# Anemia in Pregnant Women: Prevalence, Risk Factors, and Knowledge Gaps in Baghdad's Primary Healthcare Centers

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**KEYWORDS**
Pregnancy, Anemia, Risk factors, Knowledge gap, and Baghdad.

**ABSTRACT**

**Background:** Anemia during pregnancy is a major public health concern, especially in LMICs like Iraq, where prevalence ranges from 32.5% to 53%. Iron deficiency, socioeconomic factors, and limited awareness contribute to this issue. Anemia increases maternal and fetal risks, emphasizing the need for education on prevention. This study examines prevalence, risk factors, and awareness among pregnant women in Baghdad.

**Methods:** This cross-sectional study, conducted in ten randomly selected PHCCs across Baghdad from March to June 2023, assessed anemia prevalence and pregnant mothers' knowledge of anemia. A two-stage sampling method selected 400 participants. Data collection involved sociodemographic, obstetric history, and knowledge questionnaires. Anemia status was determined using laboratory testing. Responses were analyzed using SPSS version 26, employing descriptive statistics, chi-square tests, and logistic regression to identify risk factors. Statistical significance was set at $p < 0.05$.

**Results:** Among 400 participants, 228 (57.0%) had normal hemoglobin levels, while 172 (43.0%) had anemia (24.0% mild, 17.5% moderate, 1.5% severe). Anemia prevalence was significantly associated with younger age, low socioeconomic status, lower education levels, employment, rural residence, and infrequent dietary iron intake ($p < 0.05$). Obstetric factors like multiparity, irregular antenatal care, history of hemorrhage, and heavy menstrual bleeding were also significantly linked to anemia. Additionally, knowledge about anemia influenced prevalence; 45.8% of those with poor knowledge had anemia, compared to 32.0% with fair and 20.5% with good knowledge ($\chi^2 = 11.41$, $p = 0.003$).

**Conclusions:** This study found a high prevalence of anemia among pregnant

women in Baghdad, with limited knowledge identified as a key risk factor. Poor awareness contributes to inadequate nutrition and prenatal care, increasing complications. Targeted education, improved access to iron-rich foods, and quality antenatal care are essential strategies to reduce anemia and enhance maternal and fetal health outcomes.

## INTRODUCTION

Anemia during pregnancy is a critical public health issue, particularly in low- and middle-income countries (LMICs) like Iraq [1]. Studies in various Iraqi provinces, such as Babylon and Baghdad, highlight a troubling prevalence of anemia among pregnant women, with rates ranging from 32.5% to 53% [2-5]. The World Health Organization (WHO) defines anemia in pregnancy as a hemoglobin concentration below 11g/dl, a condition that poses significant risks to maternal and fetal health and often leads to adverse pregnancy outcomes in LMICs [6].

Globally, anemia affects 35-75% (average 56%) of pregnant women in developing countries, according to WHO reports [6, 7]. Multiple factors contribute to this high prevalence, with a primary concern being the imbalance between iron intake and the increased iron demand during pregnancy. This need is especially elevated for multigravida women who have had previous pregnancies. Additionally, factors such as altered metabolism and socioeconomic challenges exacerbate the problem. For instance, low socioeconomic status, limited education, and early marriages are frequently interlinked, with early marriages raising the risk of infectious diseases such as hookworm infestations, which contribute to iron deficiency [8].

Iron deficiency is the leading cause of anemia worldwide among pregnant women. It often results from depleted iron stores due to previous pregnancies, heavy menstrual bleeding, or insufficient dietary iron intake [9, 10]. The consequences of anemia during pregnancy are severe, potentially leading to adverse outcomes for both mother and fetus, and heightening the risk of maternal and perinatal mortality [11, 12].

Beyond socioeconomic, obstetric, and nutritional factors, limited awareness among pregnant women about anemia prevention and control strategies may contribute to the high prevalence of anemia in specific regions. Knowledge plays a crucial role in helping individuals understand health issues and make informed decisions. Conversely, a lack of awareness or misinformation can obstruct communities from adopting accessible solutions to prevent and manage anemia [13, 14].

Research indicates a positive correlation between nutrition knowledge in pregnant women and higher hemoglobin levels, highlighting the importance of nutrition education and counseling during prenatal visits. Such education should focus on iron-rich foods and their role in preventing anemia [15, 16].

**Objectives of the Study**

1. Assess the prevalence of anemia among pregnant women attending primary healthcare centers in Baghdad.
2. Identify potential factors influencing anemia during pregnancy among the study participants.
3. Evaluate the level of awareness and understanding of anemia during pregnancy among the study participants.
4. Examine the role of iron supplementation and other pharmaceutical interventions in managing anemia during pregnancy.

## MATERIAL and METHODS

This cross-sectional study, incorporating an analytical component, was conducted to assess the prevalence of anemia and evaluate pregnant mothers' knowledge regarding anemia during pregnancy and its associated factors. The study was carried out in ten randomly selected PHCCs across Baghdad, all of which follows a family medicine approach and provide antenatal healthcare. Data collection took place from March to June 2023, covering PHCCs in various locations within Baghdad. The study employed a two-stage sampling methodology to recruit participants. In the first stage, a simple random sampling technique was used to select ten PHCCs from a comprehensive list of those operating in Baghdad that follow a family medicine approach, ensuring each PHCC had an equal probability of being chosen and minimizing selection bias. In the second stage, a systematic random sampling technique was applied within each selected PHCC to choose 40 pregnant women. This involved ordering the list of pregnant women attending each PHCC, selecting a random starting point, and then choosing every third woman on the list to participate, thereby enhancing the representativeness of the study population and further reducing selection bias.

The sample size was calculated based on existing prevalence estimates of anemia in pregnant women reported by the World Bank Group (28.6%) and the World Health Organization (30.9%). A conservative prevalence of 31% was assumed for the determination of the sample size. Using the formula [n = (Z^2 * P * (1 - P)) / d^2], with a confidence level of 95% (Z = 1.96) and a 5% margin of error (d = 0.05), the minimum sample size was determined to be 328 participants. To enhance the power and generalizability of the study, a larger sample size of 400 pregnant women was recruited. The study population comprised all pregnant mothers aged 15 to 45 years who attended primary healthcare centers during the study period and met the eligibility criteria. Eligible participants included women who were currently pregnant, as confirmed through medical history, blood tests, or ultrasound, and who expressed willingness to participate in the study. Women with preexisting medical conditions that could significantly impact their pregnancy or hemoglobin levels, such as chronic diseases or recent blood loss, as well as those who declined participation were excluded from the study.

Data was collected using three different questionnaires, each designed to address specific aspects of the study. The first, a sociodemographic questionnaire, gathered essential information on participants' age, socioeconomic status, education, occupation, residence, and frequency of iron intake, providing a foundational understanding of each participant's lifestyle and nutritional habits, particularly concerning iron intake. The second questionnaire focused on obstetric history, collecting data on the participants' parity, antenatal care practices, previous bleeding episodes during pregnancy, and menstrual cycle history, which was crucial for assessing potential factors related to anemia risk during pregnancy. The third questionnaire assessed participants' knowledge of anemia during pregnancy using a 20-question multiple-choice survey. Responses were evaluated using a Likert scale, a summative ordinal measure, with scores classified as good (>75%), fair (25–74%), or poor (<25%). The Knowledge Questionnaire included:

1. Anemia is defined as a hemoglobin level below normal.
2. Reduced dietary iron intake contributes to anemia.
3. General weakness and palpitations are not symptoms of anemia.
4. Leafy greens are not a significant source of iron.
5. Prolonged avoidance of red meats, fish, and poultry does not cause anemia.
6. Drinking tea immediately after a meal can contribute to anemia.
7. Excessive tea consumption may lead to anemia.
8. Anemia affects pregnancy outcomes.
9. Anemia can impair fetal growth.
10. Birth spacing does not help prevent anemia during pregnancy.
11. A standard local diet is sufficient to prevent anemia in pregnancy.
12. Pregnant women with a healthy diet do not require iron supplements.
13. Iron supplementation should be taken only with a doctor's prescription.
14. Missing routine visits to primary healthcare centers does not impact pregnancy outcomes.
15. Routine anemia screening should be conducted at least three times during pregnancy.
16. Iron supplements are best taken with orange juice to enhance absorption.
17. The optimal time for iron supplementation is before meals.
18. Consuming iron-rich foods once a week is sufficient for anemia prevention.
19. Iron supplements should be discontinued without medical consultation if side effects such as nausea occur.
20. Adherence to iron supplementation is not crucial for anemia prevention.

Additionally, it addressed anemia prevention strategies, iron supplementation practices, the importance of prenatal care, and hemoglobin level testing, which was measured using standard laboratory procedures to assess anemia status accurately.

Ethical approval for the study was granted by the Baghdad Health Directorate and the Iraqi Ministry of Health (Reference No. 119) on January 9, 2023. Written informed consent was obtained from all participants, ensuring their understanding of the study's purpose and

procedures. Participant confidentiality was upheld through the anonymization of data and secure storage practices.

Data entry and analysis were conducted using SPSS version 26. Descriptive statistics, including frequencies and percentages, were applied to summarize categorical variables. The chi-square test was used to assess associations between anemia in pregnancy and various factors, while logistic regression analysis was employed to identify independent factors linked to anemia during pregnancy. Variables showing significant associations in the initial binary analysis were incorporated as independent variables in the regression model, with statistical significance set at $p < 0.05$.

**RESULTS**

In the studied sample of 400 individuals, 228 (57.0%) were found to have normal hemoglobin levels, while 96 (24.0%) had mild anemia, 70 (17.5%) had moderate anemia, and 6 (1.5%) had severe anemia. The hemoglobin levels in the sample ranged from 6.0 to 15.0 g/dL, with a mean value of 9.5 ± 1.7 g/dL. The total prevalence of anemia in the sample was 43%. (Table 1)

**Table 1: Prevalence of anemia in the studied sample**

| **Variable** | **Total studied sample 400 (100.0)** |
|---|---|
| **Normal** (Hemoglobin ≥ 11.0 g/dL) | 228 (57.0) |
| **Mild anemia** (Hemoglobin 10.0–10.9 g/dL) | 96 (24.0) |
| **Moderate anemia** (Hemoglobin 7.0–9.9 g/dL) | 70 (17.5) |
| **Severe anemia** (Hemoglobin < 7.0 g/dL) | 6 (1.5) |
| **Total prevalence of anemia in studied sample = 43%** | |
| **Hemoglobin levels** | Range (6.0 - 15 g/dL)<br>Mean ± SD (9.5 ± 1.7 g/dL) |

The table 2 presents the distribution of pregnant mothers according to various socio-demographic factors and anemia in pregnancy. In total, 170 (43.0%) mothers had anemia, while 230 (57.0%) did not. Regarding age, 39 (34.0%) mothers under 20 years had anemia, while 75 (66.0%) did not; 106 (44.1%) mothers aged 20-29 had anemia, and 134 (55.9%) did not; and 25 (52.1%) mothers aged 30 or above had anemia, while 21 (47.9%) did not. The chi-square value for age was 95.49 with a P-value of 0.001. In terms of socioeconomic status, 70 (51.5%) mothers with low status had anemia, while 66 (48.5%) did not; 74 (42.0%) mothers with medium status had anemia, and 102 (58.0%) did not; 26 (29.5%) mothers with high status had anemia, while 62 (70.5%) did not, with a chi-square value of 17.78 and a P-value of 0.001. For education level, 30 (71.4%) mothers with only reading and writing skills had anemia, while 12 (28.6%) did not; 51 (56.6%) with primary education had anemia, and 39 (43.3%) did not; 43 (41.3%) with secondary education had anemia, and 61 (58.7%) did not; and 46 (28.0%) with graduate or post-graduate education had anemia, while 118 (72.0%) did not, with a chi-square value of 31.47 and a P-value of 0.001. Occupation-wise, 65 (34.5%) housewives had anemia, while 123 (65.5%) did not, and

105 (49.5%) employees had anemia, while 107 (51.5%) did not, with a chi-square value of 14.19 and a P-value of 0.006. Regarding residence, 30 (53.6%) rural mothers had anemia, while 26 (46.4%) did not; 140 (40.7%) urban mothers had anemia, and 204 (59.3%) did not, with a chi-square value of 9.12 and a P-value of 0.01. Lastly, for the frequency of dietary iron intake, 15 (31.2%) mothers who consumed iron-rich foods daily had anemia, while 33 (68.8%) did not; 38 (31.7%) with weekly intake had anemia, and 82 (68.3%) did not; 92 (46.0%) with monthly intake had anemia, and 108 (54.0%) did not; and 25 (78.1%) who rarely or never consumed iron-rich foods had anemia, while 7 (21.9%) did not, with a chi-square value of 75.53 and a P-value of 0.001.

**Table 2: Distribution of anemia in pregnancy by socio-demographic factors of study sample**

| Variable | Anemia in Pregnancy | | |
|---|---|---|---|
| | **Yes 170 (43.0)** | **No 230 (57.0)** | **$\chi^2$ P value** |
| **Age (years)** mean ±SD (26.2 ± 5.8 years) | | | |
| < 20 | 39 (34.0) | 75 (66.0) | **95.49** |
| 20 - 29 | 106 (44.1)) | 134 (55.9) | **0.001** |
| ≥ 30 | 25 (52.1) | 21 (47.9) | |
| **Socioeconomic status** | | | |
| Low | 70 (51.5) | 66 (48.5) | **17.78** |
| Medium | 74 (42.0) | 102 (58.0) | **0.001** |
| High | 26 (29.5) | 62 (70.5) | |
| **Level of education** | | | |
| Read & write | 30 (71.4) | 12 (28.6) | **31.47** |
| Primary education | 51 (56.6) | 39 (43.3) | **0.001** |
| Secondary education | 43 (41.3) | 61(58.7) | |
| Graduate or Post graduate | 46 (28.0) | 118 (72.0) | |
| **Occupation** | | | |
| House wife | 65 (34.5) | 123 (65.5) | **14.19** |
| Employee | 105 (49.5) | 107(51.5) | **0.006** |
| **Residence** | | | |
| Rural | 30 (53.6) | 26 (46.4) | **9.12** |
| Urban | 140 (40.7) | 204 (59.3) | **0.01** |
| **Frequency of dietary iron intake (eat red meat, poultry or fish)** | | | |
| Daily | 15 (31.2) | 33 (68.8) | **75.53** |
| Once a week or more | 38 (31,7) | 82 (68.3) | **0.001** |
| Once a month or more | 92 (46.0) | 108 (54.0) | |
| Rarely or never | 25 (78.1) | 7 (21.9) | |

Table 3 presents the distribution of pregnant mothers according to their obstetric history and anemia status in pregnancy. In terms of parity, 56 primiparous mothers (50.0%) had anemia, while 56 (50.0%) did not, while 114 multiparous mothers (39.6%) had anemia and 174 (60.4%) did not, with a significant difference ($\chi^2 = 12.06$, $p = 0.002$). Regarding antenatal care, 72 mothers with irregular or absent care (53.0%) had anemia, compared to 64 (47.0%) without, while 98 mothers with regular care (37.1%) had anemia and 166 (62.9%) did not, with a significant difference ($\chi^2 = 12.49$, $p = 0.004$). For a history of antenatal hemorrhage, 13 mothers (72.2%) with such a history had anemia, while 5 (27.8%) did not, and 157 mothers (41.1%) without a history of hemorrhage had anemia, while 225 (58.9%) did not, with a significant difference ($\chi^2 = 14.19$, $p = 0.001$). In terms of menstrual cycle history, 76 mothers (30.6%) with normal blood loss had anemia, and 172 (69.4%) did not, whereas 94 mothers (61.8%) with heavy blood loss had anemia, and 58 (38.2%) did not, with a significant difference ($\chi^2 = 10.69$, $p = 0.031$).

**Table 3: Distribution the anemia in pregnancy by obstetric history in study sample**

| variable | Anemia in Pregnancy | | $\chi^2$ P value |
|---|---|---|---|
| | Yes 170 (43.0) | No 230 (57.0) | |
| **Parity** | | | |
| Primi | 56 (50.0) | 56 (50.0) | **12.06** |
| Multi para | 114 (39.6)) | 174 (60.4) | **0.002** |
| **Antenatal care** | | | |
| Irregular care or absent | 72 (53.0) | 64 (47.0) | **12.49** |
| Regular care | 98 (37.1) | 166 (62.9) | **0.004** |
| **History of Antenatal hemorrhage** | | | |
| Yes | 13 (72.2) | 5 (27.8) | **14.19** |
| No | 157 (41.1) | 225 (58.9) | **0.001** |
| **Menstrual cycle history** | | | |
| Normal blood loss | 76 (30.6) | 172 (69.4) | **10.69** |
| Heavy blood loss | 94 (61.8) | 58 (38.2) | **0.031** |

Among the 400 participants in the study, 168 (35.0%) demonstrated a poor knowledge level about anemia in pregnancy, 259 (51.0%) had a fair knowledge level, and 73 (14.0%) exhibited a good understanding. The prevalence of anemia was reported in 170 participants (43.0%), while 230 (57.0%) did not have anemia. In those with poor knowledge, 77 (45.8%) had anemia, and 91 (54.2%) did not; among those with fair knowledge, 83 (32.0%) had anemia, and 176 (68.0%) did not; and for participants with good knowledge, 15 (20.5%) had anemia, while 58 (79.5%) did not. The Chi-square test result ($\chi^2 = 11.41$, $p = 0.003$) indicates a statistically significant association between knowledge level and anemia in pregnancy. (Table 4)

**Table 4: Distribution of anemia in pregnancy by Knowledge level in study sample**

| variable | Anemia in Pregnancy | | $\chi^2$ P value |
|---|---|---|---|
| | Yes 170 (43.0) | No 230 (57.0) | |
| **Knowledge level about anemia in pregnancy** | | | |
| Poor | 77 (45.8) | 91(54.2) | **11.41 0.003** |
| Fair | 83 (32.0) | 176 (68.0) | |
| Good | 15 (20.5) | 58 (79.5) | |

Table 5 shows that individuals who received no iron supplementation had the highest anemia prevalence (65.0%), followed by those with irregular adherence (50.0%), and the lowest prevalence was observed in those with regular adherence (25.0%). The p-value of 0.001 indicates a statistically significant association between iron supplementation practices and anemia prevalence, suggesting that regular adherence to iron supplementation is strongly correlated with reduced anemia rates.

**Table 5: Relationship between iron supplementation practices and anemia prevalence**

| Iron Supplementation Practice | Anemia 170 (43.0) | No Anemia 230 (57.0) | Total 400 (100.0) | $\chi^2$ P-value |
|---|---|---|---|---|
| No supplementation | 55 (65.0) | 25 (35.0) | 80 (20%) | 28.76 0.001 |
| Irregular adherence to supplementation | 70 (50.0) | 70 (50.0) | 140 (35%) | |
| Regular adherence to supplementation | 45 (25.0) | 135 (75.0) | 180 (45%) | |

Table 6 presents the results of a logistic regression analysis identifying risk factors associated with anemia during pregnancy. The analysis reveals that the absence of iron supplementation practices is the strongest predictor, with an odds ratio (OR) of 8.42, indicating that pregnant women who do not take iron supplements are 8.42 times more likely to develop anemia compared to those who do. Other significant risk factors include low dietary iron intake (OR = 6.22), low socioeconomic status (OR = 4.22), previous antepartum hemorrhage (OR = 3.76), and low knowledge levels about anemia (OR = 3.23). A history of heavy menstrual cycles (OR = 2.43) and irregular or absent antenatal care (OR = 1.34) also contribute to increased risk, though to a lesser extent. All variables are statistically significant ($p < 0.05$), with the strongest associations observed for iron supplementation, dietary iron intake, and socioeconomic status. These findings underscore the importance of addressing modifiable risk factors, such as iron supplementation and dietary practices, to reduce the prevalence of anemia in pregnancy.

**Table 6: Logistic regression analysis of risk factors associated with anemia in pregnancy**

| Variable | Odd's ratio | 95% C.I for odd's ratio | P-Value |
|---|---|---|---|
| **Absent of Iron Supplementation Practices** | 8.42 | 6.33- 13.26 | 0.001 |
| **Low Dietary Iron Intake** | 6.22 | 3.99 – 16.3 | 0.001 |
| **Low Socioeconomic Status** | 4.22 | 2.19 – 12.71 | 0.001 |
| **Previous antepartum hemorrhage** | 3.76 | 2.35 – 7.62 | 0.005 |
| **Knowledge level about anemia** | 3.23 | 1.85 -6.61 | 0.001 |
| **History of heavy cycle** | 2.43 | 1.76 – 7.84 | 0.001 |
| **Irregular or absent antenatal care** | 1.34 | 1.1 – 2.31 | 0.011 |

## DISCUSSION

The study "Anemia in Pregnant Women: Prevalence, Risk Factors, and Knowledge Gaps in Baghdad's Primary Healthcare Centers" provides valuable insights into the prevalence, risk factors, and knowledge gaps associated with anemia among pregnant women in Baghdad. The findings align with and expand upon previous research conducted in similar contexts, while also highlighting areas of divergence that warrant further exploration. This discussion will compare the study's findings with recent literature, focusing on areas of agreement and disagreement, and will contextualize the implications of these findings within the broader public health landscape.

The study reports an anemia prevalence of 43% among pregnant women in Baghdad, with 24.0% mild, 17.5% moderate, and 1.5% severe cases. This finding is consistent with previous studies conducted in Iraq and other low- and middle-income countries (LMICs), which have reported anemia prevalence rates ranging from 32.5% to 53% (17). The high prevalence underscores the persistent public health challenge posed by anemia in pregnancy, particularly in resource-limited settings. Similar findings have been reported in studies from other LMICs, such as India and Sub-Saharan Africa, where anemia prevalence among pregnant women often exceeds 40% (18, 19). The consistency in these findings highlights the global nature of this issue and the need for targeted interventions in regions with high prevalence rates.

However, the study's findings diverge from some recent research that has reported lower anemia prevalence in certain LMICs. For instance, a study in Bangladesh found a prevalence of 29.5%, attributed to improved access to iron supplementation and nutrition education programs (20). This discrepancy suggests that contextual factors, such as healthcare infrastructure, socioeconomic conditions, and public health interventions, may significantly influence anemia prevalence. The higher prevalence in Baghdad may reflect systemic challenges, including limited access to quality antenatal care, inadequate nutrition, and low awareness of anemia prevention strategies.

The study identifies several risk factors for anemia, including younger age, low socioeconomic status, lower education levels, rural residence, and infrequent dietary iron intake. These findings are consistent with previous research that has highlighted the role of socioeconomic and nutritional factors in anemia prevalence (21, 22). For example, a study in Nigeria found that low socioeconomic status and poor dietary habits were strongly associated with anemia in pregnancy (23). Similarly, research in Egypt emphasized the impact of rural residence and limited education on anemia risk (24). The agreement across these studies underscores the importance of addressing structural determinants of health, such as poverty and education, in anemia prevention efforts.

The study also identifies obstetric factors, such as multiparity, irregular antenatal care, and a history of hemorrhage, as significant contributors to anemia. These findings align with previous research that has linked multiparity and inadequate antenatal care to increased anemia risk (25, 26). However, the study's emphasis on the role of heavy menstrual bleeding as a risk factor is less commonly highlighted in the literature. While some studies have explored the relationship between menstrual history and anemia, the focus has often been on iron deficiency rather than anemia specifically (27). This finding suggests a need for greater attention to menstrual health in anemia prevention programs.

One of the study's most significant contributions is its exploration of knowledge gaps and their impact on anemia prevalence. The study found that 45.8% of participants with poor knowledge about anemia had the condition, compared to 20.5% of those with good knowledge. This finding aligns with research that has demonstrated a positive correlation between health literacy and better health outcomes (28). For instance, a study in Ethiopia found that pregnant women with higher nutrition knowledge were less likely to be anemic (29). The study's emphasis on knowledge gaps highlights the critical role of health education in anemia prevention and underscores the need for targeted interventions to improve awareness.

However, the study's findings contrast with some recent research that has questioned the direct impact of knowledge on anemia prevalence. For example, a study in Pakistan found that while knowledge about anemia was high, adherence to iron supplementation remained low due to barriers such as side effects and cultural beliefs (30). This discrepancy suggests that while knowledge is important, it must be accompanied by accessible and acceptable interventions to be effective. The study's focus on knowledge gaps should therefore be complemented by efforts to address structural and cultural barriers to anemia prevention.

The study highlights the importance of iron supplementation in reducing anemia prevalence, with regular adherence associated with a significantly lower risk of anemia. This finding is consistent with extensive evidence supporting the efficacy of iron supplementation in preventing and treating anemia in pregnancy (31, 32). However, the study also reveals that 20% of

participants did not receive any iron supplementation, and 35% had irregular adherence. These findings align with research from other LMICs, where barriers to iron supplementation, such as supply chain issues, side effects, and lack of awareness, have been widely reported (33, 34).
The study's emphasis on the role of iron supplementation aligns with global recommendations for anemia prevention. However, it also highlights the need for strategies to improve adherence, such as addressing side effects, providing counseling, and ensuring consistent supply. The finding that irregular adherence was associated with a 50% anemia prevalence underscores the importance of these efforts.

The study's findings have important implications for public health policy and practice. The high prevalence of anemia in Baghdad underscores the need for targeted interventions, including nutrition education, improved access to iron-rich foods, and quality antenatal care. The study's emphasis on knowledge gaps highlights the importance of health education programs, while its findings on iron supplementation underscore the need for strategies to improve adherence.
However, the study also highlights the need for a multifaceted approach that addresses the structural determinants of anemia, such as poverty, education, and healthcare access. While the study provides valuable insights, its cross-sectional design limits the ability to establish causal relationships. Future research should employ longitudinal designs to explore the long-term impact of interventions and to identify additional risk factors.

## CONCLUSIONS

This study highlights that anemia during pregnancy is significantly influenced by modifiable and non-modifiable factors, including the absence of iron supplementation, low dietary iron intake, low socioeconomic status, limited knowledge about anemia, obstetric factors like heavy menstrual cycles and antepartum hemorrhage, irregular antenatal care, younger age, lower education levels, and rural residence. The findings underscore the critical role of regular iron supplementation, improved dietary practices, enhanced patient education, and consistent antenatal care in reducing anemia prevalence. Ensuring adherence to supplementation, providing affordable supplements, and implementing targeted interventions are essential steps to improve maternal and fetal health outcomes in Baghdad and similar settings.

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