

PREVALENCE OF ANEMIA AND ASSOCIATED RISK FACTORS AMONG PREGNANT WOMEN IN THREE CITIES OF PAKISTAN

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ABSTRACT

Anemia during pregnancy is a global health issue that affects both developed and developing nations. The primary objective of the study was to ascertain the prevalence of anemia in pregnant women and associated risk factors.

To identify the causes of anemia in patients, across-sectional survey was conducted through face-to-face interviews in hospitals and clinics. Data was collected using a modified questionnaire and analyzed using SPSS version 2021.

This study found that 18.7% were mildly anemic, 74.9% were moderately and 6.44% were severely anemic. The mean age of the participants ranged from 14 to 42 years, with a maximum age of 42 and a minimum age of 14. A chi-square test examines the relationship between Hb levels and various factors. Some factors showed a significant relationship with Hb levels, including the age of the respondent ($p=0.000$), type of pregnancy ($p=0.018$), no consumption of fresh fruits ($p=0.003$), no use of iron supplements ($p=0.012$), not taking healthy diet ($p=0.009$), no nutritional guidance ($p=0.048$) and menstrual flow ($p=0.016$) as all p -values were <0.05 .

The findings indicated that a considerable share of the participants suffer from anemia. There were notable correlations between hemoglobin (Hb) levels and various factors, including age, pregnancy type, no fresh fruit intake, no iron supplements, no healthy diet, no nutritional guidance, and menstrual flow.

Key-words: Anemia, Risk factors, Pregnancy, Prevalence, Pakistan, Women.

INTRODUCTION

Anemia is a condition in which there is insufficient hemoglobin in the blood, which limits the body's ability to carry oxygen (Suprapti *et al.*, 2025). The World Health Organization (WHO) characterizes anemia during pregnancy as having a hemoglobin level below 11g/dl (James, 2021). According to estimates from the World Health Organization (WHO), anemia affected 30.7% of women between the ages of 15 and 49 in 2023. 35.5% of pregnant women in this group were impacted (https://www.who.int/data/gho/data/themes/topics/anaemia_in_women_and_children) (Alem *et al.*, 2023). This issue is widespread across both developed and developing countries. Out of the different forms of anemia, iron deficiency anemia stands out as the most prevalent, predominantly impacting women in their reproductive years, especially pregnant women (Kassa *et al.*, 2017). Anemia during pregnancy is associated with a high risk of maternal and perinatal mortality, a silent disease with few physical symptoms, and a slow progression (Karamiet *et al.*, 2022). Age, gender, and socioeconomic status are all associated with variations in the prevalence of iron deficiency anemia (IDA) (Warner and Kamran, 2023). According to WHO estimates, 16,800 to 28,000 women of reproductive age die from anemia each year, according to a 2024 study. Iron deficiency is the main risk factor for maternal disorders, according to this study (Wuet *et al.*, 2024). South Asia is the "global epicenter" of anemia among teenage girls and women, according to a joint analysis by UN agencies (UNICEF, WHO, and SAARC) (<https://news.un.org/en/story/2025/07/1165350>).

The prevalence of anemia among pregnant women in Pakistan is still alarming, with estimates indicating that about 60% of pregnant women are anemic, according to the most recent PDHS data (Sehar *et al.*, 2024). The prevalence varies across different regions of Pakistan, with higher rates observed in rural areas, including socioeconomic, dietary, cultural, and healthcare-related factors (Nazet *et al.*, 2023). Hence, the present study aims to determine the prevalence of anemia in pregnant women and associated risk factors.

MATERIALS AND METHODS

Study design and setting:

The study was a descriptive cross-sectional study. Data was collected from hospitals across three cities: Okara, Renala Khurd & Kasur to assess the occurrence of anemia in pregnant women. Permission was obtained from the Institutional Ethical Committee, the Head of the department, DHQ Hospital Okara, THQ Hospital Renala Khurd, and THQ Hospital Kasur. Informed consent was obtained from each participant.

Sample size:

The study included a sample size of n=450 pregnant women. Participants were selected for the study over three months, from May 2023 to July 2023.

Sample selection criteria:

All pregnant women who visited the hospital during the study period were included in the study, and no one was excluded.

Data collection:

Two methods were used: A specially designed questionnaire was used in this study (Abbasi *et al.*, 2013). The questionnaire consists of 33 questions that cover the different aspects of participants, such as dietary intake, economic status, maternal, socio-demographic, and health conditions before and after marriage. To determine how different factors, like menstrual flow and pregnancy type, affected the frequency and severity of anemia among participants, we modified the questionnaire. Blood examinations, like a complete blood count (CBC), were carried out within the hospital laboratory. The CBC report was collected from all the participants one by one. The hemoglobin level is also detected, which is divided into four categories (3 - 4 g/dL, 5 - 6 g/dL, 7 - 10 g/dL, and above 10 g/dL).

Statistical Analysis:

Statistical Package for the Social Sciences (SPSS) version 2021 was used to analyze the collected data from the questionnaire and the blood test results. MS Excel was used to create tables and graphs from the collected data. Descriptive statistics regarding frequency and percentage were run for demographics and questionnaires. A chi-square test was run between hemoglobin level and other lifestyle factors. The chi-square test requires independence of observations, a large sample size, and an expected frequency count of at least five in each category which were confirmed. If the significance level (P-value) was less than 0.05, the correlation seemed significant.

RESULTS

The study identified that 18.7%, 74.9%, and 6.44% of pregnant women were diagnosed with mild, moderate, and severe anemia at least once during their pregnancy, as shown in Fig. 1. Hemoglobin levels are mainly considered an indicator of anemia.

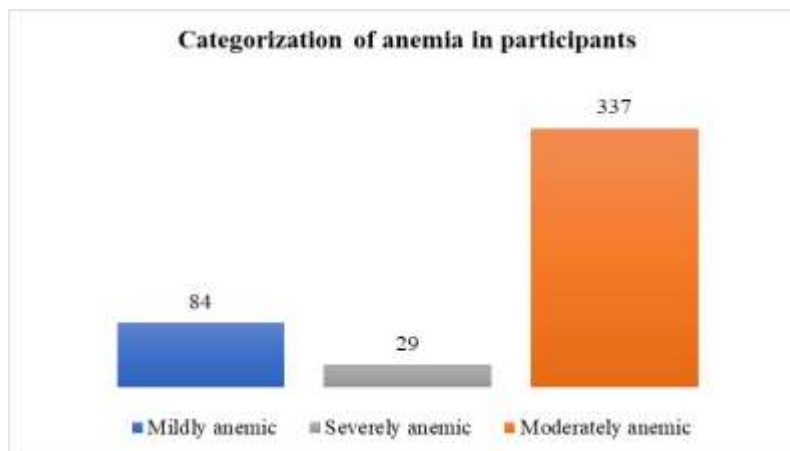


Fig. 1. Categorization of anemia.

The mean age of the participants is (14-42 years). The maximum age is 42, and the minimum age of the participants is 14. Data regarding age, age at the time of marriage, educational background, and monthly income are shown in Table1.

Table1. Demographics of participants.	
Variables	n (%)
Age	
15-20	49 (10.9%)
20-25	181 (40.2%)
25-30	152(33.8%)
30-35	52(11.5%)
Above 35	16(3.6%)
Age at the time of marriage	
≤15	19 (4.2%)
16-20	203 (45.1%)
21-25	200 (44.4%)
26-30	24 (5.3%)
≥30	04 (0.89%)
Educational background of the participants	
Literate	103 (22.9%)
Primary	100 (22.2%)
Middle	55 (12.2%)
Matric	144 (32%)
Intermediate	48 (10.7%)
Monthly income of the household	
≤10000	131 (29.1%)
11000-15000	119 (26.4%)
16000-20000	65 (14.4%)
Above 20000	135 (30%)
Current status of the respondent	
Housewife	425 (94.4%)
Doing job	20 (4.4%)
Both	05 (1.1%)

A questionnaire regarding pregnancy demographics is used to collect data about the type of pregnancy, gestational month, miscarriage history, blood disease, and nutritional guidance during pregnancy. A detailed description is presented in Table 2.

Table2. Pregnancy demographics of participants.	
Variables	n (%)
Type of pregnancy	
Single	391 (86.9%)
Twin	58 (12.9%)
Triplet	01 (0.225)
Quadruplet	0 (0%)
Gestational month	
1-3	73 (16.2%)
4-5	144 (32%)
6-7	92 (20.4%)
8-9	141 (31.3%)
Previous history of miscarriage	
Yes	123 (27.3%)
No	327 (72.7%)
Blood disease before pregnancy	
Yes	14 (3.1%)
No	436 (96.9%)
Nutritional guidance during pregnancy	
Yes	219 (48.7%)
No	231 (51.3%)

Data about participants' dietary habits is also collected to examine whether the maternal diet falls short of providing adequate nutrients (Table 3).

Table3. Dietary habits of participants.	
Variables	n (%)
Eating habits of the respondent	
2 times a day	155 (34.4%)
3 times a day	287 (63.8%)
4 times a day	03 (0.7%)
More frequent	05 (1.1%)
Daily tea intake	
No	138 (30.7%)
Once a day	165 (36.7%)
Twice a day	108 (24%)
Thrice a day	20 (4.4%)
Frequently	19 (4.2%)
Eating fresh fruit, vegetables, and milk	
No	38 (8.4%)
Daily	132(29.3%)
Two times a week	40 (8.9%)
Weekly	66 (14.7%)
Very rare	174 (38.7%)
Any sort of iron supplements	
Yes	118 (26.2%)
No	327 (72.7%)

To examine the relationship between Hb levels and various factors, a chi-square test is conducted. Some factors such as age (chi-square = 39.879, $p = 0.000^*$), number of children (chi-square = 19.816, $p = 0.019^*$), type of pregnancy (chi-square = 11.961, $p = 0.018^*$), gestational month (chi-square = 28.267, $p = 0.001^*$), eating fresh fruits (chi-square = 30.208, $p = 0.003^*$), use of iron supplements (chi-square = 16.388, $p = 0.012^*$), knowledge about cheap alternatives of healthy diet (chi-square = 21.837, $p = 0.009^*$), nutritional guidance during pregnancy (chi-square = 7.892, $p = 0.048^*$) and menstrual flow (chi-square = 20.323, $p = 0.016^*$) showed the significant relation with Hb level. Additionally, we conducted an exploration of odds ratios and regression analyses. However, our findings regarding the occurrence of Hb levels at 3-4 g/dL yielded a 0% response rate. This outcome is implausible because sustaining life at such low hemoglobin levels is not feasible. It's worth noting that while previous studies obtained their data from records, our approach involved face-to-face interviews, making it unlikely for individuals to exist with such critically low Hb levels.

DISCUSSION

Anemia during pregnancy presents a substantial challenge with far-reaching consequences for maternal and child well-being. Data regarding age reveals that child marriage is still a problem in these areas, as also shown by previous studies (Bari *et al.*, 2025) in which the mother is not able to fulfill her own and the fetus growth requirements and that's the reason they are usually anemic (Afzal and Khan, 2018). The main factors observed in this study are unawareness and low socio-economic status, because of which women are not able to fulfill their increased demand for diet (Baig-Ansari *et al.*, 2008). Anemia is more prevalent in the literate (22.9%) and primary (22.2%) groups revealing the lack of awareness among mothers (Siddiqui *et al.*, 2014). According to data, most anemic-diagnosed women are living below the poverty line, socioeconomic status shapes access to a nourishing diet, and poverty and food insecurity can lead to insufficient intake of vital nutrients, particularly iron (Anjum *et al.*, 2015). Malnutrition stands as a recognized predisposing element for pregnancy-related anemia (Malik *et al.*, 2022). Further supported by efforts carried out in Pakistan which revealed that pregnant women hailing from economically disadvantaged backgrounds exhibited a greater prevalence of anemia in contrast to those with more favorable financial circumstances (Ullah *et al.*, 2019).

Limitations

The relatively small sample size may limit the generalizability of our findings. Additionally, the study's generalizability may be limited to a specific population and healthcare settings included in the study. The study used self-reported data, so reporting errors are possible, which could distort the findings.

Conclusion

The findings of this study reveal a high prevalence of anemia among women in these regions. Approximately 74% of these women are affected by moderate anemia, characterized by hemoglobin levels ranging from 7 to 9.9g/dl. Notably, the risk of anemia is more pronounced among mothers in the younger age group. There are significant associations between the severity of anemia and various factors, including socioeconomic status, the respondent's age, pregnancy type, and menstrual flow. Specifically, early-age pregnancy and low socioeconomic status emerged as independent risk factors for anemia during pregnancy. Therefore, it is strongly needed to improve both socioeconomic status and educational awareness, as a lack of awareness is identified as another key contributing factor to anemia.

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Conflict of interest

No.

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