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Prevalence Of Anemia And Associated Factors Among Pregnant Women At Zliten -Libya

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ABSTRACT

Background: Anemia is a major global public health problem affecting both developing and developed countries, with serious consequences for maternal and fetal health. It is a leading cause of morbidity and mortality during pregnancy, particularly in developing countries. This study aimed to determine the prevalence of anemia and its associated factors among pregnant women in Zliten city, Libya.

Methods: A facility-based cross-sectional study was conducted among 300 pregnant women attending antenatal clinics in Zliten city. Consecutive sampling was applied. Data were collected using a structured questionnaire and hemoglobin (Hb) levels were measured. Data entry and analysis were performed using SPSS version 22.0. Pearson's chi-square test was used to assess associations between anemia and selected socio-demographic factors.

Results: The mean hemoglobin level of participants was 11.12 g/dL (SD ± 0.8), with a median of 11.10 g/dL and a range of 8.0–15.5 g/dL. The overall prevalence of anemia was **[insert %]**. Of the anemic participants, 4 (1.3%) had mild anemia, 125 (41.7%) had moderate anemia, and 75 (25%) had severe anemia. No cases of very severe anemia (Hb <7 g/dL) were observed. Family size and other demographic characteristics were not significantly associated with anemia.

Conclusion: Anemia was found to be highly prevalent among pregnant women in Zliten city, with moderate anemia being the most common form. These findings highlight the need for strengthened antenatal screening, nutritional counseling, and public health interventions to prevent and manage anemia during pregnancy.

Keywords: *Anemia, Pregnancy, Hemoglobin, Zliten, Libya, Maternal health.*

1. INTRODUCTION

Anemia is a major global public health problem that affects both developed and developing countries, with particularly severe consequences for pregnant women. According to the World Health Organization (WHO), approximately 36.5% of pregnant women worldwide are anemic, with the highest burden (around 56%) occurring in low- and middle-income countries (1). In Libya, limited data exist on the prevalence and determinants of maternal anemia, despite its significant impact on maternal and neonatal health.

Nutritional anemia, primarily caused by deficiencies in iron, folic acid, vitamin B12, and vitamin C, remains the most common form globally. WHO classifies anemia in pregnancy by hemoglobin (Hb) concentration: mild (10.0–10.9 g/dL), moderate (7.0–9.9 g/dL), and severe (<7.0 g/dL) (2). Maternal anemia has been associated with adverse outcomes, including fatigue, impaired immunity, cardiovascular complications, preterm birth, low birth weight, intrauterine growth restriction (IUGR), intrauterine fetal demise (IUFD), and low APGAR scores (3,4). Preterm birth and low birth weight are among the leading contributors to neonatal mortality, with some regions reporting neonatal mortality rates as high as 39.4 per 1,000 live births (5).

Iron deficiency anemia (IDA) alone affects more than two billion people globally, and nearly half of all pregnant women in

some regions. While oral iron supplementation is widely used as the first-line treatment, gastrointestinal side effects and poor adherence often limit its effectiveness (6,7). Intravenous iron therapy has emerged as an alternative, demonstrating better tolerability and efficacy with modern formulations, although it is typically administered under medical supervision (8,9).

Pregnancy is a period of increased metabolic demand, and many women begin pregnancy with suboptimal iron stores. Daily iron requirements rise significantly during gestation—from approximately 0.7 mg/day in the first trimester to 5 mg/day in the third trimester—resulting in a total requirement of about 864 mg over the course of pregnancy (10). These

demands make pregnant women particularly vulnerable to anemia if adequate nutritional intake or supplementation is lacking.

In Libya, few studies have systematically assessed anemia among pregnant women, despite its public health significance. Therefore, this study aimed to determine the prevalence of anemia and associated factors among pregnant women attending antenatal clinics in Zliten City, Libya.

2. MATERIALS AND METHODS

Study Design and Setting

A facility-based cross-sectional study was conducted among pregnant women attending antenatal care (ANC) services in Zliten City, Libya. Data were collected from public and private health facilities, including ZMC Hospital, primary health centers, and four private clinics (Alalamia, Zawia, Al Yasmeen, and Royal). ANC services were provided by midwives using the focused ANC model.

Study Population

The study population comprised pregnant women aged 16–45 years residing in Zliten City who were attending ANC services at the selected facilities during the study period.

Inclusion criteria

Pregnant women aged 16–45 years.

Permanent residents of Zliten City.

Exclusion criteria

Pregnant women with co-morbidities directly affecting hemoglobin levels.

Women who did not provide consent to participate.

Women who had recently received iron supplementation or treatment for iron deficiency anemia.

Sample Size and Sampling

A total of 300 consecutive pregnant women who met the eligibility criteria were recruited using a consecutive sampling method.

3. STUDY VARIABLES

Dependent variable: Hemoglobin level.

Independent variables:

Socio-demographic factors: age, education, family size, family income, age at marriage.

Obstetric factors: gestational period, parity, frequency of ANC visits, intake of deworming tablets.

Anthropometric factors: body mass index (BMI), mid-upper arm circumference (MUAC).

Dietary factors: frequency of meals, consumption of meat, fruits, eggs, and green leafy vegetables, tea intake (type and frequency).

Data Collection Procedures

Data were collected using a semi-structured questionnaire and anthropometric and biochemical measurements.

Anthropometric Measurements

Body Mass Index (BMI): Weight and height were measured using a weighing balance and stadiometer, respectively. BMI was calculated as weight (kg) divided by height squared (m^2).

Mid-Upper Arm Circumference (MUAC): Measured using an adult MUAC tape at the midpoint between the acromion and olecranon processes on the left arm, with the tape kept flat and snug on the skin.

Hemoglobin Measurement

Capillary blood samples were collected, and hemoglobin concentration was measured using a standard hemoglobinometer. WHO cut-off values for anemia at sea level were applied: mild (10.0–10.9 g/dL), moderate (7.0–9.9 g/dL), and severe (<7.0 g/dL).

Questionnaire Data

Information on socio-demographic characteristics, obstetric history, dietary practices, and health behaviors was collected through face-to-face interviews using a pre-tested semi-structured questionnaire.

Data Analysis

Data were checked for completeness, coded, and entered into SPSS version 22.0 for analysis. Descriptive statistics (means, medians, frequencies, and percentages) were used to summarize participants' characteristics. Associations between independent variables and anemia status were assessed using cross-tabulations and Pearson's chi-square tests. Statistical significance was set at $p < 0.05$ with a 95% confidence interval.

4. RESULT

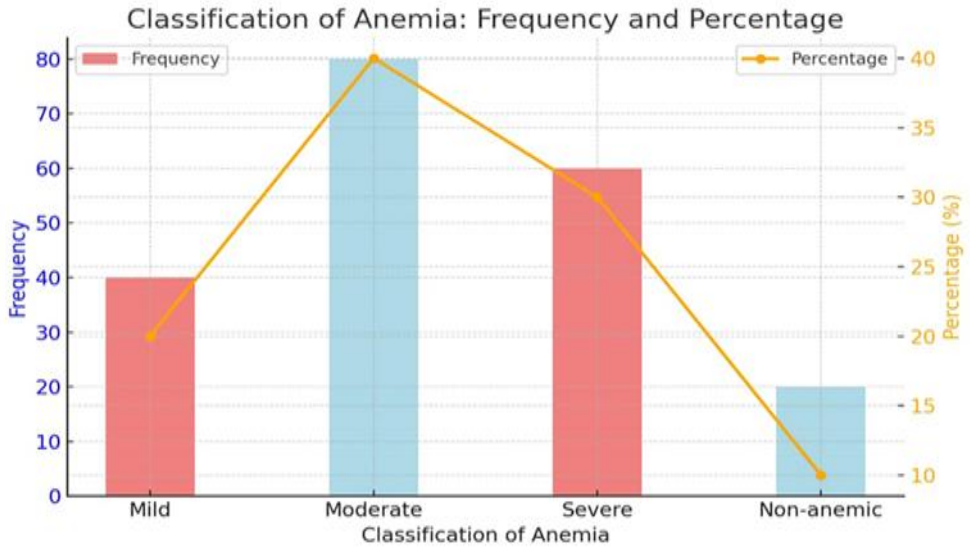
Our study included 300 pregnant women in total (N=300). The study's sample consisted of people aged 16 to 45 who visited antenatal clinics at Zliten city , Libya's state and private hospitals.

4.1 Prevalence of anemia

In all, 300 pregnant women between the ages of 16 and 45 were included in the research investigation. Among pregnant women, the median haemoglobin level was 11.10 gm/dl, while the mean was 11.12 gm/dl. In a similar vein, the lowest and maximum readings were 7.5 and 15.5 gm/dl, respectively. Anaemia was discovered in 204 (68%) of the 300 women who participated in the study. Regarding severity, no severe anaemia (with Hb<7gm/dl) was found, and 4 (1.33%) were mildly anemic, 125 (41.67%) were moderately anemic, and 75 (25%) were moderately anemic.

Similarly, Figure 4.1 shows that the prevalence of anemia among pregnant

Figure 4.1: Classification of Anemia Among study participants (N=300)



women in countries like India (89.4%) and Pakistan (90.5%) is higher than in this study, likely due to the inclusion of more rural areas. Anemia risk also increases with pregnancy progression. In comparison, the prevalence in Albayda, Libya, is higher than the global average (38.2%) and close to the African average (44.6%). It is lower than rates reported in Nigeria (62.6%) and Egypt (62.2%), but higher than those in Cape Verde (38.8%) and some Nigerian and Ethiopian studies, which reported rates as low as 16.6%

4.2 Demographic and socioeconomic characteristics and Anemia

Table 1. Sociodemographic characteristics

Characteristics	**Total no of patients(N=300)**
Age (years) [n, (%)]	
Less than 19	18 (6)
20-35	229 (76.33)
36-40	44 (14.6)
Above 40	9 (3)
Occupation [n, (%)]	
Housewives	197 (65.7)
Private Employee	2 (0.7)
Government employee	98 (32.7)
Farmer	3 (1)
Residence [n, (%)]	
Zliten	267 (89)
Others	24 (8)
Non-Libyan	9 (3)
Educational status [n, (%)]	
Uneducated	25 (8.3)
Elementary	58 (19.3)
High school	96 (32))
University	121 (40.3)
Income/month (LYD)	
500-800	36 (12)
1000-3000	229 (76.3)
3000-5000	35 (11.7)
Family size	
≤4	152 (55.6)
≥4	91 (30.3)

Information is **displayed** as a mean± SD.*P- and †P-values were from the **free** sample-t test and chi- squared test **individually**

Table 1 Socio-demographic Characteristics of Study Subjects. A total of 300 representative ANC attendees participated in the study yielding the response The majority of participants were aged 20–35 years (76.3%), with smaller proportions in the other age groups (<19 years: 6%, 36–40 years: 14.6%, >40 years: 3%). Most participants were housewives (65.7%), followed by government employees (32.7%). Regarding residence, 89% of participants lived in Ziltein, 8% in other areas, and 3% were non-Libyan. In terms of educational status, 40.3% had a university degree, 32% had completed high school, 19.3% had elementary education, and 8.3% were uneducated. Monthly income levels were categorized into three groups: 76.3% earned 1,000–3,000 LYD, 12% earned 500–800 LYD, and 11.7% earned 3,000–5,000 LYD. Lastly, most families had a family size of ≤4 members (55.6%), while 30.3% had ≥4 members.

4.3 Obstetric and maternal characteristics of the study participants

Table-2 Obstetric and maternal characteristics of the ponder members

Characteristics	Total no of patients(N=300)	Number (%)		P-Value
		Anemia (n=204)	Non -Anemia(n=96)	
Gestational age [n, (%)]				
First (0-3)	64 (21.3)	29(45.3)	35(54.7)	
Second (3-6)	85 (28.3)	55(64.7)	30(35.3)	<0.001
Third (6-9)	151 (50.3)	120(79.5)	31(20.5)	
Gravidity (n, (%)]				
Primi gravidity	52 (17.3)	24(46.2)	28(53.8)	<0.001
Multi gravidity	248 (82.7)	180(72.6)	68(27.4)	
Parity [n, (%)]				
nulliparous	60 (19.7)	29(48.3)	31(51.7)	
primipara	48 (16)	33(68.8)	15(31.3)	0.001
multipara	192 (64.3)	142(74)	50(26)	
History of miscarriage [n, (%)]				
Yes	110 (36.7)	77(70)	33(30)	0.572
No	190 (63.3)	127(66.8)	63(33.2)	
History of heavy cycle [n, (%)]				
Less than 5 days	185 (61.7)	133(72.7)	50(27.3)	0.030
More than 5 days	115 (38.3)	71(60.7)	46(39.3)	
Birth interval [n, (%)]				
0-2 years	165 (55)	118(71.5)	47(28.5)	
2-4 years	60 (20)	45(75)	15(25)	0.001
More than 4 years	17 (5.7)	14(82.4)	3(17.6)	
First pregnant	58 (19.3)	27(46.6)	31(53.4)	
Mood of delivery [n, (%)]				
Normal vaginal delivery	164 (54.7)	121(73.8)	43(26.2)	
Caesarean section	77 (25.7)	55(71.4)	22(28.8)	0.001
Before labor	59 (19.7)	28(47.5)	31(52.5)	
Iron /folic acid [n, (%)]supplementation				0.518
Yes	282 (94)	193(68.4)	89(31.6)	
No	18 (6)	11(61.1)	7(38.9)	
History of contraceptive [n, (%)]				
Yes	59 (19.7)	36(61)	23(39)	0.20
No	241 (80.3)	168(69.7)	73(30.3)	

History of clinical illness [n, (%)]				
Yes				0.071
No	21 (7)	18(85.7)	3(14.3)	
	279 (93)	186(66.7)	93(33.3)	

†P-value was from the chi-squared test.

Figure4.2 Prevalence of Anemia in Obstetric and maternal characteristics

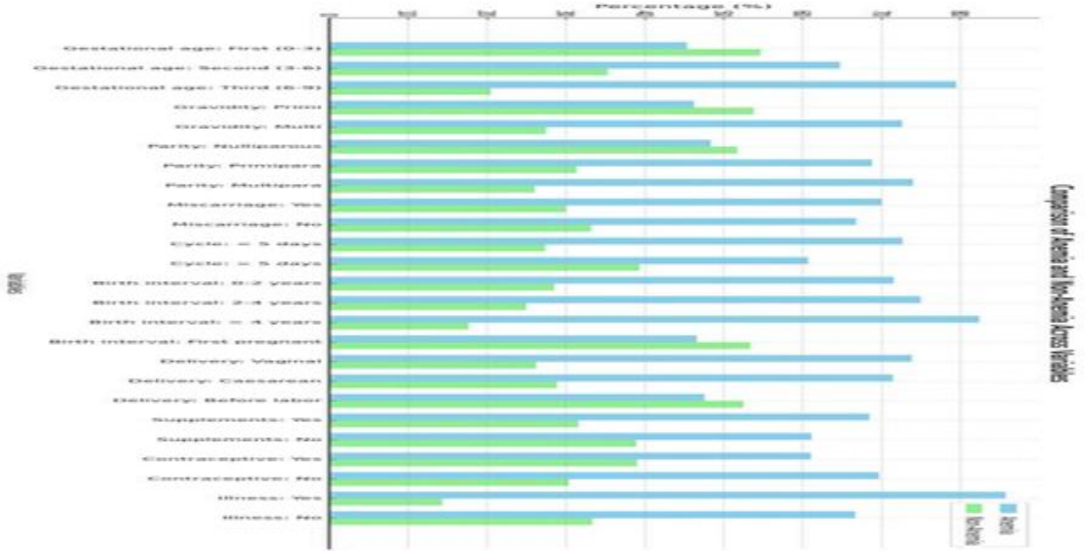


Table 2 Obstetric and maternal characteristics among all pregnant women characteristics between individuals with anemia and non-anemia. Gestational Age: Participants are categorized into first, second, and third trimesters. There's no significant difference in distribution between anemic and non-anemic groups ($p > 0.05$). Gravidity: Divided into primigravida (first pregnancy) and multigravida (multiple pregnancies). Anemia is more common in multigravida, with a statistically significant association ($p < 0.05$). Parity: The table compares nullipara (no prior births), primipara (one prior birth), and multipara (multiple prior births). Parity shows a significant relationship with anemia ($p = 0.001$). History of Miscarriage: The presence of a miscarriage history doesn't differ significantly between groups ($p = 0.572$).History of Heavy Cycle: Women with heavy menstrual cycles of more than five days show a statistically significant association with anemia ($p = 0.030$).Birth Interval: Birth spacing (0-2 years, 2-4 years, more than 4 years) is statistically significant for anemia ($p = 0.005$).Mode of Delivery: The method of delivery (normal vaginal delivery, cesarean section, or before labor) is significantly associated with anemia ($p = 0.032$).Iron/Folic Acid Supplementation: No significant difference is observed regarding supplementation status between groups ($p = 0.518$).Use of Contraceptives: No significant association is noted between contraceptive use and anemia ($p = 0.062$).History of Clinical Illness: A history of clinical illness appears to be marginally significant ($p = 0.071$).statically significant differences between anemia and non-anemia groups These characteristics are associated with maternal Anemia.

4.4 Medical and physical findings of the study

Table 3. Therapeutic and physical discoveries of the ponder members

Characteristics	**Total no of patients(N=300)**	**Number (%)**		**P-Value**
		Anemia(n=204)	**Non-Anemia(n=96)**	
Current medical illness [n, (%)]				
Yes	145 (48.3)	105(72.4)	40(27.6)	0.113

No	155 (51.7)	99(63.9)	56(36.1)	
Temperature (°C) [n, (%)]				
<96.8	11 (3.7)	7(36.6)	4(36.4)	
96.8–98.6	196 (65.3)	137(69.9)	59(30.1)	0.625
> 98.6	93 (31)	60(64.5)	33(35.5)	
Pulse rate (bpm) [n, (%)]				
<60	53 (17.7)	34(64.2)	19(35.8)	0.508
60–100	247 (82.3)	170(68.8)	77(31.2)	
Blood pressure (mmHg)[n, (%)]				
<90/60	223 (74.3)	144(64.6)	79(35.4)	0.03
90/60	77 (25.7)	60(77.9)	17(22.1)	
Intestinal parasite [n, (%)]				
Yes	5 (1.7)	3(60)	2(40)	0.699
No	295 (98.3)	201(68.1)	94(31.9)	
History of malaria [n, (%)]				
Yes	0 (0)	0	0	0
No	300 (100)	204(68)	96(32)	
Blood loss [n, (%)]				
Yes	49 (16.3)	33(67.3)	16(32.7)	0.915
No	251 (83.7)	171(68.1)	80(31.9)	
Stool examination for parasite [n, (%)]				
Positive	13 (4,3)	9(69.2)	4(30.8)	0.923
Negative	287 (95.7)	195(67.9)	92(32.1)	
HIV Serostatus [n, (%)]				
Positive	0 (0)	0	0	0
Negative	300 (100)	204(68)	96(32)	

aMean ± SD, *P- and †P-values were from the independent sample-t test and the chi-squared test, respectively.

Table 3 Medical and physical characteristics findings of 300 study participants, classifying them into those with anemia and those without. Here's a detailed analysis of Current Medical Illness - Total: 145 patients (48.3%) reported a current medical illness, while 155 (51.7%) did not. P-value: 0.113, suggesting that a current medical illness does not significantly impact anemia status. Temperature Most participants had a normal temperature range, with very few in abnormal ranges. P-value: 0.625 indicates no significant relation to Anemia.Pulse Rate: As many as 53 patients (17.7%) had a pulse rate below 60 bpm, while 247 (82.3%) were above 60 bpm. P-value: 0.508, again showing no significant correlation with anemia. Blood Pressure Most participants exhibited normal ranges (90/60 mmHg) P-value: of 0.03 suggests a significant difference, indicating blood pressure might affect anemia status. Intestinal Parasite and History of Malaria Compared the presence and absence of these conditions. P-values of 0.699 and 1.00 indicate no significant correlation with anemia. Blood Loss p-value of 0.915, suggesting no significant effect on anemia. Stool Examination for Parasite P-value: 0.923 indicates no significant results related to anemia. HIV Serostatus: All participants were negative, indicating this factor was irrelevant in the current context. P-value the p-values serve as indicators of statistical significance. A value below 0.05 signifies significance, while above

this threshold indicates no significant association. The only significant finding is related to blood pressure.

3.1 Anthropometric measurements with Anemia

Characteristics	Total no of patients(N=300)	Number (%)		
		Anemia(n=204)	Non-Anemia (m=96)	p-value
Body weight				
Under weight	60(20)	50 (24.5)	10 (10.4)	0.0085
Normal	180(60)	140(68.6)	40(41.6)	
Over weight	60(20)	14(6.9)	46(47.9)	
MUAC				
21-23cm	81(27)	54(66.7)	27(33.3)	0.763
>23cm	219(73)	150(68.5)	69(31.5)	

Table 3.1 Anthropometric measurements with Anemia related to anemia among a sample of 300 patients. It is divided into two main sections: Body Weight and Mid-Upper Arm Circumference (MUAC). General Categories Underweight 60 individuals (20%) Normal Weight 180 individuals (60%) Overweight 60 individuals (20%) Anemia Prevalence (n = 204) Underweight 50 individuals (24.5%) Normal Weight 140 individuals (68.6%) Overweight 14 individuals (6.9%) Non-Anemia (n = 96)Under weight: 10 individuals (10.4%) Normal Weight: 40 individuals (41.6%) Overweight 46 individuals (47.9%) to the data enhance the statistical significance of the association between body mass index (BMI) and Anemia, with a p-value0.0085 statistical significance. MUAC 21-23 cm Total patients: 81 (27%) Anemia: 54 (66.7%) Non-Anemia: 27 (33.3%) >23 cm Total patients: 219 (73%) Anemia: 150 (68.5%) Non-Anemia: 69 (31.5%) p-values that indicate the statistical significance of the differences observed between patients with Anemia

4.5 Dietary characteristics

Table 4. Dietary characteristics of consider members †P-value was from the chi-squared test.

Characteristics	Total no of patients(N=300)	Number (%)		P-Value
		Anemia(n=204)	Non - Anemia(n=96)	
Eating animal products [n, (%)]				
Daily	199 (66.3)	141(70.9)	58(29.1)	
Every other day	49 (16.3)	36(73.5)	13(26.5)	
Weekly	38 (12.7)	20(52.6)	18(47)	0.106
Every 2 weeks	4 (1.3)	2(50)	2(50)	
Once a month	10 (3.3)	5(50)	5(50)	
Eating green vegetables [n, (%)]				
Daily	223 (74.3)	149(66.8)	74(33.2)	
Every other day	49 (16.3)	33(67.3)	16(32.7)	0.451
Weekly	28 (9.3)	22(78.6)	6(21.4)	

Eating fruits after meal [n, (%)]				
Yes	236 (78.7)	159(67.4)	77(32.6)	0.655
No	64 (21.3)	45(70.3)	19(29.7)	
Dietary diversity score				
High	171 (57)	121(70.8)	50(29.2)	0.238
Low	129 (43)	83(64.3)	46(35.7)	
History of coffee/Tea (the last 3 months)				
Yes	144 (48)	102(70.8)	42(29.2)	0.312
No	156 (52)	102(65.4)	54(34.6)	
History of pica				
Yes	11 (3.7)	10(90.9)	1(9.1)	
No	289 (96.3)	194(67.1)	95(32.9)	0.097

Table 4 Dietary characteristics present the nutritional characteristics of pregnant women and their relationship to Anemia including consumption of animal products Every day, animal products, and green leafy vegetables consumption by participants was 199 participants (66.3%) eat animal products daily. Within the anemia group, 141 participants (70.9%) eat animal products daily, compared to 58 (29.1%) in the non-anemia group. *P-value = 0.106 *74.3%of participants consume green vegetables daily, with no large difference between the anemia and non-anemia groups. *P-value = 0.451*: Not statistically significant consuming Fruits78.7%of participants eat fruits after meals, but there is no significant difference between the two groups. - P-value = 0.655: Not statistically significant Dietary Diversity Score 57% of participants have a high dietary diversity score, but this is not significantly associated with anemia status.P-value = 0.238: Not statistically significant History of Coffee/Tea Consumption 48% of participants reported consuming coffee/tea in the last 3 months. No significant difference was found between the anemia and non-anemia groups. P-value = 0.312 not statistically significant History of Pica Only 3.7% of participants reported pica, with a higher proportion in the anemia group (90.9%). However, the association is not statistically significant. P-value = 0.097**: Close to significance but still not statistically significant. The statistical analysis suggests that none of the dietary characteristics analyzed are significantly associated with anemia status in this study population. However, certain trends (e.g., history of pica) may require further investigation with larger sample sizes or more detailed analyses. The dietary habits showed different levels of significance between the study groups (Table 4).

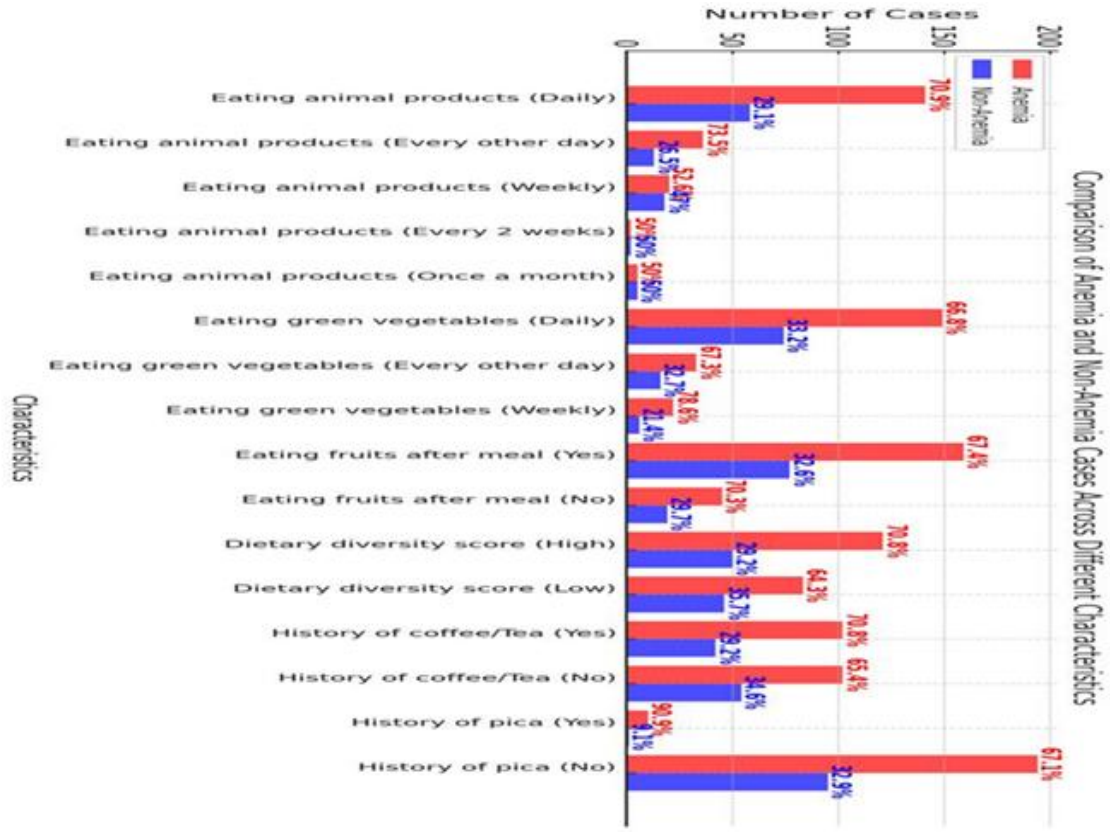


Figure4.3 Prevalence of Anemia in dietary characteristics

4.6 Prevalence and degree of Anemia

Table 5. Predominance and degree of iron deficiency of ponder members

Category of Anemia	**Hemoglobin (gm\dl)**	**Total no patients(N=300)**
Severe anemia	<7	4 (1.3)
Moderate anemia	7–9.9	75 (25)
Mild anemia	10–10.9	125 (41.7)
No anemia	>11	96 (32)

†P-value was from the chi-squared test..

Table 5 Severe Anemia: Defined as hemoglobin levels less than 7 gm/dl, with 4 patients (1.3% of the total). Moderate Anemia Hemoglobin levels between 7 and 9.9 gm/dl, consisting of 75 patients (25%) Mild Anemia: Hemoglobin levels from 10 to 10.9 gm/dl, with 125 patients (41.7%).No Anemia: Hemoglobin levels greater than 11 gm/dl, including 96 patients (32%).

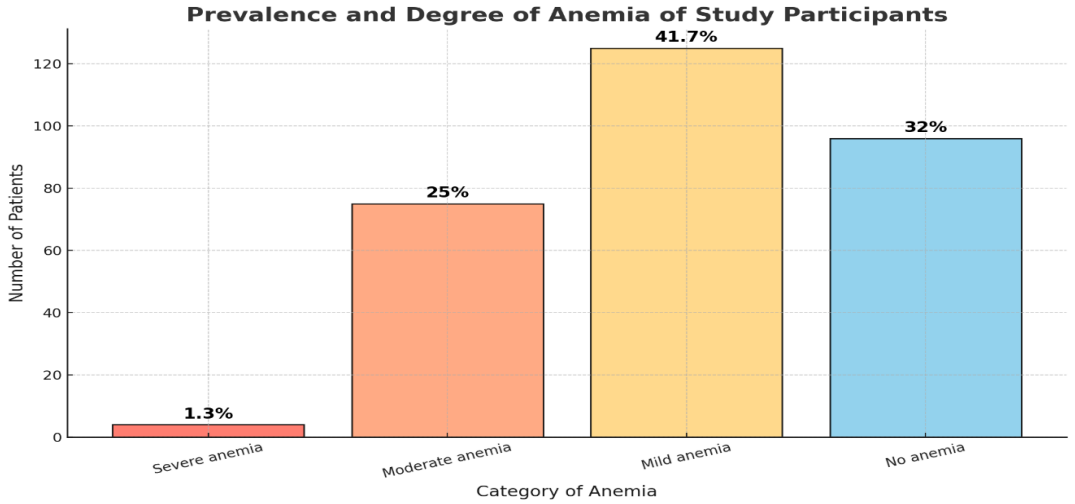


Figure4.4Prevlence and degree of Anemia

Table 6. Affiliation of hazard components and seriousness of iron deficiency in pregnancy

Variables	Severity of Anemia [n (%)]				Total (N=300)	P-value
	Mild (n =125)	Moderate (n =75)	Severe (n =4)	No Anemia (n= 96)		
Age (years);						
Less than 19	3(2.4)	4(5.33)	0(0)	11(11.46)	18(6)	
20-35	101(80.8)	59(78.67)	3(75)	66(68.75)	229(76.33)	0.036
36-40	16(12.8)	12(16)	1(25)	16(16.67)	45(15)	
Above 40	5(4)	0(0)	0(0)	3(3.12)	8(2.67)	
Occupation;						
Housewives	81(64.8)	46(61.33)	2(50)	68(70.83)	197(65.67)	
Private Employee	0(0)	2(2.67)	0(0)	0(0)	2(0.67)	
Government employee	43(34.4)	27(36)	2(50)	26(27.09)	98(32.66)	0.112
Farmer	1(0.8)	0(0)	0(0)	2(2.08)	3(1)	
Others						
Educational status;						
Uneducated	9(7.2)	8(10.67)	1(25)	7(7.29)	25(8.33)	
Elementary	24(19.2)	19(25.33)	0(0)	15(15.62)	58(19.33)	
High school	40(32)	19(25.33)	2(50	35(36.46)	96(32)	0.820
University	52(41.6)	29(38.67)	1(25)	39(40.63)	121(40.34)	
Income/month (LYD)						
500-800	15(12)	8(10.67)	1(25)	12(12.5)	36(12)	
1000-3000	99(79.2)	57(76)	2(50)	71(73.96)	229(76.33)	0.775
	11(8.8)	10(13.33)	1(25)	13(13.54)	35(11.67)	

3000-5000						
Gestational age;						
First (0-3)	21(16.8)	8(10.67)	0(0)	35(36.46)	64(21.33)	
Second (3-6)	33(26.4)	20(26.67)	2(50)	30(31.25)	85(28.33)	0.000
Third (6-9)	71(56.8)	47(62.66)	2(50)	31(32.29)	151(50.34)	
Gravidity ;						
primigravidity	15(12)	9(12)	0(0)	28(29.17)	52(17.33)	0.003
Multi gravidity	110(88)	66(88)	4(100)	68(70.83)	248(82.67)	
Birth interval;						
0-2 years	72(57.6)	43(57.34)	3(75)	47(48.96)	165(55)	
2-4 years	29(23.2)	15(20)	1(25)	15(15.63)	60(20)	0.030
More than 4 years	7(5.6)	7(9.33)	0(0)	3(3.12)	17(5.66)	
First pregnant	17(13.6)	10(13.33)	0(0)	31(32.29)	58(94)	
Iron /folic acid; supplementation						
Yes	118(94.4)	71(94.67)	4(100)	89(92.71)	282(94)	0.893
No	7(5.6)	4(5.33)	0(0)	7(7.29)	18(6)	
Blood pressure (mmHg);						
<90/60	92(73.6)	48(64)	4(100)	79(82.29)	223(74.33)	0.030
90/60	33(26.4)	27(36)	0(0)	17(17.71)	77(25.66)	

. †P-value was from the chi-squared test.

Table6: shows the association between selected risk factors and anemia severity in pregnant women. Age was significantly associated with anemia (p = 0.036); moderate anemia was highest among women aged 36–40. Gestational age had a strong association (p = 0.000); most moderate and severe anemia cases occurred in the third trimester .Gravidity and birth interval were also significant (p = 0.003 and p = 0.030), with multigravida women and short birth intervals showing higher anemia rates. Blood pressure showed significance (p = 0.030); low BP (<90/60 mmHg) was linked to more severe anemia. Other factors like occupation, education, income, and iron/folic acid supplementation had no significant association.

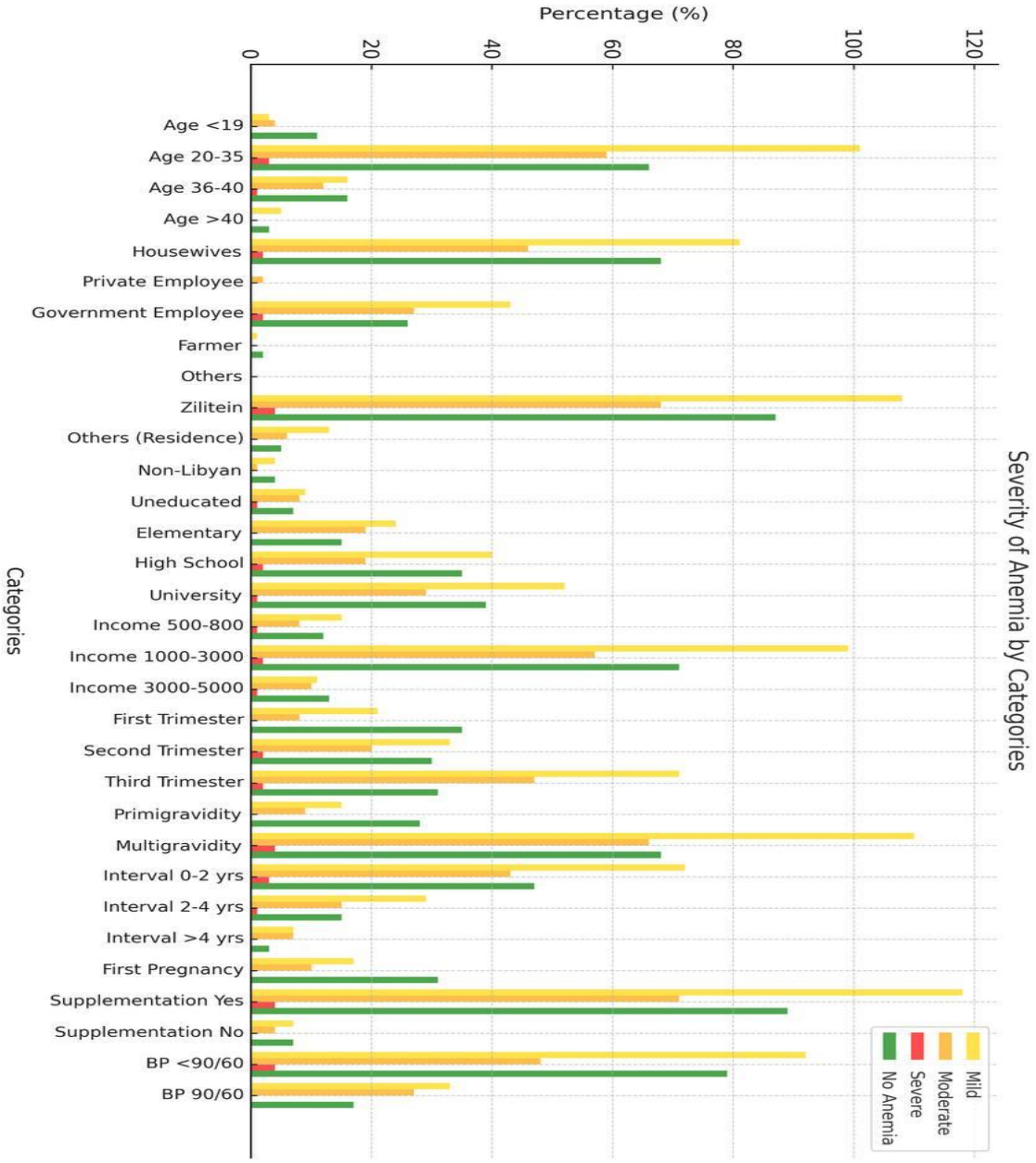


Figure4.5Prevalence and degree of Anemiaof each category

Table 7. Impact of distinctive chance variables on predominance of iron deficiency among pregnant ladies

Variables	Anemia (%) N=204	Normal (%) N=96	Total Number (%) N=300	AOR (95% cl)	P-value
Age (years)					
Less than 19	7 (2.3)	11 (3.7)	18 (6)	1	
20-35	163 (54.3)	66 (22)	229(76.3)	0.499(0.147-1.694)	0.280
36-40	29 (9.7)	16 (5.3)	45 (15)	1.013(0.23-4.3201)	
Above 40	5 (1.7)	3 (1)	8 (2.7)	0.866(0.118-6.334)	

Educational status					
Uneducated	18 (6)	7 (2.3)	25 (8.3)	1	
Elementary	43 (14)	15 (5)	58 (19)	0.897(0.313-2.570)	0.668
High school	61 (20.3)	35 (11.7)	96 (32)	1.475(0.561-3.880)	
University	82 (27.3)	39 (13)	121 40.3)	1.223(0.472-3.171)	
Income/month (LYD)					0.677
500-800	24 (8)	12 (4)	36 (12)	1	
1000-3000	158 (52.7)	71 (23.7)	229(76.4)	0.968(0.408-2.298)	
3000-5000	22 (7.3)	13 (4.3)	35 (11.6)	1.231(0.392-3.865)	
Attending antenatal care					0.157
Private Hospital	106 (35.3)	61 (20.3)	167(55.6)	1.521(0.864-2.677)	
Government Hospital	98 (32.7)	35 (11.7)	133(44.4)	1	
Gestational age [n, (%)]					
First (0-3)	28 (9.7)	35 (11.7)	64 (21.4)	1	0.000
Second (3-6)	55 (18.3)	30 (10)	85 (28.3)	0.471(0.226-0.981)	
Third (6-9)	120 (40)	31 (10.3)	151 50.3)	0.217(0.108-0.435)	
Parity					
nulliparous	29 (9.7)	31 (10.3)	60 (39.3)	1	
primipara	33 (11)	15 (5)	48 (16)	0.514(0.214-1.232)	0.000
multipara	142 (47.3)	50 (16.7)	192 (64)	0.279(0.131-0.595)	
History of contraceptive					0.013
Yes	36 (12)	23 (7.7)	59 (19.7)	1	
No	16 (56)	73 (24.3)	241 80.3)	0.457(0.228-0.919)	
Iron /folic acid supplementation					0.855
Yes	193 64.3)	89 (29.7)	282 (94)	1	
No	11 (3.7)	7 (2.3)	18 (6)	1.2456(0.382-4.064)	

Table 7 Factors Linked to Anemia The variables influencing maternal anemia were determined using a binary logistic regression model. After controlling for other factors, there were no independent risk factors for anemia, including age groups ranging from 20 to 35 years old (AOR = 0.499, 95%CI1.47 – 1.694. P < 0.280) and from 36 to 40 years old (AOR = 1.013, 95%CI = 013-4.320, P < 0.280), monthly family income between 1000 and 3000 LYD (AOR = 0.968, 95% CI: 0.408–2.298, P < 0.677), and attendance at ANC in a private hospital (AOR = 1.521, 95% CI:0.864–2. 677, P < 0.157). Multiparametric parity (AOR=0.279, 95%Cl:0.131-0595) and usage of contraception (no contraception)

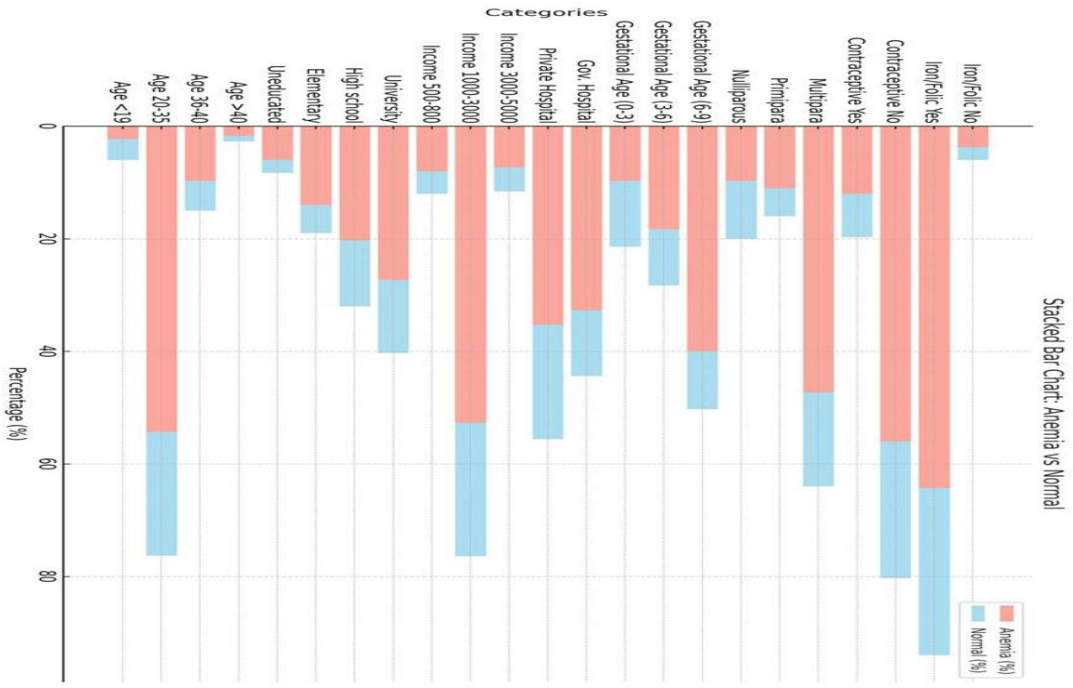


Figure4.6the proportions of Anemia and the normal state of each category

5. CONCLUSIONS

This study revealed that anemia remains a major public health concern among pregnant women in Zliten City, with a prevalence of 68%. Most cases were of mild to moderate severity, and no severe anemia was observed. Maternal factors such as MUAC, BMI, age, income, gestational age, and pregnancy frequency showed significant associations with anemia, whereas education level, age at marriage, and general dietary patterns did not. Specific dietary factors, including egg and green leafy vegetable consumption, were significantly related to anemia status, while fruit, meat, and overall meal frequency were not. Tea consumption frequency was also associated with anemia, although tea type showed no effect.

These findings emphasize the importance of integrating nutrition-focused interventions within antenatal care services to reduce the burden of anemia in pregnancy.

6. RECOMMENDATIONS

Based on the study findings, the following recommendations are proposed:

Strengthen antenatal care services by incorporating routine screening and early management of anemia.

Expand nutritional counseling with emphasis on dietary diversity, particularly the consumption of eggs and green leafy vegetables.

Target vulnerable groups, including low-income women and those with high parity, with tailored interventions.

Enhance health education programs for women and adolescent girls to increase awareness of anemia prevention.

Promote policy support to integrate nutrition extension services into maternal health programs and reinforce women's education and empowerment.

Encourage further research on anemia prevention, nutrient requirements, and cultural dietary practices across different subgroups of pregnant women.

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