

# Assessment of the Prevalence of Anemia and Its Associated Risk Factors among Pregnant Women in Chiro Referral Hospital, West Hararghe Zone: Ethiopia

Abebe Getu Derso<sup>1</sup>, Getachew Gashaw \*<sup>2</sup>, Fuad Redi<sup>3</sup>

<sup>1</sup>Department of Food Science and Nutrition, Oda Bultum University, Chiro, Ethiopia

<sup>2</sup>Department of Biology, Oda Bultum University, Chiro, Ethiopia

<sup>3</sup>Department of statistics, Oda Bultum University, Chiro, Ethiopia

## Abstract

**Background:** Anemia is a significant public health problem in developing countries, particularly in pregnant women. It refers to a condition in which the hemoglobin content of the blood is lower than normal. In developing countries, the cause of anemia during pregnancy is multi-factorial and includes nutritional deficiencies. It is associated with an increased risk of maternal and prenatal morbidity and mortality. In order to design an intervention for prevention of anemia in pregnancy, determination of its magnitude and identifying associated risk factors for anemia are paramount importance.

**Objectives:** To determine the magnitude and factors associated with anemia during pregnancy among mothers attending antenatal care at Chiro Referral Hospital antenatal care clinic from September 2017 to January 2019.

**Methods:** Cross sectional study design was used. The study participants were selected using systematic sampling technique from their sequence of antenatal care visit in the period of study, and associated risk factors data were collected using structured questionnaire by trained antenatal care service providers. Level of haemoglobin was determined. Descriptive and analytical statistics were computed using SPSS version 20. Chi-square-the analytical statistics was used to identify predictor variables associated with the dependent variable -anemia.

**Result:** The overall prevalence of anemia in this study population was 57.1%. Two hundred twenty two cases (57.2%) showed mild type of anemia followed by moderate anemia 156 (40.2%) and the remaining 10 (2.6%) were having severe anemia. Iron supplementation [p-value <2.2e-16], trimester [p-value 0.002], abortion p-value 0.053], birth interval [p-value 0.008], history of any illness [p-value 9.991e-09], contraception [p-value 3.654e-07], presence of pica [p-value <2.2e-16], food aversion [p-value <2.2e-16], residence [p-value 0.04], fruit vegetable consumption [p-value 4.518e-13] and meat/poultry

consumption [p-value 3.068e-08] had statistically significant association with anemia in pregnant women. Parity and bleeding during index pregnancy were not significantly associated with anemia.

**Conclusion:** The prevalence of anemia was found to be 57.1%. Iron supplementation during pregnancy and presence of pica were significantly associated with anemia in the study population. Therefore, long term and short term strategies helpful in alleviating these predisposing factors need to be developed so as to reduce the number of mothers affected by anemia.

**Keywords** - Anemia, Magnitude, Risk Factors, Pregnancy, Ethiopia

## I. INTRODUCTION

Anemia is defined as a condition in which there is less than the normal hemoglobin (Hb) level in the body, which decreases oxygen-carrying capacity of red blood cells to tissues. Anemia is a global public health problem affecting both developed and developing countries with major consequences for human health as well as social and economic development. It occurs at all stages of the life cycle [1, 2].

World Health Organization defines anemia as hemoglobin below 11g/dl as the lower limit acceptable and 10.5g/dl in the second half of pregnancy. Anemia can further be classified into mild anemia (10 -10.9g/dl), moderate anemia (7-9.9g/dl) and severe anemia (<7g/dl) [3].

An estimated 58.27 million women worldwide are anemic during pregnancy, 95.7% of whom live in developing countries [3]. In Africa, the prevalence of anemia in pregnancy is estimated to be between 35% and 75% as compared to the developed countries where prevalence is at 15% [3-4].

Moreover, anemia in pregnant women is a severe public health problem in Ethiopia; 62.7% of pregnant women were anemic [5]. Although the prevalence varies widely in different settings and accurate data are often lacking, in resource-limited areas terribly

significant proportions of women of childbearing age particularly pregnant are anemic [6]. Geographically, those living in Asia and Africa are at the greatest risk [7].

Seventeen percent of Ethiopian women in the reproductive age group are anemic and 22% of these women were pregnant [10]. Anemia may result from both nutritional and non nutritional factors, specifically besides iron, deficiency of micronutrients such as vitamins A, C and B-12 and folic acid may contribute to the development of anemia. These nutrients may affect haemoglobin synthesis either directly or indirectly by affecting absorption and/or mobilization [3].

Anemia has been a topical issue in many developing countries because of its association with adverse pregnancy outcome such as increased rates of maternal and prenatal mortality, premature delivery, low birth weight, fetal physical growth and mental impairment and infant deaths etc. [4, 9]. Anemia may worsen the sequelae of postpartum hemorrhage and predispose to puerperal infection both of which are

leading causes of maternal mortality in developing countries [4].

Epidemiological studies done on prevalence of anemia in pregnant women in Ethiopia have reported varying magnitude of anemia and identified several factors associated with anemia [11-15]. Determination of the magnitude of anemia among pregnant women helps to monitor health of the pregnant women, contributing to reduction in maternal morbidity and mortality. Also, assessment of factors predisposing to anemia in a local area enables to take targeted intervention activities.

## II. METHODS

### A. Study design and area

A cross-sectional study design was conducted in Chiro Referral Hospital from September 2017 to January; 2019. The study was conducted in Chiro city, Eastern part of Ethiopia which is located 325 kilometer away from Addis Ababa. It is geographically located between 34°18'43" to 43°0'4" E Latitude and 10°09'24" to 30°18'43" N longitude

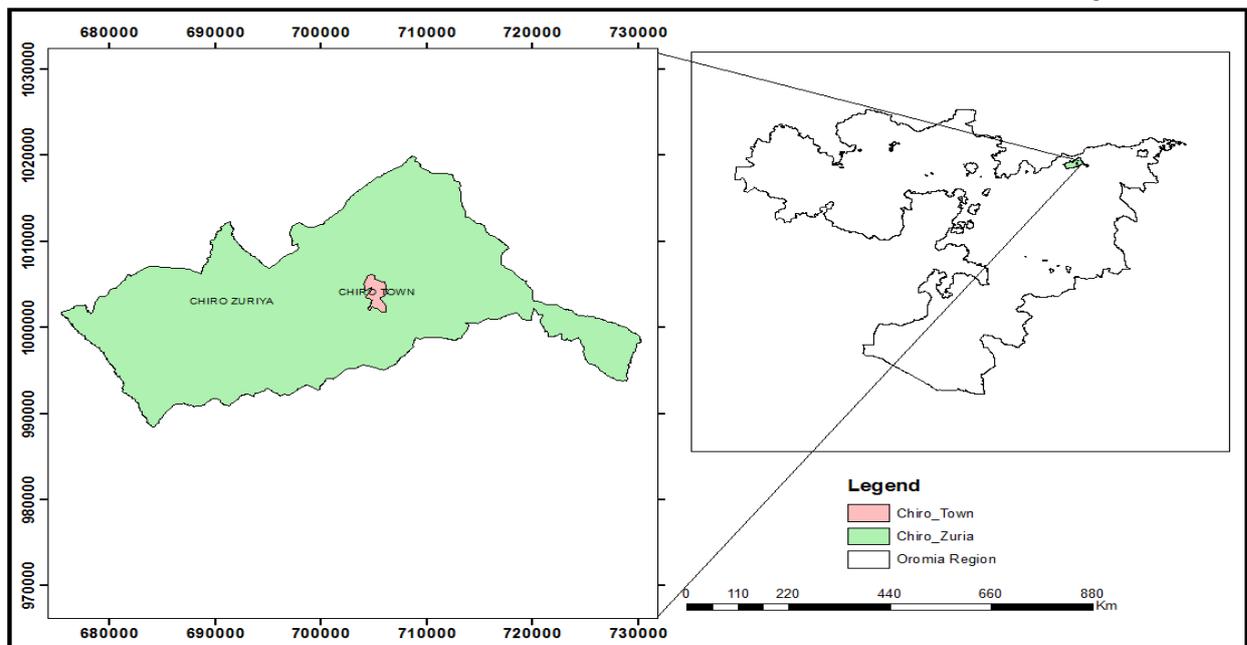


Fig 1. Map of Study Area

### B. Source populations

All pregnant women who attended ANC in Chiro referral hospital public health centers

### C. Study populations

Pregnant women who attended ANC service in the selected Chiro referral hospital public health centers during the study period.

### D. Inclusion criteria

Pregnant women who attended antenatal care visit in the selected Health centers during the study period and provide informed written consent were included.

### E. Exclusion criteria

Pregnant women who were seriously ill and had communication barriers were excluded from the study.

### F. Sample size determination

Sample size was determined using single population proportion formula by taking 5% degree of precision and 95% CI with the following assumptions:

The prevalence of anemia among pregnant women was taken as 36.6% [16]. Using the formula  $n = Z^2 p$

(1-p)/d2) for computing the sample size for cross sectional study and non-response rate of 10%, 680 pregnant women included in the study.

### G. Sampling procedures

Five Health Centers were considered which carried out Hemoglobin determination for pregnant mothers routinely. Each respondent from the respective health centers were selected by proportional allocation method. From each health centers consecutive subjects were included until the desired sample size was achieved.

### H. Dependent variable

- Occurrence of anemia

### I. Independent variables

- **Social-demographic factors:** Age, marital status, residency, education status, pregnant occupation and family size.

**Obstetrics and medical history:** Parity, trimester, birth interval, history of abortion, history of APH and history of any illness.

**Nutritional related factors:** Consumption of fruit/vegetable and meat/poultry foods

### J. Data collection

Data were collected through face-to-face interview using structured, pre-tested questionnaire. Trained nurses collected the data after explaining the purpose of their visit by reading the information sheet. The questionnaire was adopted from Demographic Health Survey (10) and prepared in English, which was translated into local language (Oromifa).

Pretest was done in 5% of the sample in Chiro Hospital. Findings and experiences from the pre-test were utilized in modifying the data collection tool. Supervision was done during data collection. The collected data were checked for completeness and clarity by supervisors and principal investigators on daily basis.

### K. Blood sample collection process

Blood sample was collected via finger-prick with disposable lancet and hemoglobin concentration was measured using a portable Hemo-Cue photometer system. Standardized checklist was used to gather information on Hemoglobin count status. (Table1).

### L. Data analysis

The data was coded and entered using SPSS version 16.0 statistical software. Data were cleaned for inconsistencies and missing values and analyzed using SPSS version 16.0 statistical software. Frequencies and proportions were computed for description of the study population. Significance was determined at 95% confidence intervals. Chi-square analysis was done to assess the association between dependent and independent variables. In the Chi-square analysis, statistically significant variables at significance level of 0.05 were considered for the analysis.

### M. Operation definitions

The following definitions were used for the analysis and interpretation.

1. Anemia in pregnancy: Hemoglobin level below 11 g/dl during pregnancy.
2. Mild anemia: Hemoglobin level from 10-10.9 g/dl.
3. Moderate anemia: Hemoglobin level from 7-9.9 g/dl.
4. Severe anemia: Hemoglobin level from <7 g/dl [1, 17].

### N. Ethical issue

Institutional ethical clearance was obtained from the research and publication office of Oda Bultum University. Permission to conduct this study was obtained from Chiro referral hospital. Individual written informed consents were obtained from each study participant before starting the study; participants were requested to agree after they had understood the study aims and before answering the questions. Confidentiality was assured, where anonymous questionnaires were used.

## III. RESULTS

### A. Socio-demographic characteristics

A total of 680 mothers who attended ANC were interviewed making a response rate of 100%. The mean age of the attendants was 26.7 years old  $\pm$  4.9 years. More than half of the study groups (51 %) were 26-36 years old. About 29.4% were unable to read and write. Half of the pregnant women (50 %) were house wife and 19.6% were government employee. Majority of the study participants (71.9%) were urban residents. About three fourth of the attendants (76.0%) had 2-5 family size

Table 1: Characteristics of the study participants

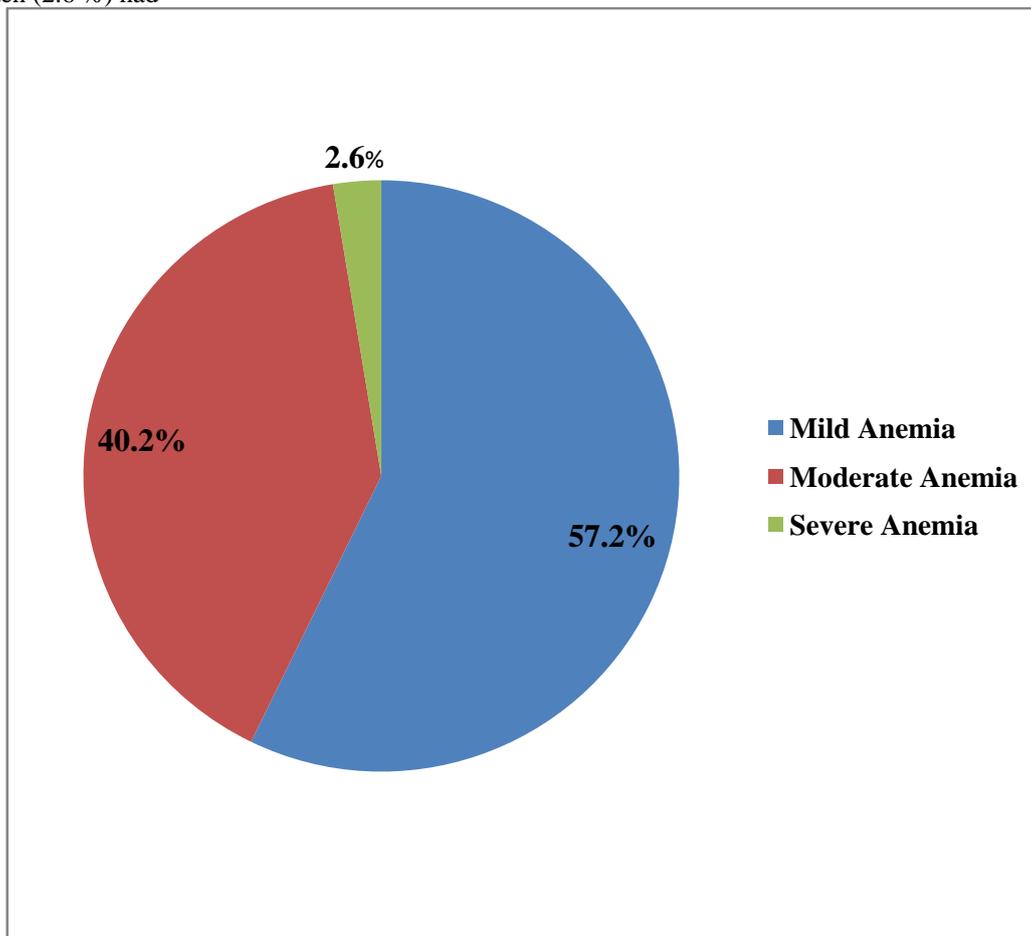
Characteristics	N (%)
<b>Age group</b>	
15-25	248 (36.5%)
26-36	347 (51%)
Above 36	85(12.5%)
<b>Residence</b>	

Urban	489(72%)
Rural	191(28%)
<b>Education</b>	
Illiterate /unable to read	200(29.4%)
Primary/ secondary	352(51.8%)
College/ university	128(18.8%)
<b>Marital status</b>	
Unmarried	154(22.6%)
Married	526(77.4%)
<b>Occupation</b>	
Housewife	340(50%)
Government employed	133(19.6%)
Self employee/ farmers	207(30.4%)
<b>Family size</b>	
2-5	517(76%)
6-10	163(24%)

**B. prevalence of anemia among antenatal women attending at Chiro Referral Hospital**

Figure 2 below shows that the overall prevalence of anemia among antenatal mothers attending clinic at Chiro referral Hospital with regard to Hb level, around 42.9 % had normal hemoglobin level and 57.1 % had anemia. Two hundred twenty two (57.2%) had mild anemia (Hb 10-10.9g/dl), one hundred fifty six women (40.2%) had moderate anemia (Hb 7-9.9g/dl) whilst ten (2.6 %) had

severe anemia (Hb<7g/dl). Mild and moderate anemias were predominant. Of the mothers who were found to be anemic, two hundred fifty (64.4%) had a microcytic pattern while the rest, one hundred thirty eight (35.6%) displayed a normocytic picture. There was no macrocytic anemia reported.



**Fig 2: Prevalence of anemia among women attending at Chiro referral Hospital**

**Table2. Distribution of anemia in pregnant women attending antenatal care with different factors at Chiro Referral Hospital 2018/19**

Risk factors		Anemia 57.1%		Non-anemia 42.9%		Total 680	X <sup>2</sup>	Df	p-value
Parity	Nullipara	167	43.04%	131	44.86%	298	0.15671	1	0.6922
	Multipara	221	57.0%	161	55.14%	382			
Iron supplementation	Yes	142	36.60%	217	74.32%	359	93.597	1	<2.2e-16*
	No	246	63.4%	75	25.68%	321			
Bleeding during index pregnancy (APH)	Yes	16	4.12%	8	2.74%	24	0.57488	1	0.448
	No	372	95.88%	284	97.26%	656			
Trimester	First	28	7.22%	27	9.25%	55	12.95	2	0.002*
	Second	104	26.80%	112	38.36%	216			
	Third	256	65.98%	153	52.40%	409			
Abortion	Yes	126	32.47%	74	25.34%	200	3.7455	1	0.053*
	No	262	67.53%	218	74.66%	480			
Birth interval	<=2year	45	11.60%	56	19.18%	101	6.9822	1	0.008*
	>2 year	343	88.40%	236	80.82%	579			
History of any illness	Yes	48	12.37%	89	30.48%	137	32.843	1	9.991e-09*
	No	340	87.63%	203	69.52%	259			
Contraception	Yes	142	36.60%	165	56.51%	307	25.869	1	3.654e-07*
	No	246	63.40%	127	43.49%	373			
Presence of pica	Yes	333	85.82%	28	9.5%	361	385.76	1	<2.2e-16*
	No	55	14.18%	264	90.41%	319			
Food aversion	Yes	300	77.32%	128	43.8%	428	78.656	1	<2.2e-16*
	No	88	22.68%	164	56.1%	252			
Residence	Urban	174	44.85%	155	53.0%	329	4.2025	1	0.040*
	Rural	214	55.15%	137	46.9%	351			
Fruit/vegetable consumption	Yes	177	45.62%	215	73.6 %	392	52.404	1	4.518e-13*
	No	211	54.38%	77	26.3%	288			
Meat/poultry consumption	Yes	182	46.90%	200	68.4%	382	30.664	1	3.068e-08*
	No	206	53.09%	92	31.5%	298			

\*significant

### C. Risk factors associated with anemia

Chi square test was used to find out the association between risk factors with anemia. Based on table 2 above, there was an association between iron supplementation [p-value <2.2e-16], trimester[ p-value 0.002], abortion p-value 0.053], birth interval[ p-value 0.008], history of any illness [p-value 9.991e-09], contraception[ p-value 3.654e-07], presence of pica [p-value <2.2e-16], food aversion [p-value <2.2e-16], residence[ p-value 0.04], fruit vegetable consumption[ p-value 4.518e-13] and meat/poultry consumption [p-value 3.068e-08] and found to be statistically significant at p<0.05 level (Table2).

Parity and bleeding during index pregnancy were not significantly associated with anemia [p-value 0.6922 and p-value <2.2e-16] respectively (Table2).

## IV. DISCUSSION

Anemia is a known public health problem affecting mainly the developing countries than the developed countries, especially anemia in pregnancy affects not only the health of the mother but also the outcome of the pregnancy, health of the baby, leading

to intergenerational cycle of anemia, malnutrition, etc., and other co morbidities.

Many women begin pregnancy in a slightly anemic state. In pregnancy, mild anemia can rapidly become more severe; therefore, it needs immediate treatment. Iron deficiency anemia is the most common medical complication of pregnancy, primarily because of expansion of plasma volume without normal expansion of maternal hemoglobin mass.

The prevalence of anemia in this study area is 57.1%. This result is much higher than across sectional study

carried out in Gondar (23%), in Bahir Dar (18.3%), in Turkey (27.1%), in the University of Port Harcourt Teaching Hospital, Port Harcourt in Nigeria which had shown a prevalence rate of 23.2% and in Thailand showed a prevalence rate of 14.1% [17-20]. This may be due to a difference in socio-economic and educational status between the study populations in the two study areas.

The result of the present study is consistent with a study done in Jimma (57%) and Peru (50%) [13, 21]. The prevalence of anemia in this study is lower than a study done in Northern Ethiopia (62.7%), India (92.38%) and highlands of Tibet (China) (70%) a [22,23]. This might be due to differences in sample size, geographic area and diarrhea status. Anemia in pregnancy is related to different socio-demographic

factors [24]. In different studies, age, educational status, economic position have been found to be significantly associated with anemia during pregnancy [4, 25].

Out of all anemic pregnant mothers; mild, moderate and severe anemia account for 57%, 40% and 2.6%, respectively. This result is somewhat lower than a study conducted in Jimma and Kenya where moderate anemia accounted for 74.3% and 68%, respectively [3,12]. This inconsistency may be because of the strengthened health education given on risk factors and prevention of anemia and interventions given at health institutions during ANC follow up in an attempt to reduce the prevalence and severity of anemia among pregnant mothers. In addition, it might be because of time and place difference between the present study and the study conducted in Kenya and in Jima. Of the mothers who were found to be anemic, two hundred fifty (64.4%) had a microcytic pattern while the rest, one hundred thirty eight (35.6%) displayed a normocytic picture. There was no macrocytic anemia reported.

Chi square test was used to find out the association between anemia and iron supplementation trimester, abortion, birth interval, history of any illness, contraception, presence of pica, food aversion, residence, fruit vegetable consumption and meat/poultry consumption and Hb level of women and found to be statistically significant at  $p < 0.05$  level.

In this study, insignificant association between anemia and bleeding during index pregnancy and also with parity were observed and this is in line with studies that were conducted in Sudan and Niger delta of Nigeria but in contrary finding in Saudi Arabia low parity had low risk of anemia [26, 27, and 28].

## V. CONCLUSION

The prevalence of anemia in the study area is significantly high. Mild anemia was also significantly high. Normocytic normochromic and microcytic hypochromic anemia were identified to be high. Regular antenatal care follow up, adjustment of dietary and screening of any parasitic infections are recommended to prevent impacts of anemia in pregnant women. Accessing the knowledge regarding anemia, nutrition, availability of various free governmental services, and importance of spacing between the pregnancies on health of the mother and the baby and educating about the same may improve prevalence of the anemia.

## ACKNOWLEDGEMENTS

We would like to thank the Oda Bultum University for financial and administrative support, all study participants for their cooperation, and administrative and laboratory staff of Chiro Referral hospital for all their support to carry out this study.

## REFERENCE

- [1] World Health Organization/United Nations University/UNICEF: Iron Deficiency Anemia, Assessment, Prevention and Control: A Guide for Programme Managers. Geneva: WHO; 2001.
- [2] WHO: Reducing Risks, Promoting Healthy Life, and the World health report. Geneva, Switzerland; 2001.
- [3] World Health Organization (WHO). The prevalence of Anemia in women: A tabulation of available information. Geneva, Switzerland: WHO; 1992. WHO/MCH/MSM/92.2
- [4] Van den Broek NR, Rogerson SJ, Mhango CG, Kambala B, White SA, Molyneux ME:
- [5] Anemia in pregnancy in southern Malawi: prevalence and risk factors. BJOG: An
- [6] International Journal of Obstetrics & Gynecology 2000, 107:445-451.
- [7] Benoist B, McLean E, Egli I, Cogswell M, World Health Organization, Centers for Disease Control and Prevention (Eds): Worldwide Prevalence of Anemia 1993–2005. Geneva: World Health Organization; 2008.
- [8] WHO and UNICEF, Focusing on Anaemia: Towards an Integrated Approach for Effective Anaemia Control, WHO, Geneva, Switzerland, 2004.
- [9] E. McLean, M. Cogswell, I. Egli, D. Wojdyla, and B. De Benoist, "Worldwide prevalence of anaemia, WHO Vitamin and Mineral Nutrition Information System, 1993–2005," Public Health Nutrition, vol. 12, no. 4, pp. 444–454, 2009. View at publisher View at Google Scholar View at Scopus
- [10] Cyril C. Dim, MBBS (Nigeria), senior Registrar and Hyacinth E. Onah, MBBS (Nig), MPA, FMCOG, FWACS, FICS, senior lecturer/ consultant The prevalence of anemia among pregnant women at booking in Enugu, South eastern Nigeria
- [11] Mulugeta Melku, Zelalem Addis, Meseret Alem and Bamlaku Enawgaw Research Article Prevalence and Predictors of Maternal Anemia during Pregnancy in Gondar, Northwest Ethiopia: An Institutional Based Cross-Sectional Study Volume 2014 (2014), Article ID 108593, 9 pages <http://dx.doi.org/10.1155/2014/108593>
- [12] Ethiopia Central Statistical Agency and ICF International: 2011 Ethiopia Demographic and Health Survey: Key Findings. Calverton, Maryland, USA: CSA and ICF International; 2012. Jufar AH, Zewde T: Prevalence of anemia among pregnant women attending antenatal care at tikuranbessa specialized hospital, Addis Ababa Ethiopia. J HematolThromb Dis 2014., 2 doi:10.4172/2329-8790.1000125
- [13] Filagot Kefiyalew, Endalew Zemene, Yaregal Asres and Lealem Gedefaw BMC Research Notes 2014, 7:771 doi: 10.1186/1756-0500-7-771 Risk factors for anemia among pregnant women attending antenatal clinic at jimma university hospital, southwest ethiopia. belachew t, legesse y. ethiop med j. 2006 jul;44(3):211-20.
- [14] Desalegn S: Prevalence of anemia in pregnancy in jimma town, southwestern Ethiopia. Ethiop Med J 1993, 31:251-258. PubMed Abstract.
- [15] F. W. Lone, R. N. Qureshi, and F. Emanuel, "Maternal anaemia and its impact on perinatal outcome," Tropical Medicine and International Health, vol. 9, no. 4, pp. 486–490, 2004. View at Publisher View at Google Scholar View at Scopus.
- [16] T. Kousar, Y. Memon, S. Sheikh, S. Memon, and R. Sehto, "Risk factors and causes of death in Neonates," Rawal Medical Journal, vol. 35, no. 2, pp. 205–208, 2010. View at Google Scholar View at Scopus.
- [17] Obse N, Mossie A, Gobena T (2013) Magnitude of anemia and associated risk factors among pregnant women attending ANC in Shalla woreda, West Arsi Zone, Oromia region, Ethiopia. Ethiop J Health Sci 23: 165-173
- [18] Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van-Look PF (2006) WHO analysis of causes of maternal death: A systematic review. Lancet 367: 1066-1074.
- [19] Getaneh D, Bayeh A, Belay B, Tsehaye T, Mekonnen Z (2018) Assessment of the Prevalence of Anemia and Its

- Associated Factors among Pregnant Women in Bahir Dar City Administration, North-West Ethiopia. *J Preg Child Health* 5: 367.
- [20] Oboro VO, Tabowei TO, Jemikalajah J (2002) Prevalence and risk factors for anaemia in pregnancy in South Southern Nigeria. *J Obstet Gynaecol* 22: 610-613.
- [21] Singh K, Fong YF, Arulkumaran S (1998) Anemia in pregnancy--a cross sectional study in Singapore. *Eur J Clin Nutr* 52: 65-70.
- [22] Sukrat B, Suwathanapisate P, Siritawee S, Pongthong T, Phupongpanku K (2010) The prevalence of iron deficiency anemia in pregnant women in Nakhonsawan, Thailand. *J Med Assoc Thai* 93: 765-770.
- [23] Zavaleta N, Berlanga R, Lonnerdal B, Brown H (1993) Prevalence and determinants of iron deficiency anaemia in a representative sample of pregnant women in Lima, Peru, Pan American Health Organization: 54-67.
- [24] Peters WH (1984) Haematocrit and haemoglobin levels in adult males and in pregnant and non-pregnant females in northern Ethiopia. *Ethiop Med J* 22: 17-27.
- [25] Xing Y, Yan H, Dang S, Zhuoma B, Zhou X, et al. (2009) Hemoglobin levels and anemia evaluation during pregnancy in the highlands of Tibet: a hospital-based study. *BMC Public Health* 9: 336
- [26] Stone JE, Simmons WK, Jutsum PJ, Gurney JM (1984) An evaluation of methods of screening for anaemia. *Bull World Health Organ* 62: 115-120.
- [27] Glover-Amengor M, Owusu WB, Akanmori B (2005) Determinants of anaemia in pregnancy in sekyere west district, ghana. *Ghana Med J* 39: 102-107.
- [28] Bahaj A, Briek ASB (2006) Prevalence of and risk factors of anemia among pregnant women Mukalla Hadhramout in Yemen. *Tikrit J Pharm Sci* 2: 71-77.
- [29] Ibrahim IA, Dennis K (2012) The Burden of anemia among pregnant women at booking in the Niger Delta of Nigeria. 1: 91-95.
- [30] Abdelhafez AM, El-Soadaa SS (2012) Prevalence and risk factors of anemia among a sample of pregnant females attending primary health care centers in Makkah, Saudi Arabia. *Pakistan J Nutr* 11: 1113-1120.