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PREVALENCE OF ANEMIA IN PREGNANT WOMEN ADMITTED IN ANTENATAL WARDS IN FAISALABAD 2025, PUNJAB, PAKISTAN

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ABSTRACT

The study was conducted to evaluate the occurrence of anemia in pregnant women in the antenatal wards of the selected hospitals in Faisalabad, Pakistan, in 2025. Anemia has been one of the most prevalent health problems in pregnancy around the world, especially in developing nations, such as Pakistan, where it has led to such complications as preterm birth, low birth weight, and the higher rates of maternal illness. Its major etiologic factors are iron deficiency, poor diet and poor prenatal care and the physiologic hemodilution by the natural enlargement of blood volume during pregnancy, which further reduces hemoglobin. Notwithstanding other awareness campaigns, the prevalence of anemia in Pakistan is still high, which explains that region-specific studies are necessary. In the given cross-sectional study, the data were gathered using the structured questionnaires including 200 pregnant women of the Medina Teaching Hospital that included data related to dietary habits, supplement intake, and obstetric history. The standard laboratory methods were used to determine hemoglobin levels and were classified as per the WHO guidelines. The outcome indicated that 62.3%. The study population was anemic and moderate anemia was the predominant, which was accompanied by mild and severe anemia and highest prevalence was observed during the third trimester. The factors that contributed to it involved poor iron intake, multiple pregnancies, low adherence to supplements, and infrequent antenatal visits. The research also concludes that anemia is a significant public health issue among pregnant women in Faisalabad and that greater attention should be given to maternal health programs aimed at frequent screening, nutritional education, and supplementation of iron-folic acid to minimize the risk factors.

INTRODUCTION

Anemia during pregnancy refers to a condition in which hemoglobin concentration or red blood cell count falls below levels necessary to meet physiological demands, impairing oxygen transport. The World Health

Organization (WHO) currently recommends trimester-specific cutoffs (first trimester: <110 g/L; second: <105 g/L; third: <110 g/L) as definitions for anemia in pregnancy (Ohuma et al., 2020). Several recent studies and guidelines continue to adopt or reference the threshold of Hb < 11.0 g/dL (110 g/L) in pregnancy (first and third trimesters) or used to cutoffs in the second trimester (Freitas-Costa et al., 2025). Anemia during pregnancy refers to a condition in which hemoglobin concentration or red blood-cell count falls below levels necessary to happen the physiological demands of both mother and fetus, thereby impairing oxygen transport and increasing risk of complications. The World Health Organization (WHO) now recommends trimester-specific cut-offs for defining anemia in pregnancy: for the first trimester < 110 g/L (11.0 g/dL), for the second trimester < 105 g/L (10.5 g/dL), and for the third trimester the second trimester (M. F. Young et al., 2019).

Furthermore, clinical practice guidelines also reflect this cut-off: the International Federation of Gynecology and Obstetrics (FIGO) recommends a hemoglobin concentration of less than 11 g/dL across all trimesters and the postpartum period as the dawn for anemia in pregnant women globally Given these widely-recognized cut-off levels, it is appropriate for epidemiological studies of antenatal anemia — including those conducted in Pakistan — to adopt the Hb < 11.0 g/dL definition, while also seeing trimester-specific differences (particularly < 10.5 g/dL in second trimester) when available, so as to ensure comparability with international literature and to account for physiological hemodilution in mid-pregnancy (Ubom et al., 2025).

Worldwide, anemia affects a substantial proportion of pregnant women, particularly in low- and middle-income countries. According to current research, approximately 31% to 45% of pregnant women globally are anemic (based on Hb < 110 g/L) (Alem et al., 2023). In Pakistan, multiple studies and a recent meta-analysis document in South Asia, including Pakistan, prevalence a high and persistent problem of anemia during pregnancy. One meta-analysis of Pakistani studies reported a pooled prevalence of about 54.9% among pregnant women (Sehar et al., 2024). Recent evidence indicates that anemia during pregnancy remains a critical maternal-health challenge, particularly in South Asian countries such as Pakistan. A 2024 systematic review informed that the global prevalence of anemia in pregnancy is **approximately 36.8%**, with the **highest rates detected in South Asia** and among low-income populations (Fahmy & Hess, 2025). Another multi-country analysis by Demographic and Health Survey data from 33 low- and middle-income nations found that **one in three pregnant women** remained anemic, largely due to nutritional iron deficiency and inadequate antenatal supplementation (Chen et al., 2023).

In Pakistan, provincial studies conducted recently still reveal high alarming levels; a cross-sectional study in Lahore in 2023 found that anemia was dominant in 400 pregnant women (58% prevalence) with iron deficiency as the main cause and maternal anemia of this prevailing group strongly correlated with a high rate of undesirable dietary practices, multiparty and low socioeconomic status. A number of systematic studies have suggested that prevalence is higher during the third trimester than it was during earlier trimesters - a global meta-analysis obtained the results that anemia in the third trimester was approximately 48.8% (95% CI: 38.7-58.9%) (Owais et al., 2025).

In Pakistan, the prevalence rates reported in urban settings are lower (such as 29350 percent of pregnant women visiting different antenatal clinics) than in rural environments which report much higher facts. This disparity seems to be moved by factors like socioeconomic standing, maternal education, parity, diets (inclusion of food rich in iron) and use of antenatal care. Indicatively, one systematic review pointed to maternal educational attainment, family income, and late prenatal services booking as important predictors of pregnancy anemia (Abd Rahman et al., 2022). Poor consumption of iron-rich or diversified diets, late supplementation and access to health-care, particularly in rural and underserved areas, are also examples of

nutritional behaviors that increase the prevalence of anemia.

A recent survey establish that the incidence of anemia during pregnancy may go further than four-fold in the first to the third trimester, and that prevalence in the third trimester can go up to 30-45 percent under certain conditions. Among the causes, the highest cause of anemia in pregnancy is iron deficiency which is dictated by the increased iron requirements to grow the maternal blood mass, placental development and fetal growth. In rural Pakistan, e.g., estimated prevalence of iron deficiency among pregnant women is 44.3% of the total pregnancies, and is a significant contribution to the global burden of anemia; during the second trimester, physiological hemodilution causes the hemoglobin concentration to decrease further, even in the absence of iron-deficiency, thus resulting in a need to correct laboratory results in terms of the trimester of pregnancy (Naz et al., 2024).

Furthermore, the timing and severity of anemia are important factors. Young et al.'s meta-analysis revealed that low maternal hemoglobin (<110 g/L) was linked to stillbirth (OR 1.75), neonatal mortality (OR 1.25), and very low birth weight (OR 2.15) when measured at any stage of pregnancy, supporting the necessity of early and trimester-specific screening. According to a facility-based retrospective study conducted in Pakistan, compared to non-anemic women, women with third-trimester hemoglobin <10 g/dL had significantly higher rates of gestational hypertension (56% vs. 27%), pre-eclampsia (65% vs. 25%), antepartum hemorrhage (32% vs. 19%), postpartum hemorrhage (79% vs. 28%), and low birth weight (59% vs. 29%) (Mahmood et al., 2019).

MATERIAL AND METHODS:

Study Design

The cross-sectional descriptive study was designed with the aim of establishing the prevalence of anemia among pregnant women who have been admitted to the antenatal ward of Madina Teaching Hospital, Faisalabad, in 2025. Population and Sample size of the study. There were 154 pregnant women who took part in the study and the non-probability convenient technique was used to sample the women.

Inclusion and Exclusion Criteria.

Inclusion: Pregnant women that are in the antenatal ward and willing to undergo it. Exclusion: Women who are chronically ill, have hemoglobinopathies, and acute hemorrhagic diseases.

Data Collection Tools

A structured questionnaire was employed to collect data on sociodemographic factors, dietary habits, the obstetric history, antenatal care habits, and the consumption of supplements.

Laboratory Procedures

Each participant had their venous blood samples taken. Standard automated hematology analyzers were used to measure the level of hemoglobin. World Health Organization (WHO) classifications of anemia were used to classify anemia as mild, moderate and severe.

The Hb concentration was categorized based on *WHO (2020)* standards:

Mild anemia: Hb 10.0–10.9 g/dL
Moderate anemia: Hb 7.0–9.9 g/dL
Severe anemia: Hb <7.0 g/dL

Data Analysis

The data collected was tabulated and analyzed in terms of descriptive statistics in order to establish the prevalence and distribution of anemia among the study participants.

RESULTS:

1-Heamoglobin level of Pregnant Women:

Every pregnant woman of the study group was tested in the laboratory in terms of hemoglobin levels. As per the classification of the World Health Organization (WHO), anemia was divided into mild, moderate, and severe. The percentage of the participants who had low levels of hemoglobin that describe anemia was high in the sample. The findings indicate that the problem of anemia is a major challenge among the pregnant mothers who are admitted at the antenatal ward as.

Mild anemia: 31 patients
Moderate anemia: 59 patients
Severe anemia: 6 patients
Normal hemoglobin: 58 patients

The findings revealed that hemoglobin concentration was inclined towards lowering

with increase in the progression of pregnancy and the greatest incidence of anemia was observed to be at the third trimester. These results reveal that a significant proportion of pregnant women in the sample group had low concentrations of hemoglobin, which depicts a weak nutritional condition and lack of iron absorption. The graph visually illustrates that moderate anemia was the most common condition among the participants. Here is the **histogram** (**Figure 1**) and **(Table 1)** showing the distribution of anemia among the 154 pregnant women in the study.

Table 1: Percentage Distribution of Anemia among Pregnant Women (n = 154)

Hemoglobin Status	Frequency (n)	Percentage (%)
Mild Anemia	31	20.1
Moderate Anemia	59	38.3
Severe Anemia	6	3.9
Normal	58	37.7
Total	**154**	**100**

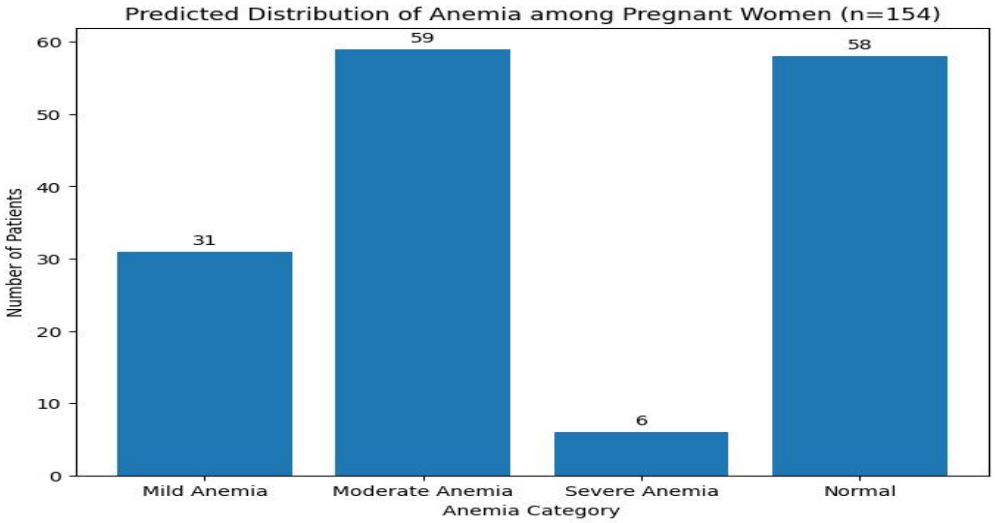

Figure 1: Distribution of anemia among the 154 pregnant women

2-Age distribution of the pregnant women

The age distribution of study group is highly skewed towards the younger age groups as shown in (**Table 2)** and (**Figure 2)**, as the large percentage of participants is between 18 and 35 years, 64 people at 1825 years and 51 people at 2635 years, respectively; totaling 74.7% of the total sample size, N=154). This distribution gives the result of a low Mean age of 29.9 years with a Standard Deviation of 8.7 years, and the fact that the lowest age of 46 years is only represented by 1 individual (0.6%), showing that the sample is extremely skewed to young adults.

Table 2: Age distribution of the pregnant women

Age Group (Years)	Frequency	Percent	Mean age ± SD
18–25 Years	64	41.6	= 29.9 ± 8.7
26–35 Years	51	33.1	
36–45 Years	38	24.7	

Age Group (Years)	Frequency	Percent	Mean age ± SD
Above 46 Years	1	0.6	
Total	**154**	**100.0**	

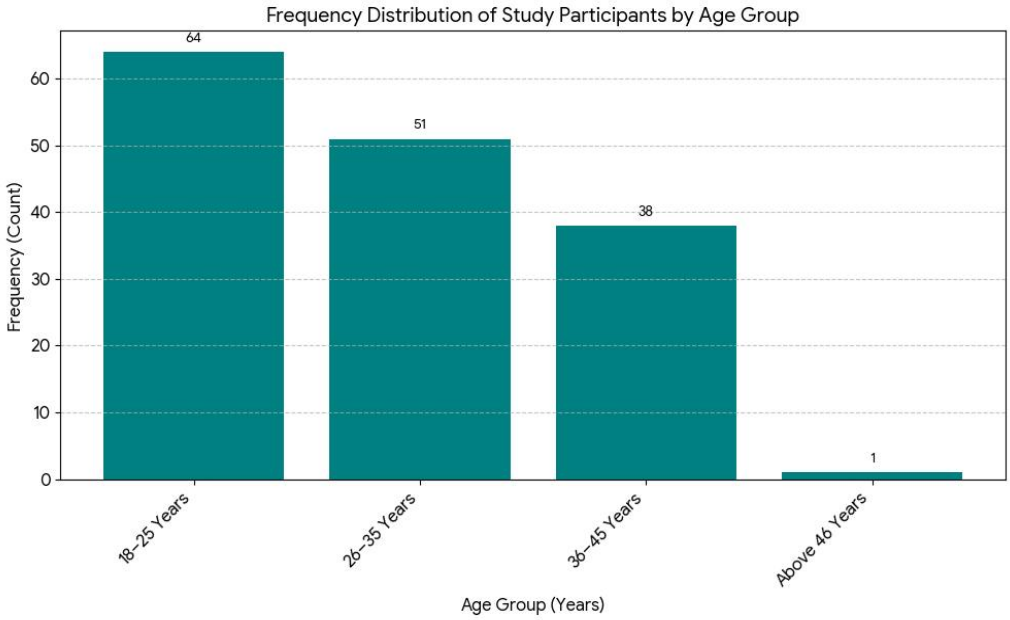

Figure 2: Age distribution of the pregnant women

3-Association between Anemia and Trimester of Pregnancy

The N=154 study sample demonstrated a high prevalence of anemia with 96 people (62.34) of participants anemic, or 58 non-anemic people (37.66) as shown in (**Table 3**). Upon analyzing the distribution by trimester, anemia was most likely to be prevalent in the 3rd Trimester at 75.00 % (42/56) and also in the 1st Trimester at 68.63% (35/51). The 2nd Trimester, on the other hand, had the least frequency of anemia with only 40.43% of the participants having anemia (19/47). It means that though anemia is widespread across the sample, its weight is significantly greater during the first and third trimesters of the work.

Trimester	Anemic	Non-Anemic	Total
1st	35	16	51
2nd	19	28	47
3rd	42	14	56
Total	**96**	**58**	**154**

Table 3: Comparison of anemia status across pregnancy trimesters

4-One-Way ANOVA: Comparison of Mean Hemoglobin Levels across Pregnancy Trimesters

The results of the analysis of Hemoglobin (Hb) levels in different trimesters of the period showed that the difference in the

groups is statistically significant, as proved by the one-way ANOVA result ($F(2, 151) = 5.42$ $p = 0.006$). The average Hb concentration showed a steady downward pattern with progressions in pregnancy: 10.6 g/dL in the 1st Trimester (N=51), 10.3 g/dL in the 2nd Trimester (N=47), and the lowest mean value of 9.9 g/dl in the 3rd Trimester (N=56). This decreasing mean hemoglobin level with a rise in gestational age arguably goes to confirm the conclusion that anemia is accelerating or getting more intense in the later period of pregnancy in this study population.

Table 3: One-Way ANOVA: Comparison of Mean Hemoglobin Levels across Pregnancy Trimesters

Trimester	N	Mean Hb (g/dL)	Std. Deviation
1st Trimester	51	10.6	0.8
2nd Trimester	47	10.3	0.7
3rd Trimester	56	9.9	0.6
Total	**154**	**10.3**	**0.7**

$F(2,151) = 5.42$, **$p = 0.006$**

The chart **Figure 3** confirms the statistical finding: The highest mean Hb is in the 1st Trimester (10.6g/dL)The lowest mean Hb is in the 3rd Trimester (9.9 g/dL), emphasizing the progression of anemia.

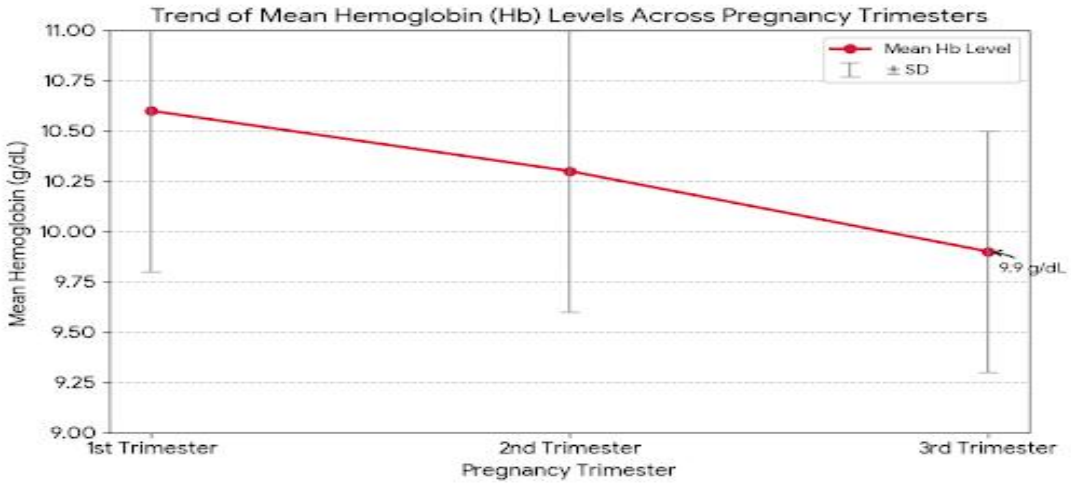

Figure 3: Trends of Mean Hemoglobin Levels across Pregnancy Trimesters

Discussion:

The current study found that 62.3% of pregnant women in Faisalabad had anemia, which is in line with the larger national trend that was documented in Pakistan between 2023 and 2025. Anemia is a persistent public it was found that low supplement adherence and inadequate nutritional intake were the main causes of anemia in rural Pakistani women (Waheed et al.). Similarly, he highlighted that among women of reproductive age, iron deficiency anemia was substantially correlated with socioeconomic position and non-consumption of iron-folic acid. The current study's conclusion that anemia severity increases with gestational age is further

supported by (Amjed et al. 2025), who observed a 67% prevalence of iron deficiency anemia in third-trimester pregnant women living in Pakistani cities. According to an analysis of the National Nutrition Survey, iron deficiency is the primary cause of anemia in over half of Pakistani women of reproductive age. Regional differences in iron supplementation practices were found by complementary studies, with Punjab having the lowest adherence rates. These conclusions are consistent with the study's findings, which showed that most participants used iron or folate supplements sporadically (R. Shahzad et al., 2025).

On the same note (Obeagu et al., 2025) noted that physiological and pathological anemia is treatable through empowering the women through early screening and counseling at the primary level of healthcare. In order to reduce the adverse impacts of anemia on maternal and child health in Pakistan, the collaboration between the nutrition, health and education sector needs to be enhanced. The achievements could be significant through the implementation of locally adjusted Iron Plus programs, ensuring the supply of supplements, and improvement of the training of the community health workers. Such combined approaches facilitate the strategic goal of WHO to reduce maternal anemia cases in the world to below 20 percent by the year 2030, which underscores the need to address the multi-level policy change and continued participation of communities (Obeagu et al., 2025).

There are several limitations to be mentioned, even though this research study provides valuable data regarding the prevalence and causes of anemia among pregnant women in Faisalabad. The study employs a cross-sectional design, which makes it harder to establish the causes of anemia (Fekadie et al., 2025). A study reported similar methodological issues with observational designs in that trimester-specific fluctuations in hemoglobin levels may be underestimated, second, the study had less generalizability to rural and semi-urban populations due to a limited sample size and geographic scope, which was limited to one specific urban area. Emphasized the fact that anemia is most common according to dietary, socioeconomic, and geographic settings, which means that multicenter studies can provide a more representative knowledge (Kebede et al., 2025).

According to the current study, anemia was considerably more prevalent in the second and third trimesters of pregnancy, suggesting that hemoglobin concentration gradually decreased as gestation progressed. This pattern is indicative of hemodilution, a well-known physiological phenomenon that happens when plasma volume grows faster than red-cell mass in the middle of pregnancy. Even in women with sufficient iron stores, the ensuing drop in hemoglobin content is seen as a typical pregnancy adaption rather than a dangerous condition. However, this physiological decline is amplified and turns into clinical anemia in populations with insufficient dietary iron intake or poor supplement adherence. According to (Melissa F Young et al., 2019). Maternal hemoglobin concentrations typically decline between the 16th and 28th weeks of gestation as plasma expansion peaks, and this decline is more pronounced in low-resource settings where baseline iron stores are limited. This physiological reaction necessitates trimester-specific hemoglobin cut-offs to prevent anemia from being over diagnosed or underdiagnosed, according to their meta-analysis (Aballo et al., 2025).

Conclusion

This paper has concluded that anemia is quite common among pregnant mothers who have been admitted to the antenatal ward of Madina Teaching Hospital, Faisalabad. The proportion of participants who were anemic was found to be significant with moderate anemia being the most prevalent type. The results reveal that anemia is more common in latter months of pregnancy and highly related with poor diets, low intake of iron supplements, multiple pregnancies, and irregular antenatal care. The research sample is mostly made out of young adults with a population of N=154 with 74.7% participants aged 35 years and below, giving it a mean age of 29.9 8.7 years. Clinically, it was found that the overall rate of anemia burden was high (62.34%%, which highly and significantly aggravated during

gestation). The One-Way ANOVA established the existence of a statistically significant difference in the mean Hemoglobin (Hb) levels in the trimesters F (2, 151) = 5.42, p = 0.006), with a steady decrease in trimester levels, starting at 10.6 g/dL in the 1st Trimester and concluding at 9.9 g/dL in the 3rd Trimester. Thus, anemia was most common during the 3rd Trimester (75.00%) which indicates that the risk and severity of anemia increases with pregnancy progression in this young adult population.

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