Prevalence and determinants of anemia among pregnant women receiving antenatal care at District Hospital in Qarbagh District, Ghazani Province, Afghanistan

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Research Article

Abstract

Background: The burden of anemia among pregnant women is high in developing countries, with an increased risk of maternal mortality and morbidity in these settings.

Objectives: The study aimed to assess the prevalence and determinants of anemia among pregnant women receiving antenatal care at District Hospital in Qarabagh District, Ghazani province, Afghanistan.

Methods: Pregnant women receiving antenatal care in this cross-sectional study completed a structured questionnaire and Hemoglobin (Hb) measurement from September to December 2020. The study questionnaire collected information on respondents' socio-demographic, reproductive and dietary characteristics. Descriptive statistics were used to describe anemia prevalence and other baseline characteristics. We employed bivariate and multivariable analyses to identify determinants of anemia. We used SPSS version 21 for statistical analyses.

Results: Overall, 45.6% (CI: 41.64%-49.60%) of the respondents were anemic, of which 54.4% cases were mild. Pregnant women who were from households with low income (vs the high income) had higher odds of anemia (AOR=2.24; 95%CI:1.06-4.71). Husbands' employment was strongly associated with anemia (AOR=2.04; 95%CI:1.04-3.97), as well as women who had a history of complications in last pregnancy (AOR=1.53; 95%CI: 1.02-2.28) and those who had irregular menstruation before this pregnancy had higher odds of anemia (AOR=2.21;1.35-3.64).

Conclusion: The prevalence of anemia among pregnant women reflects a severe public health problem in the study area. Pregnant women from a household with low income, whose husbands were self-employed, and those who had a history of complications and irregular menstruation before this pregnancy were at higher risk of anemia. Hence, policymakers and health providers in the study area should take note of the results of this study to reduce the prevalence of anemia among pregnant women.

Background

Anemia among pregnant women is a major public health problem, with nearly 56 million pregnant women affected worldwide [1]. Anemia remains one of the premiere cause of maternal morbidity and mortality during pregnancy. Recent global figures reflect a clear decline in the prevalence rates of anemia among pregnant women in developed countries over the past 2 decades [2]. However, there has been little progress in the reduction of prevalence rates of anemia among pregnant women in the developing countries [2,3].

Anemia during pregnancy is defined as hemoglobin (Hb) level remaining below 11 g/dL at first and third trimesters and Hb < 10.5 g/dL at the second trimester [1]. According to the World Health Organization's (WHO) figures, the prevalence of anemia as a public health problem is classified as no public health problem when its prevalence is <5% in the general population. It is classified as a mild, moderate and severe public health problem when its prevalence is 5-19.9%, 20-39.9% and >40%, respectively [1].

The proportion of pregnant women with anemia reflects discrepancies in different parts of the world. Moreover, anemia prevalence is higher, particularly in the developing world [1,2]. Globally, the prevalence of anemia among pregnant women has been reported to be 41.8% [1]. Data assert that pregnant women living in Asia and Africa hold the greatest risk. In Afghanistan, 36.5% of the pregnant women were anemic in 2019 [4]. Moreover, it is considered a moderate public health problem.

In pregnant women, major health consequences of severe anemia include low birth weight [5], fetal death [6], preterm delivery [7], maternal mortality [8,9], neonatal death [7,10] and infant mortality [5,7,10]. Perpetual evidence from other developing countries shows that diverse factors such as socio-demographic [3,10-13], reproductive [3,11-14], and dietary characteristics [14-16] of pregnant women can influence anemia status. Identification of factors associated with anemia enables managers and policy makers to formulate evidence-based interventions to reduce anemia among pregnant women and subsequent improvement of maternal and fetal health.

The objectives of this study are to describe prevalence of anemia among pregnant women receiving antenatal care at the Qarabagh District hospital of Ghazani province in Afghanistan and identity determinants of anemia among these populations.

Materials And Methods

Study setting and period

This hospital based cross-sectional study was carried out at Mother and Child Health (MCH) department of Qarbagh District hospital in Ghazani province from September to December 2020. Ghazani is located in the central zone and is considered as a first-grade province in Afghanistan. The province is divided into eighteen districts. Qarbagh district is located 55 km far from Ghazani city with an altitude of 2250 meters from above the sea level and is lodging approximately 161424 people. There are ten health centers including, one district hospital, two Comprehensive Health Centers (CHCs), two primary health centers and five health posts in the district.

Study design

This was a hospital-based cross-sectional study.

Sample size and sampling procedures

The sample size was calculated based on the single population proportion formula [n= Z^2P (1-P)/(d)^2] with the assumption of; 95% confidence interval, 5% margin of error, *P=0.5* (to obtain maximum value). Allowing for a 10% non-response rate and design effect of 1.5, a sample size of 640 was adequate.

Regarding sampling technique, we employed convenience sampling method to enroll study subjects until the required sample size was attained.

Inclusion and exclusion criteria:

Pregnant women who attend Antenatal Care (ANC) in the selected District Hospital and those who were permanent residents of the selected district were eligible.

Pregnant women who presented with a critical condition and those who were not willing to participate consisted our exclusion criteria.

Study variables

The dependent variable in this study was anemia status among pregnant women. The outcome variable was binary and it was coded as 1 if women was anemic and 0, if women was not anemic. Based on different literatures, maternal age, educational level, employment status, income, pregnancy intention, history of obstetrics complications, parity, access to health facility, menstrual cycle regularity, nutritional status, gestational age, history of intestinal helminths and malaria parasites were considered as independent variables.

Data collection

Data were collected in a structured and pre-tested questionnaire by trained health professionals. Before the pilot study, the principal investigators provided a two-day intensive training session. It was focused on sampling methods, interview techniques, Hb measurement procedures, filling out questionnaires, and ethical issues during the study. The recruiters collected data pertinent to subjects' socio-demographic, reproductive, dietary and other medical characteristics. Information on knowledge related to anemia was also recorded. The principal investigators monitored the data collection. The questionnaires were checked for completion and quality daily.

Hemoglobin measurements were performed by portable hemoglobinometer (Sahli, Germany) following a standardized procedure recommended by WHO [1]. Hb values were adjusted for the altitude according to the following formula before the data were analyzed= Hb adjustment = -0.032 x (altitude x 0.0032808) + 0.022 x (altitude x $0.0032808)^2$[1].

Hb level remaining below 11 g/dL at first and third trimesters and Hb < 10.5 g/dL at the second trimester was used to define anemia [1].

Based on the severity, anemia among pregnant women was classified into three categories as per WHO criteria [1]:

- Mild anemia: 10.0–10.9 g/dL (at first and third trimesters) and 10.0–10.4 g/dL (at second trimester)
- Moderate anemia: 7.0–9.9 g/dL (regardless of gestational age)

- Severe anemia: < 7.0 g/dL (regardless of gestational age)

Data management and Analysis

We investigated 30 possible factors for association with anemia among pregnant women based on extensive literature search and evidence from our data. For descriptive statistics, baseline characteristics were presented using frequency and percentage. We used a binary logistic regression model to assess determinants of anemia. Variables with a p-value of less than 0.25 were considered potential confounders and were adjusted in the multivariable logistic regression model. Finally, multivariable logistics analysis with enter method was carried out to determine independent determinants of anemia among pregnant women. Further, the relationship between gestational age and anemia was determined using ANOVA analyses. The two-tailed p-values of <0.05 were considered statistically significant. We used SPSS version 21 for statistical analysis [16].

Ethical Consideration

This study was ethically approved by the Research and Ethics Committee of Kandahar university (Maktob No. 112- dated on 10/5/2020). We obtained the administrative approval from Kandahar public health directorate to conduct this study. In addition, after explaining the purpose of the study, informed written consent was obtained from all study participants.

Results

3.1 Socio-demographic characteristics of the study participants

Of 640 study participants, a total of 625 pregnant were included in the analysis, with a response rate (97.6%). The mean ± SD age of pregnant women was 28.8 (5.27). Nearly 85% (531) of respondents were in the age range of 20-35 and 590 (94.6%) had no formal education. Concerning the educational status of the husband, 406 (65%) had no formal education, 12.5% had primary education, 15.2% had secondary education and 7.3% were high school graduates. All study participants worked as housewives. Most (91.2%) of the respondents' husbands were self-employed. The majority (83.5%) of the study participants were living with families having six or more than six members while 574 (91.8%) and 51 (8.2%) had a monthly income of 150-200 and >200 USD, respectively (Table.1).

Table.1. Socio-demographic characteristics of pregnant women receiving antenatal care at Qarabagh district Hospital, 2020.

Variable	Category	Frequency (%)
Age (in Years)	< 20	36 (5.8)
	20-35	531 (85)

	>35	58 (9.8)
Educational status	Educated	35 (5.4)
	No formal education	590 (94.6)
Husband level of education	Primary	78 (12.5)
	Secondary	95 (15.2)
	High school graduate	46 (7.3)
	No formal education	406 (65)
Occupation	Housewife	625 (100)
Husband employment status	Self-employed	572 (91.2)
	Formal employed	53 (8.5)
Family size	3-5	101 (16.2)
	≥ 6	524 (83.3)
Household monthly income (USD)	150-200	574 (91.8)
	>200	51 (8.2)

3.2 Reproductive and other medical-related characteristics of the study participants

Of the total respondents, 305 (48.8%) married before the age of eighteen. Concerning the menstrual cycle, the majority 522 (83.5%), 500 (80%) of study participants had menstruation cycle regular and 5-8 days by duration before this pregnancy, respectively. About one-fifth (19.5%) of the respondents had more than five parities. Among those who had a history of at least one birth, 407 (73.4%) of the study subjects had a birth interval of less than two years, while 72 (12.9%) experienced complications in their last pregnancy. Nearly half (44.5%) of the study participants were at the second trimester. More than half (365, 58%) of the respondents reported that they have not utilized contraceptives in the past. Among ANC attendees, most (391, 62.6%) of the pregnant women were at their first or second visit and two-third (64%) were consuming iron and folic acid supplementations. Of all the participants, 71 (11.4%) of the study participants had history of vaginal bleeding in the current pregnancy. Regarding medical assessment of the study participants, malarial infestation (2.6%), intestinal helminths (10.4%) and history of stress (31.4%) were the predominant medical conditions. Table 2 shows detailed characteristics of the respondent's reproductive and other medical-relates variables.

Table.2. Reproduction and medical characteristics of pregnant women receiving antenatal care Qarabagh district Hospital, 2020.

Variable	Category	Frequency (%)
Age at marriage (in years)	< 18	305 (48.8)
	≥18	320 (51.2)
Regularity of menstrual cycle	Regular	522 (83.5)
	Irregular	103 (16.5)
Mensuration period (in days)	< 5	74 (11.8)
1.	500 (80.0)	
>8	51 (8.2)	
Parity	Nullipara	70 (11.0)
	primipara	203 (32.6)
	3-5	211 (33.8)
	>5	122 (19.5)
Type of pregnancy (n=555)	Single	101 (16.2)
	Multiple	524 (83.3)
Place of delivery (n=555)	Health facility	423 (76.3)
	Home	132 (23.7)
Type of delivery (n=555)	Normal	488 (87.9)
	Assisted/Cesarean	67 (12.7)
Birth Interval (n=555)	< 2 years	407 (73.4)
	≥2 years	148 (26.6)
Complications in last pregnancy (n=555) Yes		72 (12.9)

	No	483 (87.1)
Gestational age	1st trimester	187 (29.9)
	2nd trimester	278 (44.5)
	3rd trimester	160 (25.6)
Access to health facility	Yes	510 (81.6)
	No	115 (18.4)
Contraceptive use before pregnancy	Yes	260 (41.6)
	No	365 (58.4)
Type of contraceptive (n=260)	Oral	75 (12)
	Injectables	97 (15.5)
	Condoms	63 (10.1)
	IUD	25 (4.0)
Number of ANC visits	1 or 2	391 (62.6)
	>2	234 (37.5)
Iron+ Folic acid	Yes	400 (64)
	No	225 (36)
Vaginal bleeding	Yes	71 (11.4)
	No	554 (88.6)
History of malaria (last year)	Yes	16 (2.6)
	No	609 (97.4)
History of intestinal helminths	Yes	65 (10.4)
	No	560 (89.6)
History of stress	Yes	196 (31.4)
	No	429 (68.6)

3.3 Dietary characteristics of the study participants

About half (52.3%) of the study participants had a meal frequency of three. Of all the respondents, 228 (36.4%) and 151 (24%) of the pregnant women consumed vegetables and fresh fruits daily, respectively. Moreover, 266 (42.5%) of pregnant women consumed meat once a week. About 61% (389) of study subjects had a habit of drinking green tea after the meal (Table.3).

Table.3. Dietary characteristics of pregnant women receiving antenatal care Qarabagh district Hospital, 2020.

Variable	Category	Frequency (%)
Meal frequency in a day	2	96 (15.4)
	3	327 (52.3)
>3	202 (32.3)	
Meat	Once a week	266 (42.5)
	Twice a week	42 (6.7)
	Once in two weeks	165 (26.4)
	Once in a month	152 (24.3)
Vegetables	Everyday	228 (36.4)
	Twice a week	116 (18.5)
	Thrice a week	92 (14.7)
	Once a week	62 (9.9)
	Once in two weeks	127 (20.4)
Fresh fruits	Everyday	151 (24.1)
	Twice a week	101 (16.1)
	Thrice a week	87 (13.9)
	Once a week	70 (11.2)

	Once in two weeks	117 (18.7)
	Once a month	99 (15.8)
Green tea after meal	Yes	389 (62.2)
	No	236 (37.8)

3.4 Knowledge of study participants on anemia

Among study participants, 446 (71.4%) had heard about anemia before. As shown in table.4, health facilities were the primary (73%) source of information. About 80% of the respondent thought anemia was treatable and 48% thought that it is very important to take medications to treat anemia. Also, 20% thought eating nutritious food during pregnancy could treat anemia. Concerning the benefits of anemia treatment, half (48%) of pregnant women thought that anemia is beneficial for the health of both mother and baby. Interestingly, we found that half (53%) of our respondents thought pregnant women need an extra diet (Table.4).

Table.4. Knowledge of anemia among pregnant women receiving antenatal care Qarabagh district Hospital, 2020.

Variable	Category	Frequency (%)
Heard about anemia	Yes	446 (71.4)
	No	179 (28.6)
Source of information (n=446)	Health facility	326 (73.1)
	Media	110 (24.6)
	Relatives (Friends)	10 (2.3)
How to treat anemia in pregnancy?	Medication	298 (47.7)
	Eating nutritious food	147 (23.5)
	Iron+ folic acid tablets	57 (9.2)
	Don't know	123 (19.7)
Treatment of anemia is beneficial for?	Mother's health	151 (24.2)
	Baby health	173 (27.7)
	Both	301 (48.2)

History of pica	Yes	301 (48.2)
	No	324 (51.8)
Do pregnant women need extra diet?	Yes	336 (53.8)
	No	289 (46.2)

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3.5 Prevalence of anemia

Of the 625 study participants, 285 (45.6%, CI: 41.64%-49.60%) were anemic (Figure.1). The mean (± S.D.) hemoglobin level of study participant was 10.76 (± 1.12). Of the anemic pregnant women, 54.4%, 40.7% and 4.9% were mildly, moderately and severely anemic, respectively.

3.5 Determinants of anemia

Factors that were significantly associated with anemia among pregnant women in the bivariate analysis included respondent's age, household monthly income, husband occupation, access to the health facility, regularity of menstruation cycle, iron and folic acid supplementation, drinking green tea after a meal, gestational age, and history of complications in last pregnancy. Variables with a p-value of less than 0.25 were retained in the multivariable logistic regression. The factors that remained significantly associated with anemia in multivariable analysis were household monthly income, husband occupation, regularity of menstrual cycle and history of complications in last pregnancy. Consequently, the likelihood of anemia was higher among pregnant women who were in the household with an income of less than 15000 Afghanis (150-200 USD) [AOR=2.24 (95%CI:1.06-4.71)]. Increased odds of anemia were observed among pregnant women who had complications in their last pregnancy [AOR=1.53 (95%CI: 1.02-2.28)] and those who experienced irregular menstrual cycle before this pregnancy [AOR=2.21 (1.35-3.64)]. Besides, the odds of anemia were higher among pregnant women whose husbands were self-employed [AOR=2.04 (95%CI:1.04-3.97)] (Table.5).

Table 5: Determinants of anemia among pregnant women receiving antenatal care at Qarabagh District, Hospital, 2020.

Independent Variable	Categories	Anemia status		Crude Odds Ratio	Adjusted Odds Ratio
		Yes	No	(95% CI)	(95% CI)
Age of respondent	< 20	22	14	1	-
	≥20	231	300	2.04 (1.02-4.07)	-
Monthly income	>15000	16	35	1	1
	10000-15000	269	305	1.93 (1.04-3.56)	2.24 (1.06-4.71)
Husband Occupation	Formal employed	16	37	1	1
	Self-employed	269	303	2.05 (1.12-3.77)	2.04 (1.04-3.97)
Access to health facility	Yes	219	291	1	-
	No	66	49	1.79 (1.18-2.69)	-
Menstruation cycle	Regular	219	291	1	1
	Irregular	66	49	2.23 (1.44-3.45)	2.21 (1.35-3.64)
Complication's history	No	221	301	1	1
	Yes	64	39	1.99 (1.24-3.22)	1.53 (1.02-2.28)
Gestational age	3rd trimester	82	81	1	-
	2nd trimester	97	177	0.54 (0.36 – 0.8)	-
	1st trimester	106	82	2.36 (1.61 – 3.44)	-
Green tea after meal	Yes	104	160	1.55 (1.12-2.13)	-
	No	181	180	1	-
Iron + folic acid supplement	Yes	117	108	1	-
	No	168	232	1.49 (1.07 – 2.07)	-

Discussion

Anemia among pregnant women is a serious public health problem worldwide, particularly affecting developing countries. It is associated with an increased risk of maternal and fetal adverse health outcomes [2-10]. This study presents a picture of anemia burden among pregnant women receiving antenatal care in a district hospital where data are scarce and also describes the relationship between socio-demographic, reproductive, and dietary characteristics of respondents with anemia. From this study, we found that 45.6% of pregnant women were anemic with a 95% CI of 41.64% to 49.60%. We

additionally found that anemia was significantly associated with household monthly income, husband occupation, regularity of menstrual cycle and history of complications in last pregnancy.

The prevalence of anemia (45.6%) in our study was higher than the national prevalence [4], but it was comparable with another study conducted in Afghanistan [18]. The rate of anemia in the present study is in line with those reported in researches from other developing countries such as Pakistan [19], Nepal [20], Bangladesh [21] and Kenya [22], where the prevalence of anemia was found to be in the range of 42%-60%. In contrast, the rate of anemia has been reported to be lower in the developed countries probably due to better health systems and other socio-demographic differences in these settings [2,23].

The study findings showed that more than half (54.4%) of the anemic cases were mild, followed by 40.7% moderate cases of anemia. The majority of the anemic cases, however, were found to be moderate in another study carried out in Helmand province of Afghanistan [18].

In this study, household monthly income was a significant determinant of anemia among pregnant women. Pregnant women from households with an income of less than 15000 Afghanis (150-200 USD) were 2 times more likely to become anemic in comparison with pregnant women from households with an income of more than 15000 Afghanis (>200 USD). This was in agreement with other studies conducted in Ethiopia [24], Bangladesh [21] and India [25], who observed an increase in the prevalence of anemia among pregnant women from households with low socioeconomic status. It is argued that low income hinders households from buying good food both in terms of quality and quantity.

From this study, it was observed that the odds of getting anemic among pregnant women whose husbands were self-employed were 2 times greater than the odds of pregnant women whose husbands were formally employed. This finding is compatible with other studies conducted in other low-income countries such as Ethiopia [26], Uganda [27] and Nepal [20]. It is believed that household monthly income and employment status are probably interrelated since most individuals with lower wages will seek to purchase food that is of low quality and as well as not enough in quantity.

The prevalence of anemia was significantly higher among women who had irregular menstruation cycles (poly-menorrhea) than those who had regular menstruation cycles before this pregnancy [AOR=2.21 (1.35-3.64)]. This study was consistent with studies conducted in Ethiopia [28] and Turkey [29]. This may be rationalized by the fact that excessive blood loss depletes iron stores in the body which subsequently leads to anemia.

As our fourth important finding, and compatible with studies conducted in Iran [30], Trindad and Tobago [31], and Ethiopia [33], the history of complications in last pregnancy was highly associated with anemia, e.g., pregnant women with a history of complications in their last pregnancy were 1.5 times more likely to be anemic than those who had no complications in their last pregnancy. It is possible that complications in last pregnancy such as heavy blood loss, history of abortion, history of miscarriage may contribute to anemia in pregnancy [3,5,7]. Hence, pregnant women with history of complications in their last pregnancy should be identified and treated at the earliest to avoid anemia.

Strengths and Limitations

This is the first study to investigate an important public health issue in an area where there is scarcity of information. However, the findings of this study should be considered in light of its limitations. First, important factors of relevance to anemia such as nutritional status and dietary characteristics of pregnant women were not deeply investigated. Hence, further investigation is warranted to determine the relationship of nutritional status and dietary characteristics of pregnant women with anemia in the study area. Secondly, our data were collected only in the hospital. Therefore, its generalizability is limited in terms of not representing the community. Finally, the cross-sectional nature of the study limits the temporal relationship between the variables.

Conclusion

In this hospital-based study, we found that nearly half (45.6%) of our subjects were anemic. The prevalence of anemia among pregnant women reflects a severe public health problem in the study area. Factors determining anemia among pregnant women such as household monthly income, husband employment, history of complications and irregular menstruation hold the key to address the issue of higher prevalence of anemia and intern improve maternal and fetal health.

Declarations

Data availability

The primary data used to support the findings of this study are available with the corresponding author upon request.

Conflict of interest

The authors have no conflict of interest.

Authors' contribution

Conceptualization and design: AAA, MHS, WMW, AWA. Analysis: AAA, HS, MHS. Writing- original draft: MHS. Writing- review & editing: AAA, WMW, MHS, HS, AWW. All authors have read and approved the final manuscript.

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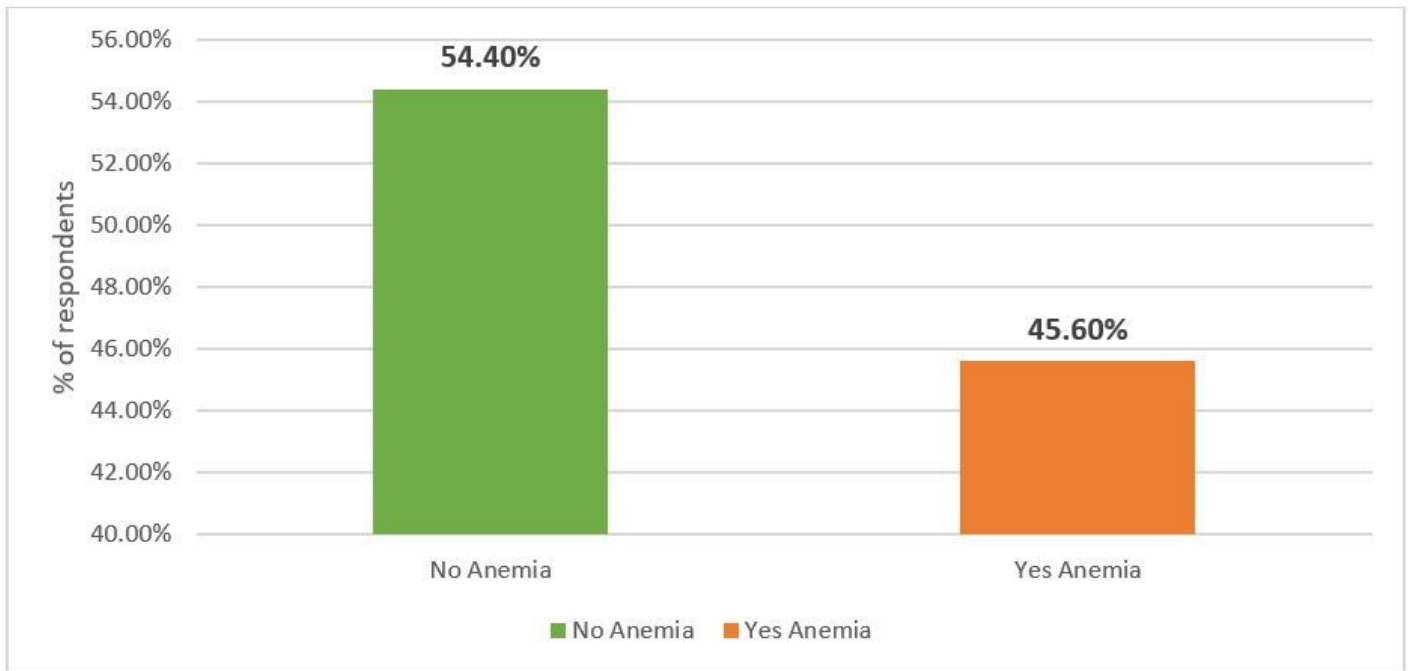
Figures

Figure 1

Prevalence of anemia among pregnant women receiving antenatal care at Qarabagh district Hospital, 2020.