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Prevalence of Anaemia in Pregnant Womens and Associated Risk Factors in Western Ethiopia

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ABSTRACT
Background: Anaemia is a global public health problem which has an eminence impact on pregnant mother. The aim of thisstudy was to assess the prevalence and associated risk factor of maternal anemia.**Method:**A cross-sectional study design was conducted from April to May, 2014 on 286 pregnant women attending antenatal care in Nekemte Referral Hospital, Western Ethiopia. Hemoglobin level was determined by using HemoCue photometer, and interviewer administered questionnaire was used to collect associated risk factors. Data were cleaned, coded and fed into SPSS version 20.0 for analysis. **Result:**Among the 286 study participants, 29% were anaemic. Out of these majorities were mild types 72.20%. Pregnant woman who were HIV sero-reactive(Adjusted odds ratio (AOR)= 20.930, 95% CI =2.441-179.428), low family income(AOR= 17.384, 95% CI =3.757-80.443), having low dietary level (AOR =19.041, 95% CI=1.767-205.213) and body mass index (AOR =7.39, 95% CI=0.994-55.047), and infected with soil transmittedHelminth(STH)(AOR=33.555, 95% CI= 5.748-195.894) had higher odds of being anaemic with comparing to their counterpart but gestational age of first (AOR=0.07, 95% CI=.008-0.61) and second AOR =0.29, 95% CI= 0.09-0.918) trimester has lower odds of being anaemic when comparing to the third trimester. **Conclusion:**The prevalence of anemia was high; mild type anaemias were dominant. Low family income, having low dietary level and body mass index, STHand HIV infection were significantly associated with anemia. Antenatal care should promote de-worming, education on dietary practice and personal hygiene Therefor, there is a need to design strategies that help to diagnosis early and management of HIV and STHinfection during their antenatal care (ANC) visit instead of testing for only haemoglobin (Hgb) levels and bloodgroup.
Key Words: Prevalence, Anemia, ANC, Pregnant, Western Ethiopia

Back ground
Anaemia is global public health problem both for developing and developed countries affecting people of different age groups (1). However, it more prominent in pregnant women and young children and other reproductive age (1, 2). According to the 2008 World Health Organization (WHO) report, anaemia affected 1.62 billion (24.8%) people globally (3). It had an estimated global prevalence of 42% in pregnant women and is a major cause of maternal mortality [4, 5]. Sub-Saharan Africa is the most affected region, with anaemia prevalence estimated to be 17.2 million pregnant women, which corresponds to approximately 30% of total global cases (7).

Ethiopia is among countries where there is a high level of anaemia among women of reproductive age (15-49 years) and pregnant women. According to the 2011EthiopiaDemographic and Health Survey (EDHS),seventeen percent of Ethiopian women age 15-49 are anaemic, with thirteen percent having mild anaemia, three percent having moderate anaemia, and one percent having severe anaemia. A higher proportion of pregnant women are anaemic (22 percent) than women who are breastfeeding (19 percent) and women who are neither pregnant nor breastfeeding (15 percent) (8).

There is an increased iron requirement during pregnancy due to greater expansion in plasma volume that results in a decrease in haemoglobin (Hgb) level to 11g/dl. Therefore, any Hgb level below 11g/dl in pregnancy is considered as anaemia (7, 8). Anaemia could be classified as mild,moderate and severe. The Hgb level for each class of anaemia in pregnancy are 10.0–10.9g/d1 (mild), 7–9.9g/dl (moderate) and<7g/ dl (severe) (9).When the Hgb value is adjusted for the altitude, anaemia in pregnancy is <11g/dl, 11.2 g/dl, 11.5 g/dl, 11.8 g/dl, 12.5 g/dl, 12.9 g/dl and 13.7g/dl for <1000, 1000-1999, 2000-2499, 2500-2999, 3000-3499 and 3500-3999 meter above sea level, respectively (6).

The main risk factors for anaemiaare low intake of iron, poor absorption of iron from diets, high phytate or phenolic compounds or increased requirements during childhood and pregnancy as well as infection with

malaria, HIV and hookworm (10, 11, 12)

The effect of anaemia during pregnancy on maternal and neonatal life ranges from varying degrees of morbidity to mortality. As many studies reported, severe anemia (Hg < 7g/L) during pregnancy has been associated with major maternal and fetal complications. It increases the anaemiaof pretermdelivery (13, 14), lowbirthweight (13–16), intrauterinefetal death (16), neonatal death (17), maternal mortality (18), infant mortality (19) and associate with child hood intellectual disability (20, 21).

The availability of local information on the magnitude and related risk factors has a major role in the management and control of anemia in pregnancy. However, there was no reputable data in our study area. Thus, the main aim of the study was to determine prevalence of anemia in pregnancy and associated risk factors in western Ethiopia.

Material and methods

Study areaand design

A cross sectional study was conducted in Nekemte Referral Hospital from April –May, 2014. The Nekemte Referral Hospital was constructed in 1932 by Sweden Missionary and intended to serve 2.1 million peoples annually. The hospital is the only referral hospital in the western part of Ethiopia and services as referral center for the patients referred to the center from other hospitals, health centers and private practitioners. The hospital is located at Nekemte Town. Nekemte is a historic town 328 Kilometers away from Addis Ababa, capital city of Ethiopia. The town has a total population of about 110,688 according to the 2012 census.

Study Population, Sample Size, and Sampling Procedure.

The study population was pregnant mothers attending antenatalcare (ANC) at Nekemte Referral Hospital. A single population proportion formula, [$n=\frac{1.96^2 * P(1-P)}{d^2}$]was used to estimate the sample size. Where the value of expected prevalence (p) of anemia among pregnant mother is 21.6% (22) and Z value of 1.96 is used at 95% Confident interval and 5% margin of error. Accordingly, the calculated sample size (n) of the study was 260, by considering the non-response rate (10% contingency), the adjustment the final sample size come to 286 study participants. The pregnant women who attended ANC service were selected using systematic random sampling technique from their sequence of ANC visit during the study period. All the pregnant women participated in the study were live in altitude between 2000 to 2499meter above sea level.

Socio-demographic characteristics and associated risk factors survey

A face-to-face interview using structured pretested questionnaire was employed to obtaindata about sociodemographic, obstetric, and gynecological, dietary intake, and medical conditions of pregnant mothers. As for the current pregnancy, intake of haematinics, gestational age, ante partum hemorrhage, and dietary intake were documented during the interview. Blood pressure, weight, and height were measured and body mass index (BMI) was calculated as (weight (kg)/height (m2)).Women were then categorized in to three groups according to their BMI as follows: underweight (BMI ≤ 20kg/m2), normal (20 kg/m2≤ BMI ≤ 24.9 kg/m2), and overweight (BMI of ≥25 kg/m2)(23).

Hemoglobin determination

Haemoglobin was measured on site, using capillary blood samples collected using aseptic techniques in microcuvette, and the result read within 10 min using a portable, battery-operated HemoCuephotometer (HemoCue, A¨ ngelholm, Sweden).The photometer was calibrated before every session using the provided standard. For internal quality control, 10% of two HemoCue-cuvettes were systematically filled from 10% a sample both results recorded and compared (24).

Stool specimen collection and examination for intestinal Parasites

After obtaining written consent from study participants, a single stool sample was collected from each participant. The study participants were provided with labeled screw capped stool containers and informed on how to collect about a five gram stool sample. The collected stool samples were immediately transported to Nekemte Referral Hospital Laboratory unites where it was processed following the standard procedure using the saline wet mounting by experienced laboratory personnel.

Data quality assurance

To ensure the reliability and validity of the study, training was given for the data collectors, the sample collections and laboratory procedure were done by senior experienced laboratory personal following the laboratory standard oppression procedure, and close follow up was done by the investigators during data collection.

Data analysis

The collected data were entered, cleaned and analyzed by using SPSS version 20 statistical software. The results were presented using descriptive methods in the tables and figures. The association and strength between the

dependent and independent variables were assessed using binary and multiple logistic regression models at 95 confidence interval.

Ethical Consideration

Ethical clearance of the study was obtained from the Research Ethics Review Board of Wollega University. Official permission was sought before initiating the study by communicating the responsible hospital administrative offices through official letter.Individual informed oral and written consent from each pregnant woman was sought after informed with the local language, Afaan Oromo on the purpose of the study, the right to refuse or participate in the study. To ensure confidentiality of participants, information, anonymous typing was used whereby the name of the participants and any participants' identifier were not written on the questionnaire, and, also during the interview to keep the privacy, they were interviewed alone. Results of laboratory on Hgb level and intestinal parasite infection were communicated with clinicians working in ANC unit for appropriate management.

Result

Characteristics of the Study Participants.

A total of 286 pregnant women were involved in the study. The study participants had mean (±standard deviation) and age range of 25.15(±4.29) and 18-39 years, respectively. Majority, 205(71.7%), 99 (77.8%), 153 (53.5%), 263 (92.0%), 273 (95.5%) were urban dwellers, had attended Secondary education, Protestant religion, Oromo race and married, respectively. Half of the study participants werebetween 25-31 years old 144 (50.3%) and farmer by occupation 55 (49.1%). One hundred fifteen (40.2%) study participants has more than 1000 Ethiopian birrs monthly income. The family sizes of the study were between 3-4 for 117 (40.9%) study participants (Table 1).

Concerning obstetrical and medical history,186 (65.0%) were multigravida of whom 61.3% has birth interval of greater than or equal to two, 18.5% has history ofabortion, 58.8% had blood loss and 62.4% have delivered at health institution in the last delivery. Around half the study participants were on second trimester 155(54.2%)followed with third106 (37.1%) and first 25(8.7%) trimester (Table 2).

Assessment of medical condition of the participant revealed that 209(73%) had a normal BMI, 33(11.5%) underweight, and 44(15.4%) over weight. In addition, 50(17.%) had history of previous surgery, 149 (77.9%) and 49 (17.1%) were use of contractive infected and with malaria n in the last one year, respectively. Majority of the study participants use Pipe as water source 200 (69.9%) and did not use insect acid treated bed net (ITN) 183 (64.2%) but few 50 (17.5%) wake with bare foot (Table 2).

Laboratory investigation showed that 7(2.4%) and 22(7.8%) % of the Participants were reactive for HIV and infected with STH pathogen, respectively(Table 2).Ascarislumbricoids6(2.5%) and Hook worm 11(3.8%) were thedominate among intestinal parasite found

As shown the table three, 246 (86.9%), 140 (49.0%), 170 (59.4%) and 176 (61.5%) had second and above ANC follow up in current pregnancy, iron supplement, medium dietary intake and iron rich food consumption habit.

Prevalence and Associated risk factors of anemia.

The mean (standard deviation) and range of Hgb level of pregnant women were12.67(±1.67)g/dL and 6.8–17.5 g/dL, respectively. The overall prevalence of maternal anaemia was 13.3% ($n = 38$). However, when adjusted for the altitude the overall prevalence of anaemia was found to be 29%. Of the anaemic women, 72.20%, 25 %and 2.80% weremildly, moderately, andseverely anaemic, respectively(Figure 1).

High prevalence of anaemia was observed in those pregnant women who were living in rural 35 (43.2%, illiterate 32 (43.2%), among families having month income of less than 500 Ethiopia birrs 45 (65.2%), family size more than or equal to five 29 (39.2%) and other based on marital status 8 (61.5%) (Table1). In addition, anaemia is higher amongmultigravidae58 (31.2%), their last delivered at home 34 (47.9%), birth interval less than one year 36 (48.0%), blood loss in the last deliver 28 (36.0%), having abortion history 26 (49.1%), Underweight 20 (60.6%), having history of Surgery19 (38.0%), having Malaria infection in the last one year18 (36.7%), STH infection 15(68.2%) , their water source is river 7 (53.8%) and spring 15 (71.4%) (Table 2).The anaemia is more prevailing among pregnant mother who were come for first ANC visit 17 (45.9%), did not take iron supplementnutritional therapy 49 (33.6%), having habite of low diet intake 41 (65.1%) and consume rich food44 (40.0%)(Table 3).

In bivariate analysis, residence, educational level, occupation, family size, monthly income, marital status, parity, gestational age, last delivery place, birth interval, blood loss in last, delivery, history of abortion, level of body mass index, STH infection, HIV status, water source, number of ANC follow up in current regency, iron

supplement as nutritional therapy , diet level and consume rich food. were significantly associated with maternal anaemia (Table 1-3). However, controlling the confounding factor pregnant women having HIV sero-reactive, monthly income less than 500 Ethiopia birrs, having low dietary level, their MBI is underweight, and infected with STH were found to be 20.930 (AOR), 17.384(AOR), 19.041(AOR), 7.395 (AOR) and 33.55 (AOR) times more likely to develop anaemia during pregnancy compared to their respective group, respectively. However, pregnant women at the first and second trimester gestational level were 0.07 (AOR) and 0.29(AOR) less likely to develop maternal anaemiacomparing to the third trimester level, respectively(Table 4).

Discussion

More than quarters (29%) of pregnant women in the study area were anemic. With reference to the WHO cutoffpoints (3), the magnitude indicates moderate public heathsignificance of anemia in the study area. This prevalence was comparable to the national prevalence of anemia among reproductive age in Ethiopia (27%)(25), but higher comparing toother study conducted among reproductive age in Ethiopia(18%)(27), in Awassa (15.3%) (24),Azezo Health Center Gondar town(22%) (22)and Gondar University Teaching Hospital (16.6%) (29). The prevalence is considerably lower than previous study reports from GilegleGibe (53.9%) (26), and in west Arsi (36.6%) (28). The possible reason for observed difference may be resulted from geographical variation for the magnitude of the problem.

In this study, mildanaemia was common followed by moderate anaemia. This is consistent with reports from the different part of the country (22, 26- 29). The mean Hgb concentration the present study was 12.67g/dl. This is consistent with the study report from West Arsi, Ethiopia, 12.05g/dl (28), and Awassa 12.3g/dl (24).

This study also showed that the HIV infection was increase the risk for the development anaemia among pregnant women compared to those no infected. This is in line with previous studies [31, 30,28,-29]. This may be partly explained by the fact that HIV infection is associated with lower serum foliate, vitamin B12, and ferritin in pregnancy (32). In addition, Anaemia in HIV/AIDS patients may arise from a number of causes, including deregulation of the host immune system

Pregnancy is the most nutritionally demanding period in a woman's life. Consequently, pregnant women are advised to eat more diversified diet than usual. However, this wasn't the case in study area. The level of diet diversity among pregnant women was lower and it significantly determines their material anaemic level in the study. This is agreement with the national study among reproductive age group (25). The possible explanationmight be the presence of food taboos during pregnancy.According to a study in southern Ethiopia, 65% ofwomen avoided at least one food type during their recentpregnancy (34). In addition, this study found that under weightiness of the study participant was one of predator for the development of anaemia. This more elucidates the relationship between the cultures of diet diversity which affect BMI on the development of anaemia.

This study demonstrated that mothers who have low monthly family income were more likely to be anaemic as compared to those with high monthly family income. This is in agreement with study conducted in in Gondar University Teaching Hospital (29). According to the 2007 Ethiopian central statistical agency household income consumption and expenditure survey, more than 57% of the total expenditure is spent on food (35). Moreover, in this study, 71.7% of study participants were from urban areasuggesting that they are food net buyers. As income is low, the expenditure for food becomes low. Besides, due to food price inflation, the purchasing power of income is low. So, low incomegroupsdidnot get adequatenutritionand thereby low family income groups were at risk of anaemia

The presence of Soil transmitted parasite infections, particularly hookworm which common parasite in our study area was significantly associated with anaemia inpregnant women (AOR=33.55, 95% CI =5.75-195.89). This is consistent with study conducted inJimma [30] and Azezo Health Center, Gondar town(22). This is because adult Hookworm parasites attach and injure upper intestinal mucosa and also ingest blood. This brings about gastrointestinal blood loss and induces depletion of iron, folic acid, and vitamin B12 that ultimately lead to anemia (7).

The pregnant women at the first and second trimester gestational level had 0.07 (AOR) and 0.29(AOR) less likely to develop maternal anaemia comparing to the third trimester level in this study. This might be due to increase in hemodilution as a result of increase in estrogen level towards the end of gestational age (28). Increase in anemia prevalence in the third trimester ascertained in this study was similar with what was reported in other studies (24,37, 38).

In this study, supplementation of Iron supplement as nutrition therapy and consume iron rich food during the current pregnancy perioddid not significantly reduce the prevalence of anaemia ascompared to those who did not take these supplementations.The finding was in contradiction with other studies (39–44). The possible reason may be that, in anaemicpregnant women, these nutritional supplements were morelikely to be prescribed as an intervention for management ofanaemia intheir previousANCvisit.This needs a further studyto explicitly explain how much effective the current WHOnutritional supplementation recommendation program isbeing implemented for prevention and control of anaemia in pregnant women (45).

In addition, in the study even though it was not statistically significant in multivariate logistic regression urban duller, illiterate, farmerby occupation, other by marital status, family size more than or equal to five, primigravidae, home in the last deliver, birth interval less than two year, blood loss in last deliver, history of abortion, water source river and spring, and ANC follow up first in this pregnancy had high odds for anaemia as compared to their counterpart.

Similar to any other study, the current study has strengths as well as limitations which need to be noted while interpreting the findings. The main strength of the study is it was conducted at referral hospital that coverage large geographical area. Hence, the finding can clearly reflect the prevalence and associated risk factor of anaemiaWestern Ethiopia. However, the limitation of this study is the nature of the study design its self, being as a cross-sectional study design, it does not show which preceded anemia or risk factors. Due to constraint of time and resource, stool concentration technique and parasite density were not done so we could not assess the impact of parasite load on the severity of anemia. In addition to this, the low sensitivity of wet mount to detect parasite in patient with low parasite load may underestimate the prevalence of intestinal parasite and alter odds ratio. Thus, if these are done the effect on STH on the anemia may be high.

In conclusion

The prevalence of anemia among pregnant women was moderate public heath significance. The low family income (income less than 500 Ethiopia birrs), having low dietary level and bod weight, and gestational level and living with HIV/AIDS were the main predictors of maternal anemia. To reduce the prevalence, there is a need to improve the dietary level and strength health care seeking behavior of women to ensure early diagnosis and management of HIV, anemia, and other medical conditions during pregnancy period.

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Author Contributions

EyasuEjeta ,BirhanAlemnew, AshetuFikadu, MergaFikadu and LensaTesfaye designed the study, collected data, analysis and drafted the manuscript. TadesseBirhanureview and edited the manuscript. All authors read, critically revised and approved the final manuscript.

Conflict of interest

The authors declare no conflict of interest

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Table 1: Socio demographic characteristics and its association risk factors with anaemia among pregnant women attending Nekemte Referral Hospital western oromia, Ethiopia, from April to May, 2014 (n =286).

Variable		Aneamia		Total (%)	COR (95% CI)
		Yes	No		
Age	18-24	23 (31.9%)	98(68.1%)	121(42.3%)	**4.26(0.257-70.685)**
	25-31	46(31.9%)	98(68.1%)	144 (50.3%)	**2.13(0.130-34.82)**
	32-38	7(36.8	12(63.2%)	19 (6.6%)	**1.714(0.09- 31.92)**
	39-45	1(50%)	1(50%)	2(0.7%)	**1**
Residence	Urban	42(20.5%)	163(79.5%)	205 (71.7%)	**2.953(1.695-5.145)***
	Rural	35 (43.2%)	46 (56.8%)	81 (28.3%)	**1**
Educational level	Illiterate	32 (43.2%)	42 (56.8%)	74 (25.9%)	**0.219(0.094-0.508)***
	Primary	14 (28.0%)	36 (72.0%)	50 (17.5%)	**0.429(0.168-1.094)**
	Secondary	22 (34.6%)	77 (22.2%)	99 (77.8%)	**0.583(0.249-1.365)**
	Tertiary	9 (14.3%)	54 (85.7%)	63 (22.0%)	**1**
Occupation	Farmer	28 (19.3%)	27 (50.9%)	55 (49.1%)	**0.20(0.072-0.556)***
	House wife	24 (30.8%)	54 (69.2%)	78 (27.4%)	**0.466(0.171-1.268)**
	Government	8 (15.7%)	43 (84.3%)	51 (17.9%)	**(1.11(0 .35-3.54)**
	NGO	11 (16.7%)	55 (83.3%)	66 (23.2%)	**1.03(0.35-3.08)**
	Others	6 (17.1%)	29 (82.9%)	35 (12.3%)	**1**
Religion	Orthodox	26 (31.0%)	58 (69.0%)	84 (29.4%)	**0.00**
	Moslem	12 (29.3%)	29 (70.7%)	41 (14.3%)	**0.00**
	Protestant	38 (49.4%)	115 (55.0%)	153 (53.5%)	**0.00**
	Catholic	1 (1.3%)	5 (2.4%)	6 (2.1%)	**0.00**
	Others	0	2(100%)	2(0.7%)	**1**
Ethnicity	Amhara	3 (50.0%)	3 (50.0%)	6 (2.1%)	**0.35(.07-1.80)**
	Tigre	5 (6.5%)	12 (5.7%)l	17 (5.9%)	**0.85(0.29-2.51)**
	Oromo	69 (26.2%	194 (73.8%)	263 (92.0%)	**1**
Marital status	Married	69 (25.3%)	204 (74.7%)	273 (95.5%)	**4.73(1.49-14.94)***
	others	8 (61.5%)	5 (38.5%)	13 (4.5%)	**1**
Monthly income in Ethiopia birrs	<500	45 (65.2%)	24 (34.8%)	69 (24.1%)	**0.04(0.017-.095)***
	500-1000	24 (23.5%)	78 (76.5%)	102 (35.7%)	**0.24(0.104-0.569)***
	>1000	8 (7.0%)	107 (93.0%)	115 (40.2%)	**1**
Family size	≤2	18 (18.9%)	77 (81.1%)	95 (33.2%)	**2.75(1.378-5.516)***
	3-4	30 (25.6%)	87 (74.4%)	117 (40.9%)	**1.87(1.0-3.49)***
	≥5	29 (39.2%)	45 (60.8%)	74 (25.9%)	**1**

*Statically significance (P<0.05) 1 =Reference group, COR= Crude odd ration, 95%C.I=95% confidence interval, 1Ethiopa birr=19 USD

Table 2: The prevalence and associated risk factors of anaemia according to the obstetrics and medical factors among pregnant women attending ANC in Nekemte Referral Hospital, western oromia, Ethiopia ,from April to May , 2014(n= 286)

Variable		Anaemic		Total (%)	COR (95% CI)
		Yes (%)	No (%)		
Parity	Primigravidae	19 (19.0%)	81(81.0%)	100 (35.0%)	1.93(1.07-3.478)*
	Multigravidae	58 (31.2%)	128 (68.8%)	186 (65.0%)	1
Gestational age	1st trimester	8 (32.0%)	17(68.0%)	25(8.7%)	1.09(0.43-2.77)
	2nd	33 (21.3%)	122 (78.7%)	155 (54.2%)	1.9(1.09-3.32)*
	3rd	36 (34.0%)	70 (66.0%)	106 (37.1%)	1
Last delivery	Health institution	24 (20.3%)	94 (79.7%)	118 (62.4%)	3.59(1.88-6.87)*
	Home	34 (47.9%)	37 (52.1%)	71 (37.6%)	1
Birth interval	<2 years	36 (48.0%)	39 (52.0%)	75 (38.7%)	0.28(0.15-0.54)*
	>2 years	25 (21.0%)	94 (79.0%)	119 (61.3%)	1
Blood loss in last Delivery	Yes	28 (36.0%)	40 (41.2%)	68 (58.8%)	0.47(0.25-0.89)*
	No	30 (24.8%)	91 (75.2%)	121 (64.0%)	1
History of abortion	Yes	26 (49.1%)	27 (50.9%)	53 (18.5%)	0.29(0.156-0.54)*
	No	51 (21.9%)	182 (78.1%)	233 (81.5%)	1
Use of contractive	Yes	33 (52.1%)	116 (22.1%)	149 (77.9%)	1.66(0.98-2.81)
	No	44 (32.1%)	93 (67.9%)	137 (47.9%)	1
Body mass index	Underweight	20 (60.6%)	13 (39.4%)	33 (11.5%)	0.06(0.019-0.225)*
	Normal weight	53 (25.4%)	156 (74.6%)	209 (73.1%)	0.29(0.10-0.86)*
	Over weight	4 (9.1%)	40 (90.9%)	44 (15.4%)	1
History of Surgery	Yes	19 (38.0%)	31 (62.0%)	50 (17.5%	0.53(0.279-1.012)
	No	58 (24.6%)	178 (75.4%)	236 (82.5%)	1
Malaria infection in the last one year	Yes	18 (36.7%)	31 (63.3%)	49 (17.1%)	0.57(0.298-1.09)
	No	59 (24.9%)	178 (75.1%)	237 (82.9%)	1
STH infection	Yes	15(68.2%)	7 (31.8%)	22 (7.7%)	0.143(0.056-0.367)*
	No	62 (23.5%)	202 (76.5%)	264 (92.6%)	1
HIV status	Positive	5 (71.4%)	2 (28.6%)	7 (2.4%)	0.139(0.026-0.73)*
	Negative	72 (25.8%)	207 (74.2%)	279 (97.6%)	1
ITN utilization	Yes	23 (22.5%)	79 (77.5%)	102 (35.8%)	1.40(0.79-2.46)
	No	53 (29.0%)	130 (71.0%)	183 (64.2%)	1
Water source	Pipe	38 (19.0%)	162 (81.0%)	200 (69.9%)	10.65(3.88-29.27)*
	well	17 (32.7%)	35 (67.3%)	17 (18.2%)	5.14(1.69-15.62)*
	River	7 (53.8%)	6 (46.2%)	13 (4.5%)	2.14(0.506-9.08)
	Spring	15 (71.4%)	6 (28.6%)	21 (7.3%)	1
Bare foot	Yes	18 (36.0%)	32 (64.0%)	50 (17.5%)	0.59(0.31-1.13)
	No	59 (25.0%)	177 (75.0%)	236 (82.5%)	**1**

*Statically significance (P<0.05) 1 =Reference group, COR= Crude odd ration, 95%C.I=95% confidence interval Table 4: Multivariate Logistic Analysis of Factors Influencing Anemia in Pregnancy among Pregnant Women Attending ANC in Nekemte Referral Hospital, Western oromia, Ethiopia, 2014(n=286

Variable		Anemia		Total (%)	COR (95% CI)	AOR(95% CI)
		Yes	No			
Residence	Urban	42(20.5%)	163(79.5%)	205 (71.7%)	2.953(1.695-5.145)*	**0.354(0.065-1.922)**
	Rural	35 (43.2%)	46 (56.8%)	81 (28.3%)	1	**1**
Educational status	Illiterate	32 (43.2%)	42 (56.8%)	74 (25.9%)	0.219(0.094-0.508)*	**0.787(0.073-8.488)**
	Primary	14 (28.0%)	36 (72.0%)	50 (17.5%)	0.429(0.168-1.094)	**2.515(0.318-19.872)**
	Secondary	22 (34.6%)	77 (22.2%)	99 (77.8%)	0.583(0.249-1.365)	**6.474(0.99-41.963)**
	Tertiary	9 (14.3%)	54 (85.7%)	63 (22.0%)	1	**1**
Occupation	Farmer	28 (19.3%)	27 (50.9%)	55 (49.1%)	0.20(0.072-0.556)*	**4.884(0.522-45.668)**
	House wife	24 (30.8%)	54 (69.2%)	78 (27.4%)	0.466(0.171-1.268)	**1.587(0.23-10.968)**
	Government	8 (15.7%)	43 (84.3%)	51 (17.9%)	(1.11(0 .35-3.54)	**1.617(0.20-13.077)**
	NGO	11 (16.7%)	55 (83.3%)	66 (23.2%)	1.03(0.35-3.08)	**4.467(0.572-34.886)**
	Others	6 (17.1%)	29 (82.9%)	35 (12.3%)	1	**1**
Marital status	Married	69 (25.3%)	204 (74.7%)	273 (95.5%)	4.73(1.49-14.94)*	**0.383(0.056-2.628)**
	others	8 (61.5%)	5 (38.5%)	13 (4.5%)	1	**1**
Monthly income	<500	45 (65.2%)	24 (34.8%)	69 (24.1%)	0.04(0.017-.095)*	**17.384(3.757-80.443)***
	500-1000	24 (23.5%)	78 (76.5%)	102 (35.7%)	0.24(0.104-0.569)*	**1.768(0.50-6.26)**
	>1000	8 (7.0%)	107	115	1	**1**

			(93.0%)	(40.2%)		
Family size	≤2	18 (18.9%)	77 (81.1%)	95 (33.2%)	2.75(1.378-5.516)*	**0.866(0.019-39.334)**
	3-4	30 (25.6%)	87 (74.4%)	117 (40.9%)	1.87(1.0-3.49)*	**1.759(0.564-5.489)**
	≥5	29 (39.2%)	45 (60.8%)	74 (25.9%)	1	**1**
Parity	Primigravidae	19 (19.0%)	81(81.0%)	100 (35.0%)	1.93(1.07-3.478)*	**2.291(0.065-80.805)**
	Multigravidae	58 (31.2%)	128 (68.8%)	186 (65.0%)	1	**1**
Gestational level	1st trimester	8 (32.0%)	17(68.0%)	25(8.7%)	1.09(0.43-2.77)	**0.07(.008-0.61)***
	2nd	33 (21.3%)	122 (78.7%)	155 (54.2%)	1.9(1.09-3.32)*	**0.299(0.097-0.918)***
	3rd	36 (34.0%)	70 (66.0%)	106 (37.1%)	1	**1**
Last delivery	Health institution	24 (20.3%)	94 (79.7%)	118 (62.4%)	3.59(1.88-6.87)*	**0.445(0.139-1.422)**
	Home	34 (47.9%)	37 (52.1%)	71 (37.6%)	1	**1**
Birth interval	<2 years	36 (48.0%)	39 (52.0%)	75 (38.7%)	0.28(0.15-0.54)*	**2.278(0.737-7.037)**
	>2 years	25 (21.0%)	94 (79.0%)	119 (61.3%)	1	**1**
Blood loss in last Delivery	Yes	28 (36.0%)	40 (41.2%)	68 (58.8%)	0.47(0.25-0.89)*	**0.658(0.187-2.307)**
	No	30 (24.8%)	91 (75.2%)	121 (64.0%)	1	**1**
History of abortion	Yes	26 (49.1%)	27 (50.9%)	53 (18.5%)	0.29(0.156-0.54)*	**0.913(0.291-2.867)**
	No	51 (21.9%)	182 (78.1%)	233 (81.5%)	1	**1**
Body mass index	Underweight	20 (60.6%)	13 (39.4%)	33 (11.5%)	0.06(0.019-0.225)*	**7.395(0.994-55.047)***
	Normal weight	53 (25.4%)	156 (74.6%)	209 (73.1%)	0.29(0.10-0.86)*	**4.279(0.80-22.89)**
	Over weight	4 (9.1%)	40 (90.9%)	44 (15.4%)	1	**1**
STH infection	Yes	15(68.2%)	7 (31.8%)	22 (7.7%)	0.143(0.056-0.367)*	**33.555(5.748-195.894)***
	No	62 (23.5%)	202 (76.5%)	264 (92.6%)	1	**1**
HIV status	Reactive	5 (71.4%)	2 (28.6%)	7 (2.4%)	0.139(0.026-0.73)*	**20.930(2.441-179.428)***
	Non-reactive	72 (25.8%)	207 (74.2%)	279 (97.6%)	1	**1**
Water source	Pipe	38 (19.0%)	162 (81.0%)	200 (69.9%)	10.65(3.88-29.27)*	**0.505(0.087-2.918)**
	well	17 (32.7%)	35 (67.3%)	17 (18.2%)	5.14(1.69-15.62)*	**0.406(0.059-2.794)**
	River	7 (53.8%)	6 (46.2%)	13 (4.5%)	2.14(0.506-9.08)	**0.661(0.054-8.045)**
	Spring	15 (71.4%)	6 (28.6%)	21 (7.3%)	1	**1**
ANC follow up	First	17 (45.9%)	20 (54.1%)	37 (13.1%)	0.35(0.17-0.723)*	**1.711(0.424-6.90)**
	Second above	57 (23.2%)	189 (76.8%)	246 (86.9%)	1	**1**
Iron supplement	Yes	28 (20.0%)	112 (80.0%)	140 (49.0%)	2.661 (1.264, 5.599)*	**0.714(0.256-1.988)**
	No	49 (33.6%)	97 (66.4%)	146 (51.0%)	1	**1**
Diet level	Low	41 (65.1%)	22 (34.9%)	63 (22.0%)	0.036(0.005, 0.277)*	**19.041(1.767-205.213)***
	Medium	32 (18.8%)	138 (81.2%)	170 (59.4%)	0.199(0.026, 1.541)	**4.958(0.609-40.389)**
	High	4 (7.5%)	49 (92.5%)	53 (18.5%)	1	**1**
Consume iron rich food	Yes	33 (18.8%)	143 (81.2%)	176 (61.5%)	4.880(2.307, 10.32)*	**1.371(0.447-4.209)**
	No	44 (40.0%)	66 (60.0%)	110 (38.5%)	1	**1**

*=Statically significance (P<0.05), 1 =Reference group, COR= Crude odd ratio, AOR=Adjusted Odd ratio 95%C.I=95% confidence interval,

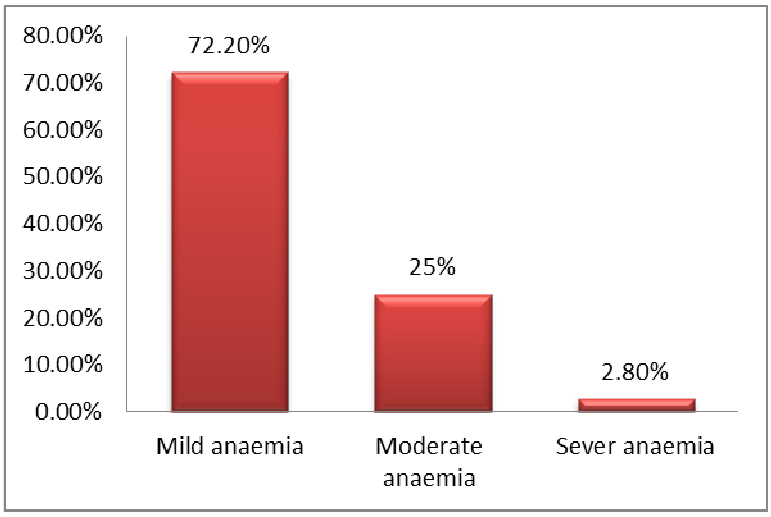

Figure 1: Percentage of anemia by severity among anemic pregnant women (n= 36)

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