ignorant about the aggravating effect malnutrition had on other childhood diseases¹⁶. This research will explore the knowledge of mothers in a selected section of the population. Likely it will encourage other researchers to continue forward and explore the total scenario of knowledge of mothers on malnutrition, who can act as a pivot to control it. Health policy making may take further steps to create health education awareness in this regard to be felt among the mothers. The study has been conducted in the selected areas of Dhaka City to identify present situation of maternal and child health.

Justification of the study:

Anemia is a major cause of maternal mortality. Anemia in pregnancy is associated with adverse consequences both for the mother and the fetus. Studies have shown that the adverse consequences of maternal anemia may affect not only the neonate and infant but also increase the risk of non-communicable diseases when the child grows into an adult and at risk of low birth weight in the next generation.¹⁷.

Family income, mother's education, sex and birth order of children are the important determinant of anemia¹⁸. Discrimination against women leaves mothers unable to make decisions in their own households regarding the food and health of themselves and their children. In the face of rising food prices, insufficient nutritious food and illness continue to set the stage for anemia. Anemia is commonest in the poorest communities and in households of low educational status. Floods and other natural disasters severely compromise food security in rural areas¹⁹.

An increased understanding of the association of anemia with maternal knowledge is coming from the international comparisons of anemia prevalence among pregnant mothers and prevention, particularly those from the national and the International Study of prevention of anemia by lifestyle modification interventions. From the current study and other studies of anemia prevention among pregnant women, it is possible to draw some tentative conclusions as to the association of maternal education with anemia worldwide.

Operational definitions:

Anemia: Anemia is a deficiency in the number or quality of red blood cells in your body. Red blood cells carry oxygen around your body using a particular protein called hemoglobin. Anemia means that either the level of red blood cells or the level of hemoglobin is lower than normal.

Pregnancy: Pregnancy is the term used to describe the period in which a fetus develops inside a woman's womb or uterus. Pregnancy usually lasts about 40 weeks, or just over 9 months, as measured from the last menstrual period to delivery.

Malnutrition: Malnutrition is a serious condition that happens when your diet does not contain the right amount of nutrients. It means "poor nutrition"

and can refer to: undernutrition – not getting enough nutrients. overnutrition – getting more nutrients than needed.

Undernutrition: Undernutrition denotes insufficient intake of energy and nutrients to meet an individual's needs to maintain good health. In most literature, undernutrition is used synonymously with malnutrition. In the strictest sense, malnutrition denotes both undernutrition and overnutrition.

Obesity: Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A body mass index (BMI) over 25 is considered overweight, and over 30 is obese. Carrying excess weight can lead to musculoskeletal disorders including osteoarthritis.

HDL: HDL cholesterol is the well-behaved "good cholesterol." This friendly scavenger cruises the bloodstream. As it does, it removes harmful bad cholesterol from where it doesn't belong. High HDL levels reduce the risk for heart disease -- but low levels increase the risk.

LDL: LDL stands for low-density lipoproteins. It is called the "bad" cholesterol because a high LDL level leads to a buildup of cholesterol in the arteries.

Hypercholesterolemia: Hypercholesterolemia is a condition characterized by very high levels of cholesterol in the blood. Cholesterol is a waxy, fat-like substance that is produced in the body and obtained from foods that come from animals (particularly egg yolks, meat, poultry, fish, and dairy products). The body needs this substance to build cell membranes, make certain hormones, and produce compounds that aid in fat digestion. Too much cholesterol, however, increases a person's risk of developing heart disease.

Peripheral vascular disease: Peripheral vascular disease, also called PVD, refers to any disease or disorder of the circulatory system outside of the brain and heart. The term can include any disorder that affects any blood vessels. It is, though, often used as a synonym for peripheral artery disease.

Cerebrovascular disease: Cerebrovascular disease includes a range of conditions that affect the flow of blood through the brain. This alteration of blood flow can sometimes impair the brain's functions on either a temporary or permanent basis. When such an event occurs suddenly, it's

referred to as a cerebrovascular accident (CVA).

Endarterectomy: Carotid endarterectomy is a procedure to treat carotid artery disease. This disease occurs when fatty, waxy deposits build up in one of the carotid arteries. The carotid arteries are blood vessels located on each side of the neck (carotid arteries).

This buildup of plaque (atherosclerosis) may restrict blood flow to the brain. Removing plaque causing the narrowing in the artery can improve blood flow in the carotid artery and reduce the risk of stroke.

Respondent: Respondents means those persons who had been questioned to answer for this current study the association of malnutrition with maternal education.

Knowledge: Here, in this current study knowledge signifies about the anemia during pregnancy.

Research question

What are the factors associated with anemia among the pregnant women in Mymensingh city, Bangladesh?

LITERATURE REVIEW

Under-five children form a bulk number of demographic forces. They are the future of the nation. Nearly 177 million babies are malnourished around the world. Malnutrition is responsible for nearly 45% of deaths in under five children. Mothers can play vital role to save these babies. A study was conducted to assess knowledge of mothers about malnutrition of under-five children in a selected slum of Dhaka city. That was cross sectional study. Three hundred mothers were purposively selected to take face to face interview. Pre-tested structured questionnaire was used to collect data. Level of knowledge was determined by pre-defined score. Mean age of respondents was 19.55 ± 3.0 years. Most of the respondents were under secondary school certificate level education. Nearly half of the respondents were housewife. Mean monthly family income of respondents was 156.84 ± 29.53 USD. Majority of the respondents (76 %) had knowledge on weaning food. The study revealed that about half of the study subjects had knowledge on preparation of khichuri (mixed food). About half of the respondents stated that diarrhea was the consequence of malnutrition. Conclusion: Overall knowledge on malnutrition among mothers needs to be improved. Mass media

should be widely used to increase the level of knowledge of mothers on malnutrition²⁰.

A study in Ghana reported that malnutrition is a common cause of morbidity and mortality in children. The aim of that study was to compare the nutritional status of children under 5 years of teenage and adult mothers in Tamale Metropolis, Ghana. A case-control study involving 300 (150 cases, 150 controls) mother-child pairs was carried out. A questionnaire was used to collect data on socio-demographic characteristics of mothers and children and anthropometry was used to assess the nutritional status of children. Anthropometric z-scores derived based on WHO Child Growth Standards were used to determine stunting, wasting and underweight statuses of children. Logistic regression analysis was used to compare the nutritional status of children of teenage and adult mothers. Children of teenage mothers, compared to those of adult mothers, were 8 times more likely to be stunted [Adjusted Odds Ratio (AOR) = 7.56; 95% confidence interval (CI) 4.20–13.63], 3 times more likely to be wasted (AOR = 2.90; 95% CI 1.04–8.04), and 13 times more likely to be underweight (AOR = 12.78; 95% CI 4.69–34.81) after adjusting for potential confounders. The risk of child malnutrition increases with young maternal age; interventions should be targeted at teenage mothers and their children to reduce the risk of malnutrition²¹. Adequate nutrition is one of the essential determinants of the health of children, and the right to adequate food is one of the fundamental human rights enshrined in many international agreements. Malnutrition is the most common nutritional disorder in developing countries²²⁻²³. Globally, 22.9% of children under 5 years are stunted and 7.7% are wasted²⁴. In Northern Region of Ghana, 33.1%, 6.3% and 20.0% of children under five are stunted, wasted and underweight respectively²⁵. Malnutrition affects physical growth, morbidity, mortality, cognitive development, reproduction and physical capacity²⁶⁻²⁷. About half of all deaths in children under five (about 3 million deaths) worldwide are caused by malnutrition²⁸. About 11% of all births worldwide are to girls aged 15–19 years old and the vast majority of these (95%) occur in low and middle-income countries where child marriage is widespread²⁹. In Ghana, 11.3% of females aged 15–19 years have had a birth, while 2.9% were pregnant at the time of interview³⁰. Young maternal age at childbirth (< 20 years) is

associated with increased risk of intrauterine growth restriction³¹, low birth weight, preterm birth³², infant mortality³³⁻³⁴ and poor child growth³⁵. For example, in low and middle-income countries, babies born to mothers under 20 years of age have a 50% higher risk of being stillborn or dying in the first few weeks versus those born to mothers aged 20–29 years³⁶. It is suggested that these associations result from interactions of biological, behavioral, and social factors. The nutritional needs of pregnant teenagers may compete with those of the developing foetus³⁷ because they are still growing resulting in increased nutritional demands compared to adult pregnant women. Teenage mothers may breastfeed for a shorter duration than older mothers³⁸, be behaviorally immature and therefore less sensitive to the needs of their infants, and may easily get annoyed and use less emotionally positive communication compared to adult mothers. In addition, younger mothers tend to have less education, and to be of lower socio-economic status and so have a higher chance of experiencing psychological stress resulting from limited resources³⁹ and parenting. Despite the high prevalence of teenage childbearing in Ghana, data are scanty on the effects of low maternal age on growth indicators of Ghanaian children. The aim of this study was to assess the effect of low maternal age on child growth indicators by comparing the nutritional status of children under five of teenage and adult mothers in Tamale Metropolis, Ghana. Another prospective randomized trial was carried out to test the efficacy of a specific intervention for reducing the extent of their malnutrition and to change behavior of mothers relating to child-feeding practices, care-giving, and health-seeking practices under the Bangladesh Integrated Nutrition Project (BINP). The study was conducted in rural Bangladesh among 282 moderately-malnourished (weight-for-age between 61% and 75% of median of the National Center for Health Statistics standard) children aged 6-24 months. Mothers of the first intervention group received intensive nutrition education (INE group) twice a week for three months. The second intervention group received the same nutrition education, and their children received additional supplementary feeding (INE+SF group). The comparison group received nutrition education from the community nutrition promoters twice a month according to the standard routine service of BINP. The children were

observed for a further six months. After three months of interventions, a significantly higher proportion of children in the INE and INE+SF groups improved (37% and 47% respectively) from moderate to mild or normal nutrition compared to the comparison group (18%) ($p<0.001$). At the end of six months of observation, the nutritional status of children in the intervention groups improved further from moderate to mild or normal nutrition compared to the comparison group (59% and 86% vs 30%, $p<0.0001$). As the intensive nutrition education and supplementation given were highly effective, more children improved from moderate malnutrition to mild or normal nutritional status despite a higher incidence of morbidity. The frequency of child feeding and homebased complementary feeding improved significantly ($p<0.001$) in both the intervention groups after three months of interventions and six months of observation. Body-weight gain was positively associated with age, length-for-age, weight-for-length, frequency of feeding of khichuri, egg, and potato ($p<0.05$). Ability of mothers to identify malnutrition improved from 15% to 99% in the INE group and from 15% to 100% in the INE+SF group, but reduced from 24% to 21% in the comparison group. Use of separate feed pots, frequency of feeding, and cooking of additional complementary feeds improved significantly in the INE and INE+SF groups compared to the comparison group after three months of interventions and six months of observation. It can be concluded from the findings of the study that intensive nutrition education significantly improves the status of moderately-malnourished children with or without supplementary feeding⁴⁰.

Malnutrition is a problem not only in rural area but also among the urban poor. Also, the urban poor are a neglected segment of population in terms of basic services and amenities. Nutrition in children is affected by various determinants including mother's level of knowledge, attitudes and practices. Hence, A study was conducted in an urban slum setting to understand the extent and determinants of malnutrition in children below five years of age. The study objectives were to understand the knowledge, attitude and practices of mothers with respect to nutrition of them under five children and to measure the extent of malnutrition in the sample population of under five children. That was a cross sectional study and data was collected on a sample of 300 children under

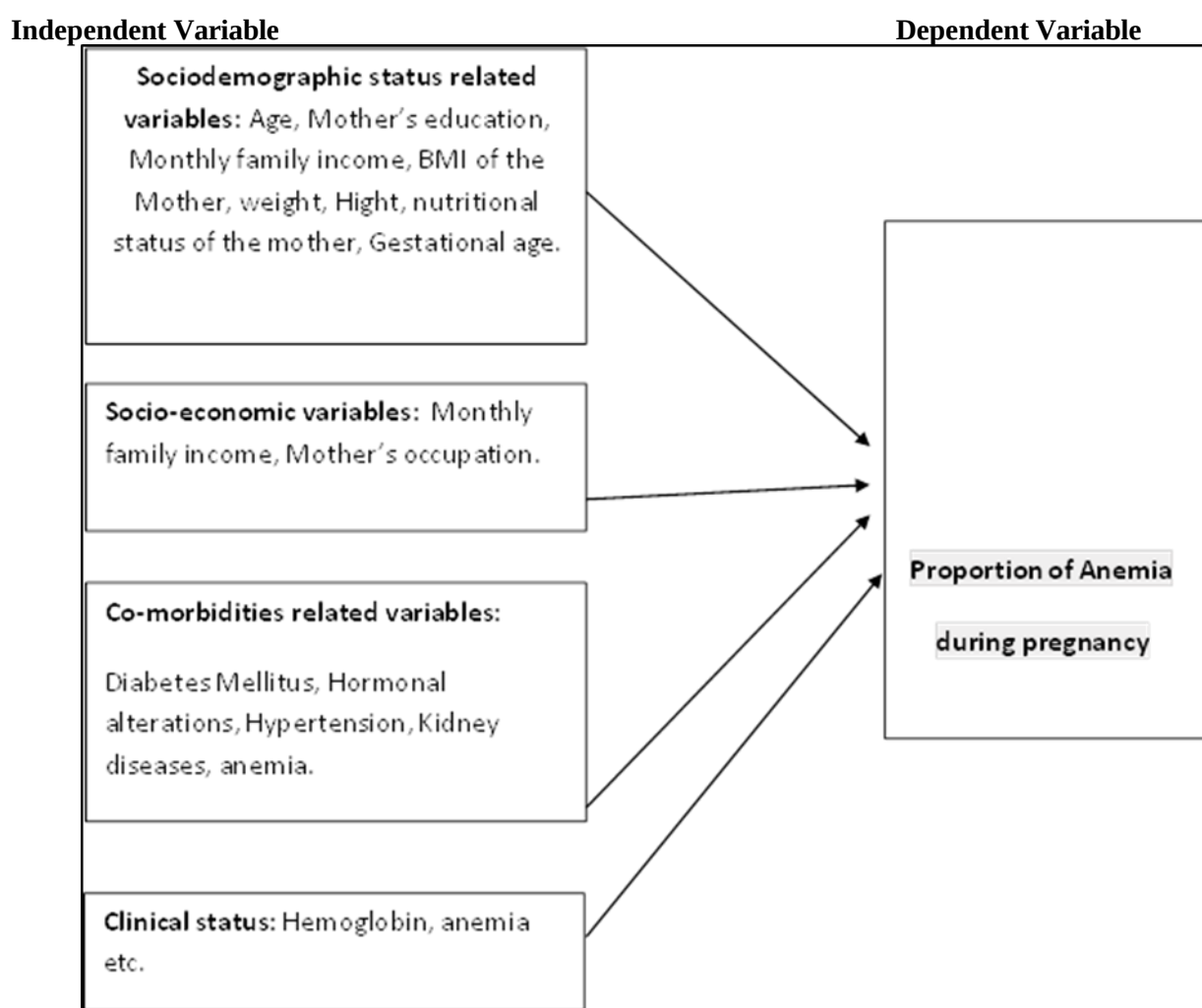
five years and their mothers selected through cluster sampling technique in Turbel stores urban slum community of Navi Mumbai. Using a semi-structured interview schedule, Knowledge, Attitude and Practice (KAP) on nutrition among mothers of these children were assessed and anthropometric measurements were taken. The study used the World Health Organization (WHO) guidelines for measuring malnutrition. Data was entered and analyzed using SPSS, version 20. z score analysis for malnutrition assessment was done using the appropriate WHO software. The knowledge levels of mothers regarding breast-feeding were mixed. Majority (88%) of the mothers were aware that only breast-feeding is required post-delivery, and duration of breast-feeding could be more than six months. there was a gap in knowledge about breast-feeding practice during infant illness. Only 9% of mothers had the correct knowledge to increase breast feeding if the infant was ill and 20% felt breast feeding should be decreased during illness of child. Mothers had very poor knowledge about nutritious food. The attitude score was created using the Likert scale with a minimum score of 16 and maximum score of 64. The mean attitude score was 54.29 with a standard deviation of 5.24. In terms of breast-feeding practices, 74 (24.6%) mothers did not initiate breast-feeding within one hour of birth, and only 21 (7%) mothers increased breast feed frequency during illness of child. Conclusion: The study found gaps in knowledge about breast-feeding practices among mothers and very poor practices related to adequate nutrition for children. Stunting was seen in more than 50 % of children. However, the mothers had a very positive overall attitude about improving nutrition of their children and were willing to learn about it. This provides a opportunity for a targeted intervention among the mothers of these children in the community⁴¹. An attempt was made to explore the predictors of child chronic malnutrition using the data of nationwide Bangladesh Demographic and Health Survey, 2004. The malnutrition status was measured according to the anthropometric indices and the analysis was carried out considering the groups of causes according to the UNICEF modified conceptual framework (basic, underlying, immediate and temporal). Logistic regression models were developed to identify the basic, underlying, immediate and temporal predictors according to the framework, and finally a combined model was developed using the

significant predictors from the preceding four models. The prevalence of child chronic malnutrition was found high (43%) in Bangladesh with 16.4% severely stunted. The findings indicate that child age, region, birth order and birth interval, mother's education, wealth status, number of sleeping room, family size and cooking place were the basic predictors. Food insecurity status, maternal care and receiving colostrum's were identified as underlying predictors; child feeding practices, receiving vitamin-A capsule by mother, acute respiratory infection (ARI) and incidence of diarrhea were immediate predictors; mother's

body mass index (BMI) and age at birth were temporal predictors. Final model indicates that chronic malnutrition was widely prevalent among the children belonging to Barisal division, ages 12-23 months, lower birth interval, households having large size, less sleeping room, poor wealth index, internal cooking place and mothers who were illiterate, thin, and insufficient maternal care recipients⁴².

RESEARCH METHODOLOGY

Conceptual Framework:



Study objectives:

General objective:

To reveal the factors associated with anemia during pregnancy in Mymensingh city, Bangladesh.

Specific objectives:

- To identify the socio-demographic characteristics of the respondents;

- To assess the anthropometric status of the respondent;
- To find out the clinical information of the respondent;

To reveal the factors associated with the anemic condition of the respondent.

Study design:

It was a descriptive type of cross-sectional study

following a quantitative design.

Study population:

The study population was the entire pregnant mothers in Mymensingh city.

Sample population:

Those pregnant mothers who took services from two different Maternity Hospitals in Mymensingh city. Study population is all pregnant women including this study who aged between 16 to 40 years.

Study site:

Mymensingh District is a district in Mymensingh Division, Bangladesh, and is bordered on the north by Meghalaya, a state of India and the Garo Hills, on the south by Gazipur District, on the east by the districts of Netrokona and Kishoreganj, and on the west by the districts of Sherpur, Jamalpur and Tangail.

Study area:

The study was conducted in 2 different maternity hospital: Marie Stopes Clinic, Mymensingh; the largest hospital for maternity and child care situated at Mymensingh and BRAC Maternity hospital were selected on the basis of convenience and accessibility.

Study period:

The study was conducted the period from January 2024 to April 2024.

Sample size:

The sampling size was determined by the following formula. Sample size for that proposed study was calculated by the following formula-

$$n = \frac{z^2 pq}{d^2}$$

Where,

$$d^2$$

n = required sample size

z = standard normal deviation with 95% CI which is set as 1.96

p = Prevalence of the undernutrition (among under five children) in India which is 18%⁴³ = 0.18

$$q = 1-p \quad \text{So, } q = 1-0.18 = 0.82$$

d = Acceptable error = 0.05

Required sample size, $n = \frac{z^2 pq}{d^2}$

$$z^2 pq$$

$$d^2$$

$$= 226.8 \approx 227$$

Due to inadequate time, source, and financial limitation researcher collected 200 samples with the consent of the guide.

Inclusion and exclusion criteria:

Inclusion criteria:

- Those pregnant mothers who gave consent was included in the study.
- Only mothers who have children under five years of age.

Exclusion criteria:

- Respondents who refuse to provide informed consent
- Respondent with major psychiatric problem

Sampling technique:

Non-randomized Purposive sampling technique was applied.

Data collection tools:

A Semi-structured, pre-tested and modified questionnaire was used to collect the data

Data collection technique:

All the data were collected by face-to-face interview.

Data management and analysis:

Data was collected and verified daily for accuracy. Coding was done by giving a serial number for each answer. After that data was transferred to appropriate tables and analyzed and interpreted in appropriate statistical inferences. All the data entered and analyzed by using Statistical packages for social science (SPSS) software version 16.0, (Chicago, USA). Processed data was presented in the form of percentage, tables and charts and bars. Further, it will analyze significantly with the help of Mean, Standard Deviation and Regression analysis and P-value. Finally, the data was interpreted on the basis of study findings.

Limitation of the study:

As the sample collected purposively, so it may differ from the actual parameter of the population. There is a question about the reliability of the answer of the respondent. He might conceal the fact. It also affects the result. Time was too short to conduct such a study. There is also fund crisis to

conduct such a study.

Time line of study:

Activities	Months	January 2024				February 2024				March 2024				April 2024			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Proposal writing																	
Literature review																	
Proposal defense																	
Pretest of questionnaire																	
Data collection																	
Data entry																	
Data analysis																	
Report writing																	
Draft submission /Thesis defense																	
Final report submission																	

RESULTS

The descriptive type of cross-sectional study was conducted to assess the factors associated with anemia among the pregnant women in Mymensingh city, Bangladesh with a sample size of 200. A pre tested modified interviewer administrated semi structured questionnaires was used to collect the information. All the data were entered and analyzed by using Statistical packages for social science (SPSS) software

version 16.0 (Chicago). The salient features of this study are presented in the following sections:

Distribution of Participated Mother's Age:

In this study, 200 pregnant mothers were assessed in the selected areas of Dhaka city where most of the respondents (51%) were belong to 18-23yrs aged group and 36% were 24-28yrs aged group and 10% were 29-35 yrs. aged group and rest 3% were more than 36yrs aged. (Figure -1).

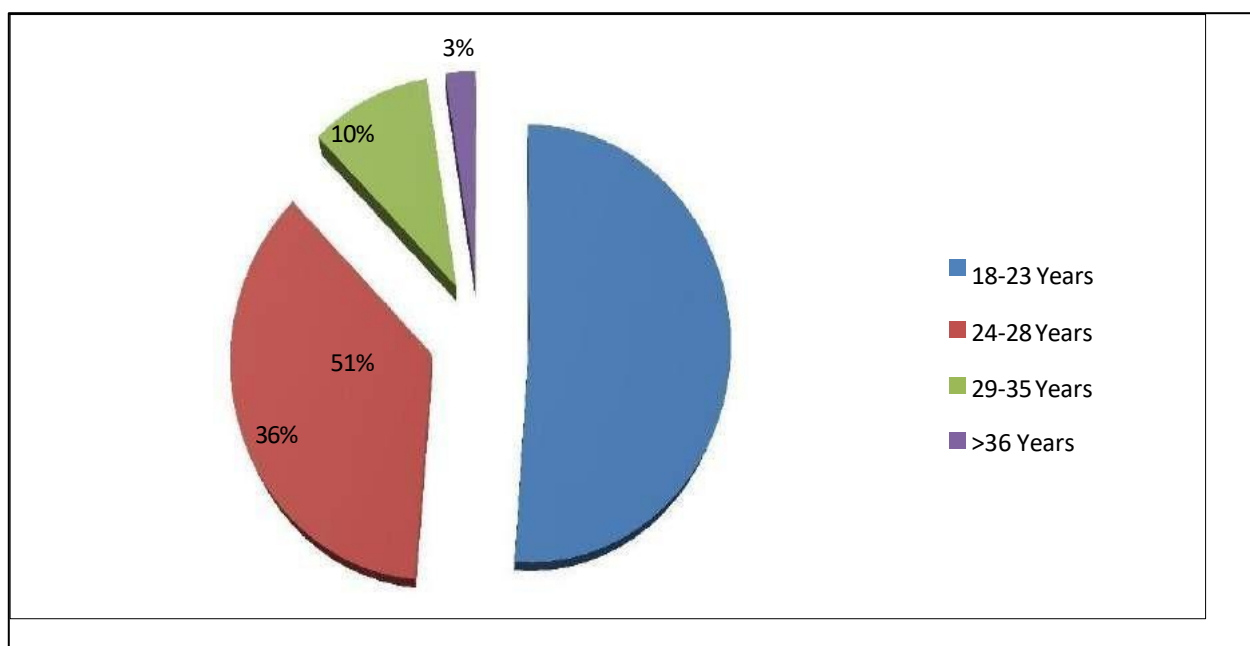


Figure.1 Age of the participated mother in the study. Distribution of Participated pregnant Mother's

Education

This figure 2 shows that most of the respondents (35%) were H.S.C. level educated and 31.25% were S.S.C. level, 22.5% were class 01-10 level,

8.75% were Bachelor degree level, 1.25% were Master's degree level and 1.25% were from technical or other.

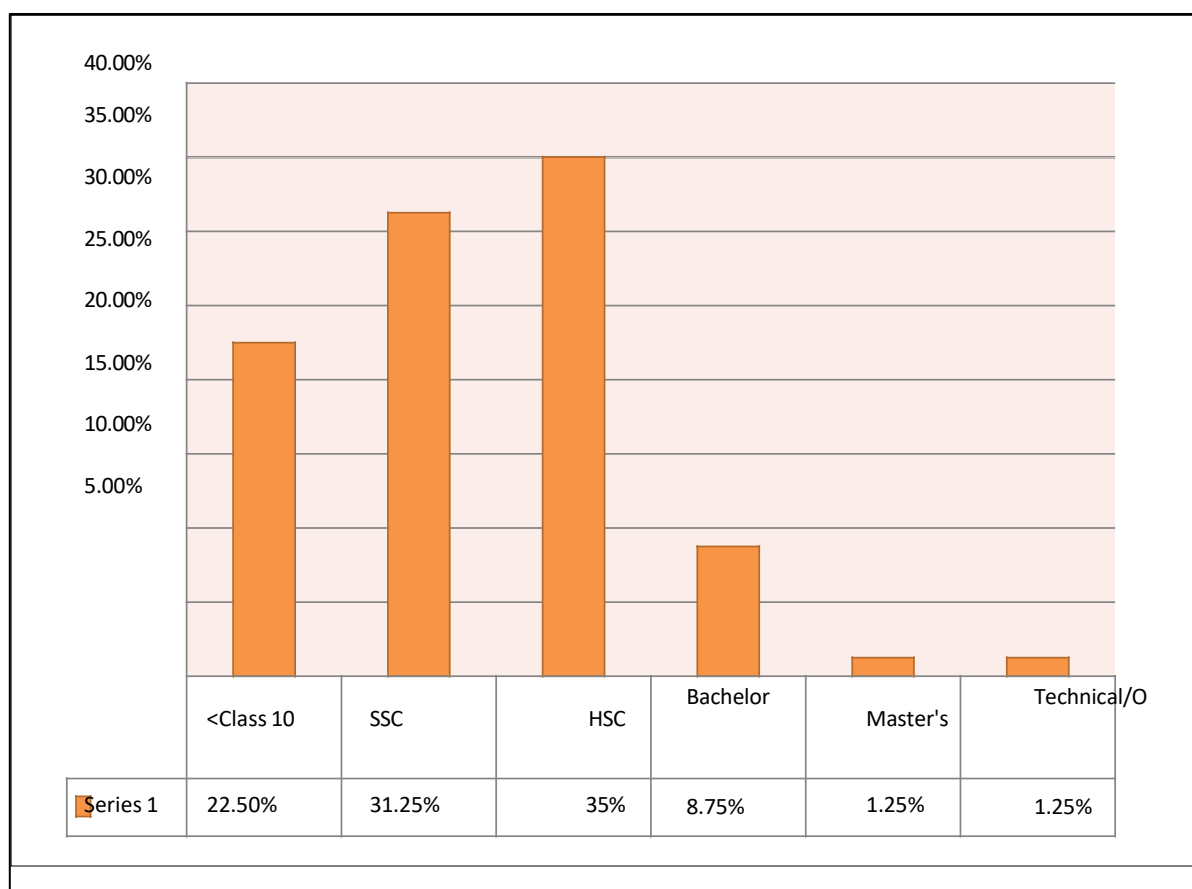


Figure 2: Distribution of pregnant mother by the level of education.

Distribution of respondents by monthly family income:**Table 1:** Distribution of responded by monthly income of the Family

Monthly Income	Frequency (N)	Percentage (%)
<less than 10,000	26	20%
10,000-20,000	143	53.75%
30,000-40,000	29	23.75%
40,000-50,000	2	2.5%
>50,000	0	0%
Total	200	100%

This table shows that majority (53.75%) respondents has 10-20 thousand monthly family income and 23.75% has 30-40 thousand, 20% has

less than 10 thousand and 2.5% has 40-50 thousand.

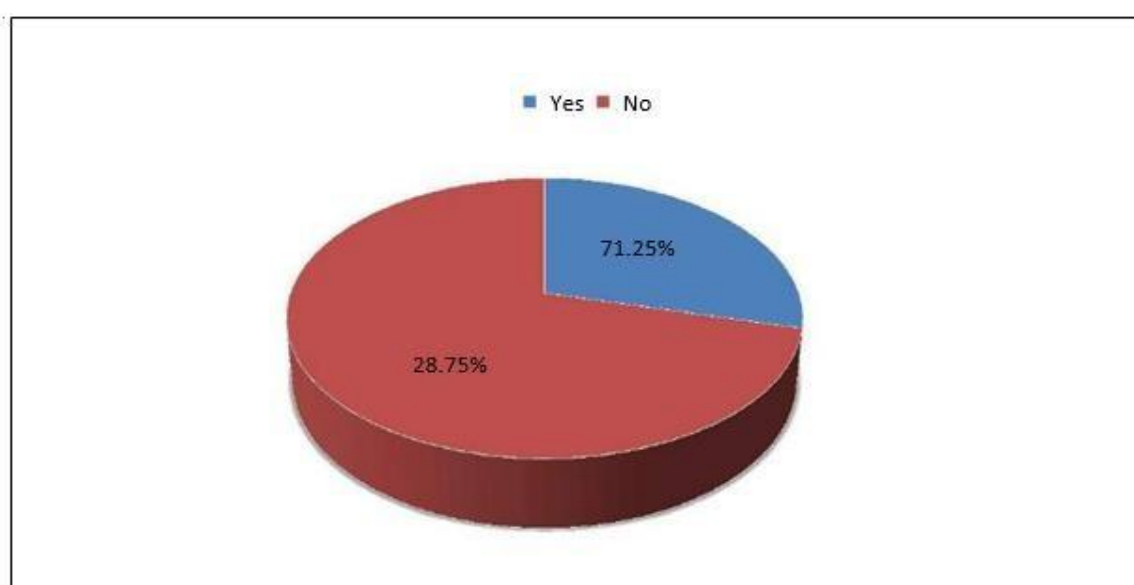
Distribution of the respondents by their type of service:

Figure 3: Distribution of pregnant mother by service. Study revealed that Majority of respondent (71.25%) was not service holder and 18.75% were service holder. (Figure-3)

Table 2: Distribution of respondent by Gestational age.

Gestational age of respondents (weeks)	Frequency (N)	Percentage (%)
28-31	25	18.75%
32-35	145	56.25%
>35	30	25%
Total	200	100%

The table shows that majority 56.25% mother's gestational age were 32-35 weeks, 25% were more than 35 weeks and 18.75% were 28-31 weeks of gestational age.

Distribution of Maternal Clinical Conditions:

Maternal Anthropometric status was determined by the Hb level and the level of anemia in different trimesters.

Table 3: Mean, SD and Median for Hb level of pregnant mothers.

	Mean Hb (g/dl)	±SD	Median Hb (g/dl)
Anemic	10.17	0.770	10.50
Non- anemic	12.01	0.879	11.70

This table-3 revealed the mean Hb level. It shows that Mean Hb level for anemic respondent is 10.17

(± 0.77) and 12.01 (± 0.879) for non-anemic.

Table 4: Distribution of pregnant mother by level of anemia in different trimesters

	1 st Trimester (%)	2 nd Trimester (%)	3 rd Trimester (%)
Mild anemia	83	80	95
Moderate Anemia	28	62	60
Severe Anemia	30	16	29

This table shows that 83% of respondent were mild anemic in 1st trimester. Majority 80% were mild anemic in 2nd trimester and it increased to 95% at 3rd trimester. 28% were moderate anemic in 1st trimester. 62% were moderate anemic in 2nd trimester and it decreased to 60% at 3rd trimester. 30% were severe anemic in 1st trimester and it decreased to 16% at 2nd trimester and again increased 29% at 3rd trimester.

Distribution of Maternal Anthropometry:

Maternal Anthropometric status was determined by the indicator called Body Mass Index (BMI). BMI is based on a Weight to Height ratio that is considered a good index of body fat and protein stores. According to BMI of mother after child birth were classified into four groups.

Table 5: Distribution of pregnant mother by BMI

BMI Range	Classification	Percentage (%)
<19	Under weight	22.5%
20-23	Normal healthy	61.25%
24-26	Over weight	15%
27-29	Mild obese	1.25%
>30	Obese	1%

This table shows that majority of respondents (61.25%) were in normal health, 22.5% were under weight and 15% were overweight. Only 1.25% were mild obese but no obese was found.

ASSOCIATION AMONG DIFFERENT PARAMETERS:

Association between age and the anemic conditions of the respondents:

Table 6: Distribution of pregnant mother by Anemic and Non-anemic by their Age

	Anemic		Non-Anemic	
	Percent (%)	Number (N)	Percent (%)	Number (N)
18-23	26%	40	74%	60
24-28	32%	45	68%	55
29-32	30%	44	70%	56
33-35	35%	58	65%	52
>36				

This table shows that 26% were anemic and 74% were non anemic belong to 18-23yrs aged group. 32% were anemic and 68% were non anemic belong to 24-28yrs aged group. 30% were anemic and 70% were non anemic belong to 32-35yrs aged group.

Figure 4 represents that, Majority of pregnant mothers (63.75%) had her 1st pregnancy. 18.75% had 1-3yrs gap, 7.5% had 4-5yrs gap, 7.5% had 6-7yrs gap and only 2.5% had 11-24yrs gap between their present and previous pregnancy.

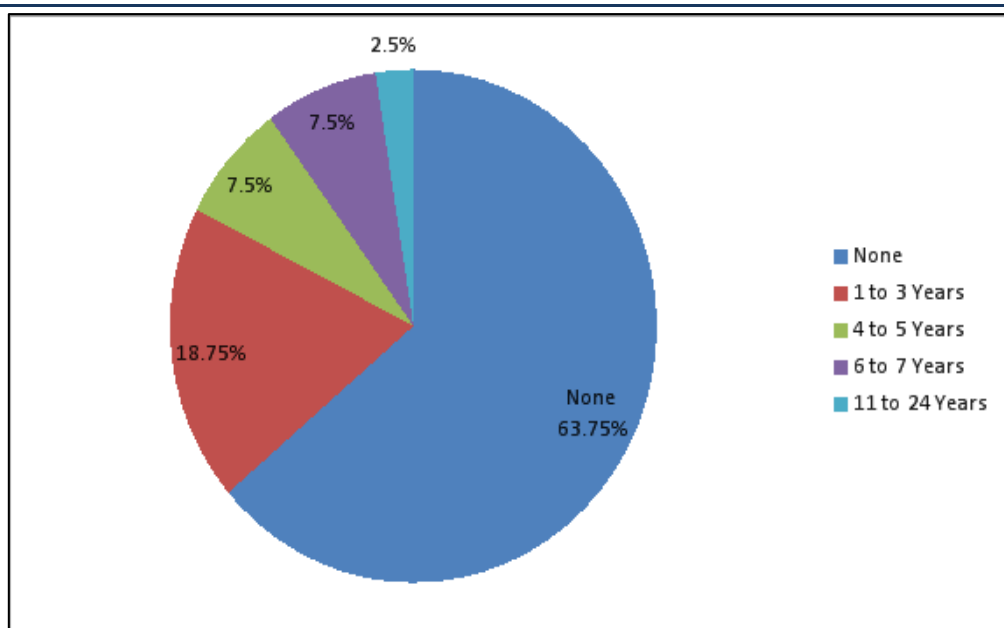


Figure-4: Distribution of the respondents by the birth year gaps. Drug history of the respondents:

Table 7: Distribution of respondent by IFA tablet taken.

Do you take IFA tablet	Frequency (N)	Percentage (%)
Yes	149	61%
No	51	39%
Total	200	100

This table expressed that most of the mothers (61%) had taken IFA tablet and 39% negatively replied.

Table 8: Distribution of respondent by taking any Vitamin supplement

Any Vitamin Supplement	Responses	
	Number	Percentage
Vit B	12	8.7%
Vit C	10	7.5%
Folic Acid	23	16.25%
Multivitamin	150	67.5%
Total	200	100%

This table shows that 67.5% mother positively answered about taking Multivitamin. 8.7% mothers consumed Vitamin-B and 7.5% consumed Vitamin-C. Others (16.5%) took folic acid tablet.

DISCUSSION

Maternal health status, habits, and environment during and even before pregnancy profoundly impact the health and well-being of a child. Thus, achieving optimal child health is dependent upon optimizing the health and well-being of a child's mother. Child health is foundational to adult health and well-being. When children's health is nurtured and supported and there is an absence of physical and mental abuse, or other intentional childhood trauma; and there exists opportunities to gain

habits that support good health during childhood, the stage is set for a healthy adulthood less likely to include chronic health problems such as overweight/obesity, poor oral health, diabetes and other chronic physical and mental health problems. The last few decades have brought significant improvements in child health in Bangladesh. The mortality rate in children under-five declined from 152 deaths per 1,000 live births to 94 deaths per 1,000 live births, but these rates are still high, and have remained constant for several years. Pneumonia, diarrhea, measles, malaria, malnutrition, injuries and the high number of neonatal deaths, and poor care-seeking behavior, all contribute to the high levels of child mortality. Because of this reason the study has been

conducted in the selected areas of Mymensingh City to identify present situation of maternal and child health.

A descriptive cross-sectional study was carried out among the 200 pregnant mothers selected purposively from different parts of the Mymensingh City.

In this cross-sectional retrospective study data was collected from Azimpur and Mohammadpur in Dhaka city. In this study maternal anemia were assessed by using maternal hematology data. Along with maternal demographic, anthropometric, disease and dietary data also collected to identify the relative factors.

The result of this study conducted in a representative group of Bangladesh pregnant mother showed the anemia status. 200 purposively selected participants attend in this study in which most of the respondents (51%) were belong to 18-23yrs aged group and 36% were 24-28yrs aged group and 10% were 29-35yrs aged group and rest 3% were more than 36yrs aged.

Most of the respondents (35%) were H.S.C. level educated and 31.25% were S.S.C. level, 22.5% were class 01-10 level, 8.75% were Bachelor degree level, 1.25% were Master's degree level and 1.25% were from technical or other. Majority (53.75%) respondents has 10-20 thousand monthly family income and 23.75% has 30-40 thousand, 20% has less

than 10 thousand and 2.5% has 40-50 thousand. Majority of respondent (71.25%) was not service holder and 18.75% were service holder.

Majority 56.25% mother's gestational age were 32-35 weeks, 25% were more than 35 weeks and 18.75% were 28-31 weeks of gestational age. Mean Hb level for anemic respondent is 10.17 (± 0.77) and 12.01 (± 0.879) for non-anemic. 83% of respondent were mild anemic in 1st trimester. Majority 80% were mild anemic in 2nd trimester and it increased to 95% at 3rd trimester. 28% were moderate anemic in 1st trimester. 62% were moderate anemic in 2nd trimester and it decreased to 60% at 3rd trimester. 30% were severe anemic in 1st trimester and it decreased to 16% at 2nd trimester and again increased 29% at 3rd trimester. Majority of respondents (61.25%) were in normal health, 22.5% were under weight and 15% were overweight. Only 1.25% were mild obese but no obese was found. 26% were anemic and 74% were

non anemic belong to 18-23yrs aged group. 32% were anemic and 68% were non anemic belong to 24-28yrs aged group. 30% were anemic and 70% were non anemic belong to 32-35yrs aged group. Majority of pregnant mothers (63.75%) had her 1st pregnancy. 18.75% had 1-3yrs gap, 7.5% had 4-5yrs gap, 7.5% had 6-7yrs gap and only 2.5% had 11-24yrs gap between their present and previous pregnancy. Most of the mothers (61%) had taken IFA tablet and 39% negatively replied.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Bangladesh already gained the MDG5. That was "Reduce by three quarters, between 1990 and 2015, the mortality ratio". Bangladesh's current MMR is about 194 maternal deaths per 1,00,000 live births, but between 1998-2001 this averaged 322 per year and in the intervening years, notes the Lancet, the country beat all expectations with a deadline of 5.6% a year. This means MMR in Bangladesh has fallen by more than 66% over the last two decades. But still mothers are suffering from anemia. Anemia is a major cause of maternal mortality. Anemia in pregnancy is associated with adverse consequences both for the mother and the fetus. Studies have shown that the adverse consequences of maternal anemia may affect not only the neonate and infant but also increase the risk of non-communicable diseases when the child grows into an adult and at risk of low birth weight in the next generation.

Anemia is associated with many factors: wrong food habit, lack of hygiene practice, worm infestation, any chronic disease can cause anemia.

This study shows that majority of mothers started their pregnancy with anemia. That may cause adverse effect on her fetus. Though none of them were severely anemic. IFA tablet can improve HB status. Maternal diet is also an effective factor to reduce anemia. Our awareness about pregnant mother and necessary care can reduce anemia and it would help us to make us a healthy nation.

During pregnancy efforts should be made towards early diagnosis and treatment of all anemic women before delivery. Qualified nutritionist should be integrated in the management of anemic pregnant women. Medical officers in charge of the treatment should endeavor to do further investigation on anemic pregnant to identify the etiology whenever possible.

Recommendations

Despite of government's many steps to reduce anemia, still anemia is a great public health problem in Bangladesh. Awareness should rise. Extra care and awareness can reduce maternal anemia. To prevent anemia in pregnancy steps should be taken from the adolescent period which is a stage when a girl can become anemic easily. If a girl becomes pregnant with anemia, she will suffer a lot of complications and it also affects her baby too. So, awareness should take place from adolescence period. As blood volume increases in pregnancy period so a mother should consume protein, iron and vitamins rich food to supply the demand of both. Iron and vitamin supplements should include. Infectious diseases and infestations should be prevented. Appropriate dietary habits and hygiene practice can reduce prevalence of anemia. So, IFA supplementation program should be more successful and government should take more effective steps to rise community awareness and prevent anemia. Along with nutritional knowledge and awareness about anemia should developed in the family members of pregnant mothers. Anemic mothers should eat animal source foods because it contains vitamin B12 and heme iron along with vitamin C rich food, because iron cannot be absorbed without vitamin C. Dried fruit and nuts provide iron and green leafy vegetables contain folic acid. So, anemic pregnant mother should eat these foods regularly.

Misconception about some foods or food taboos during pregnancy can be eliminated by raising public awareness. Specific nutrition education with dietary advices on quality, quantity and frequency should be applied.

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Abbreviations And Acronyms

HB: Hemoglobin

IFA: Iron and Folic Acid

OIC: Organization of Islamic Cooperation

WHO: World Health Organization

MMR: Measles, Mumps, Rubella

MDG: Millennium Development Goal

SES: Socioeconomic status

BMI: Body Mass Index

IGT: Impaired Glucose Tolerance

CI: Confidence Interval

OR: Odds Ratio

SPSS: Statistical Package for Social Science

RR: Relative Risk

SD: Standard Deviation

NIDDM: Non-Insulin-Dependent Diabetes Mellitus

US: United States

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