



St. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

**PREVALENCE AND LEVEL OF ANEMIA AMONG PREGNANT
MOTHERS ATTENDING ANTENATAL CARE IN SPHMMC: A
RETROSPECTIVE DESCRIPTIVE STUDY**

BY: Dr. HAILEGIORGIS YIRGU (INTERN)

ADVISORs: Mr. TESFALEM TESHOME(MPH)

**Dr. ABDULFETAH ABDULKADIR (MD, OBGYN-PERINATOLOGY
SPECIALIST)**

**A RESEARCH REPORT TO BE SUBMITTED TO DEPARTMENT OF
PUBLIC HEALTH, SPHMMC, IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF DOCTOR OF MEDICINE**

JANUARY 2018

ADDIS ABABA, ETHIOPIA



St. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

**PREVALENCE AND LEVEL OF ANEMIA AMONG PREGNANT
MOTHERS ATTENDING ANTENATAL CARE IN SPHMMC: A
RETROSPECTIVE DESCRIPTIVE STUDY**

BY: Dr. HAILEGIORGIS YIRGU (INTERM)

ADVISOR: Mr. TESFALEM TESHOME(MPH)

**Dr. ABDULFETAH ABDULKADIR (MD,OBGYN-PERINATOLOGY
SPECIALIST)**

**A RESEARCH REPORT TO BE SUBMITTED TO DEPARTMENT OF
PUBLIC HEALTH, SPHMMC, IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF DOCTOR OF MEDICINE**

JANUARY 2018

ADDIS ABABA, ETHIOPIA

Contents

ACKNOWLEDGMENT.....	5
LIST OF TABLES AND FIGURES.....	8
ABSTRACT.....	9
1. INTRODUCTION	10
1.1. Overview of anemia.....	10
1.2. Significance of the study.....	12
2. LITERATURE REVIEW	13
2.1. Global prevalence of anemia of pregnant mothers.	13
2.2. Prevalence of anemia of pregnant mothers in Africa.....	13
2.3. Prevalence of anemia among pregnant women in Ethiopia.....	14
3. OBJECTIVE OF THE STUDY	17
3.1. General objectives.....	17
3.2. Specific objectives	17
4. METHODS AND MATERIALS.....	18
4.1. Study area.....	18
4.2. Study design.....	18
4.3. Study period	18
4.4. Source population	18
4.5. Study population	18
4.6. Sample size determination	19
4.7. Sampling techniques	19
4.8. Inclusion and exclusion criteria	19
4.8.1. Inclusion criteria	19
4.8.2. Exclusion criteria	19
4.9. Study variables.....	19
4.10. Operational definition	20
4.11. Data collection	20
4.12. Data analysis	21
4.13. Ethical Clearance	21
4.14. Dissemination of the result	21
5. RESULT	22
5.1. Sociodemographic variables of the study subjects.....	22

5.2.	Obstetrical variables of the study subjects	22
5.3.	Prevalence and level of anemia among the study subjects.....	23
6.	DISCUSSION	26
7.	CONCLUSION.....	27
8.	STRENGTH AND LIMITATION OF THE STUDY	28
9.	RECOMMENDATION	29
	REFERENCE.....	30
	ANNEX: DATA COLLECTION INSTRUMENT.....	33

ACKNOWLEDGMENT

First and foremost I would like to thank God almighty. My advisors Mr. Tesfalem and Dr. Abdulfetah helped me a lot in preparation of this research. The staffs of SPHMMC who helped me while I was collecting the data , my friends and others who helped me were essential part of this research. Thank you all.

Hailegiorgis Y.

LIST OF ABBREVIATIONS AND ACRONYMS

AA-Addis Ababa

AaBET-Addis Ababa Burn Emergency and Trauma Hospital

ANC –Antenatal Care

AOR-Adjusted Odd's Ratio

APH-Ante partum Hemorrhage

ART/ARV /HAART -Anti-retroviral Treatment

C/S-Cesarean Section/delivery

CI-Confidence Interval

EDHS-Ethiopian Demographic Health Survey

EGOPD-Emergency Gynecologic/Obstetrics Outpatient Department

EMOPD-Emergency Medical Outpatient Department

END-Early Neonatal Death

ENT-Ear, Nose and Throat department

EOPD-Emergency Outpatient Department

ESOPD- Emergency Surgical Outpatient Department

ETB-Ethiopian Birr

Fe-fol /IFAS -Iron/Folic Acid Supplementation

G.C-Gregorian Calendar

GA-Gestational Age

GDM-Gestational Diabetes Mellitus

gm/dl-Gram per Decilitre

Hb-Hemoglobin

Hct-Hematocrit

HIV-Human Immunodeficiency Virus

IPI - Intestinal Parasitic Infection

ITN- Insecticide Treated Bed Net
IUGR-Intrauterine Growth Restriction
LBW-Low Birth Weight
MCHC-Mean Cellular Hemoglobin Concentration
MCH-Mean Cellular Hemoglobin
MCV-Mean Corpuscular Volume
mg-milligram
MUAC-Mid-Upper Arm Circumference
NICU-Neonatal Intensive Care Unit
OBGYN-Obstetrics and Gynecology Department
OPD-Outpatient department
PHD-Public Health Department
PIH-Pregnancy Induced Hypertension
PPH-Postpartum Hemorrhage
RDW-Red cell Distribution Width
SPHMMC-St. Paul's Hospital Millennium Medical College
SPSS-Software Program for Social Studies
SVD-Spontaneous Vertex Delivery

LIST OF TABLES AND FIGURES

Table 1: Socio-demographic variables of the pregnant women attended antenatal care from September 2015-september 2016G.C in SPHMMC (n=282).....	16
Table 2: Obstetric variables of the pregnant women attended antenatal care from September 2015-september 2016G.C in SPHMMC (n=282).....	17
Table 3: Level of anemia for different sociodemographic and obstetric variables among pregnant women attended antenatal care from September 2015-september 2016G.C in SPHMMC (n=282).....	19
Figure 1: Prevalence and level of anemia among pregnant women attended antenatal care from September 2015-september 2016G.C in SPHMMC (n=282).....	18

ABSTRACT

Background: Anemia is one of the most frequent complications related to pregnancy. Worldwide millions of pregnant women are affected by anemia with different antenatal and postnatal complications to themselves and their newborns.

Objectives: To determine prevalence and level of anemia among pregnant mothers attending antenatal care at SPHMMC in September 2015- September 2016.

Methods: A descriptive cross-sectional study was conducted among pregnant mothers who visited ANC at SPHMMC from September 2015-september 2016G.C. A total sample size of 290 was selected by systematic random sampling method. Data was collected from charts of patients who visited ANC of SPHMMC during the study period. After the data entered to SPSS 21 different socio-demographic variables was analyzed for different descriptive statistics and presented with different graphs and tables. An approval and ethical clearance was acquired from the department prior to the beginning of the research.

Result: Two hundred and eighty-two study subjects were included in the study with the response rate of 97.2%. The age of the study participants ranges from 17-42 with mean age of 26 ± 4.47 . Most of the study subjects are in the age range of 21-30 years. Residence frequency shows that 163(57.8%) live in AA while 119(42.2%) are from outside AA. Among the study subjects 77(27.3%) had no previous pregnancy while 97(34.3%) of them had no children. Two hundred and four(72.3%) visited the hospital during the third trimester. Among the total study subjects the hemoglobin level is found to be in the range of anemia in 74(26.2%) of the total study subjects. These pregnant women with anemia were in their third trimester of their pregnancy. The level of anemia was assessed among the study subjects showing 36(48.6%) have mild anemia and the remaining 33(44.5%) have moderate anemia according to the operational definition.

Conclusion: Using the criteria defined by WHO prevalence of anemia was assessed showing the prevalence of anemia among the study subjects is 26.2% of the total study subjects in their third trimester of their pregnancy.

Key words: Anemia, trimester, pregnant , SPHMMC

1. INTRODUCTION

1.1. Overview of anemia

Anemia is one of the most frequent complications related to pregnancy. The term Anemia implies a decrease in the oxygen-carrying capacity of the blood and is best characterized by a reduction in hemoglobin concentration. Currently World Health Organization define anemia in pregnancy as the level of hemoglobin (Hb) concentrations or hematocrit (Hct) level less than 11 mg/dl in the first and third trimester of pregnancy and less than 10.5mg/dl in the second trimester of pregnancy.

It is known that there is a larger increase in plasma volume relative to red cell mass in almost all pregnancies, and it accounts for “physiologic anemia.” These alterations have been known for centuries, and the term “plethora gravidarum” from medieval ages indicates this condition. Physiologically plasma volume of a pregnant mother starts to increase at about 6 weeks of pregnancy in a healthy woman. This increase accounts for the physiologic fall in the hemoglobin concentration during pregnancy.

In addition to the physiologic changes in pregnancy that causes anemia, there are many causes of pathological anemia in pregnancy. The most common anemias are iron-deficiency anemia and folate deficiency megaloblastic anemia. These anemias are more common in women who have inadequate diets and who are not receiving prenatal iron and folate supplements. Other less common causes of acquired anemia in pregnancy are aplastic anemia and hemolytic anemia. In addition, anemias such as thalassemia and sickle cell disease can have an impact on the health of the mother and fetus.

Nutritional anemia is not a broad-based problem in the populations of developed countries. It is a major health problem in poor, underdeveloped countries. Approximately 75% of all anemias diagnosed during pregnancy are due to iron deficiency. Significant deficiency of iron leads to characteristic hypochromic, microcytic erythrocytes on the peripheral blood smear. The majority of all anemias diagnosed during pregnancy are characterized as iron deficiency anemias. It is estimated that about 80% of pregnant women at term who do not use iron supplementation have hemoglobin concentrations less than 11 gr/dl. The factors contributing to that state include poor iron absorption during pregnancy, multiple gestations or successive gestations less than two years apart, adolescent pregnancy, and any associated chronic blood loss, as well as decreased

amounts of total body iron before the pregnancy. The increased demand for iron and the hemodilution during pregnancy may mask the response to iron supplementation. Oral preparations containing elemental salt are the most commonly employed, whereas ferrous sulfate compounds are the least expensive and have been demonstrated to be efficacious for iron supplementation. It should be taken three or four times daily in a dosage of 30–60 mg for a conservative dosage to 200–300 mg per day in the iron-deficient state. Nausea, vomiting, diarrhea, and constipation are the most common side effects of the ingestion of oral iron.

Folic acid deficiency causes a megaloblastic type of anemia that is second in occurrence as a cause for nutritional deficiency anemia of pregnancy after iron deficiency anemia. Folic acid must be provided in the diet: common sources are green vegetables, fruits (lemons, melons), and meats (liver, kidney). The etiology of folic acid deficiency is variable and decreased intake is associated with poor nutrition and impaired absorption as well as increased folic acid requirements seen in pregnancy because of the increased demands of fetal growth and maternal erythropoiesis. The daily requirement in a nonpregnant state is at least 0.4 mg. In pregnancy or increased growth states, such as during infancy and adolescence, however, the requirements are increased to 0.8–1.0 mg. It is possible that multiple gestations or short intervals between pregnancies increase folate requirements further. It has been reported that folate deficiency affects about 60 to 95% of untreated women at term.

The commonest clinical features of mothers with anemia are headache, fatigue, lethargy, paresthesia, and the clinical signs of tachycardia, tachypnea, pallor, glossitis, and cheilitis. In more severe cases, especially in pregnant women with hemoglobin levels less than 6 gm/dl, significant life-threatening problems secondary to high-output congestive heart failure and decreased oxygenation of tissues, including heart muscle may be encountered.

There are a lot of indications that severe maternal anemia in pregnancy is associated with poor pregnancy outcome. Several reports in the literature associate the reduction in hemoglobin level with prematurity, spontaneous abortions, low birth weight, and fetal deaths.

1.2. Significance of the study

Despite higher prevalence of anemia in pregnancy in developing countries, there are only limited researches done in our country to determine the prevalence of anemia in pregnant women. This research will fill the gap in the knowledge of prevalence and level of anemia in Ethiopia and SPHMMC.

2. LITERATURE REVIEW

2.1. Global prevalence of anemia of pregnant mothers.

A study was conducted on pregnant women, attending the Maternity Clinic of Rural Health training Centre and teaching hospital of Chalmeda Anand Rao Institute of Medical Sciences Karimnagar Telangana, India. Among 269 subjects, the prevalence of anemia is 58.36%. significant factors association was found with the mother's age, education, socio-economic status, parity and dietary habits. Other factors like family structure, size and attainment of menarche were not significantly associated with anemia (4).

Retrospective record based study was also conducted at Rural Health Training Centre, India involving total of 142 pregnant women. Prevalence of anemia in the study was found to be 75.2% with 121 cases among which 101 cases were mild form, 19 cases were moderate form and only 1 case was of severe anemia. The study didn't show any significant association between anemia and age of present pregnancy, birth interval from last pregnancy and parity(5).

On another study aimed to find out the maternal factors and fetal outcomes associated with anemia in 3rd Trimester pregnancy, hospital based cross sectional method was used. The magnitude of anemia was 91.3% in third trimester of pregnancy. Caste, dietary – habit, Education, Occupation, Socio-economic status, ANC Visit, Iron and folic acid supplementation were associated with anemia whereas maternal-age ,residence , religion, number of children ,inter-pregnancy interval were not associated ($P>0.05$) with anemia. IUGR, premature births and still births were observed in anemic mothers but it was not found significant with anemia status. Low-birth weight babies were born to anemic mothers as compared to (14.7%)among non- anemic mothers i.e. 3.181 times higher LBW babies in anemic mothers. Anemia in pregnancy may be reduce by proper iron and folic acid supplementation which can be improved through providing proper ANC services(6).

2.2. Prevalence of anemia of pregnant mothers in Africa

Cross-sectional survey done in Uganda to determine the anemia status of the pregnant women showed that the prevalence of anemia among pregnant women in Kiboga district was 63.1% . The uptake and utilization of the public-health intervention package to combat anemia in pregnancy was low, with iron/folic acid supplementation at 13.2%, use of intermittent preventive treatment of malaria 45.4%, and use of de-worming medicines 14.5%(7).

On a study involving 3836 pregnant women from two rural divisions of Mbulu and Hanang districts of Tanzania attending antenatal clinic, 36.1% of the study subjects has mild anemia, 8.8% have moderate and 1.1% have severe anemia. It is found higher risk of anemia at higher maternal age . The risk increased six-fold in the rainy season of 1995, and the risk was almost double among those with malaria parasitemia(8).

On another Tanzanian study done to determine the prevalence and possible risk factors for anemia and its effect on perinatal outcomes 2654 pregnant women aged 14-43 years and in their 3rd trimester, was recruited. Of the participants, 47.4% had anemia, 35.3% had mild anemia, 9.9% had moderate anemia , and 2.1% had severe anemia. Anemia was significantly more prevalent in HIV-positive, malaria , and low income mothers. Pregnant women with anemia were more likely to have low birth weight (LBW) infants(9).

On a study done in south Africa to determine the prevalence of anemia among antenatal attendees ,two thousand pregnant women were studied. Eight hundred and fifty-four (42.7%) were anemic . The majority (81.4%) were mildly anemic. There were five (0.6%) cases of severe anemia. The prevalence of anemia was significantly higher in HIV-positive compared with HIV-negative pregnant women. The common morphology was normochromic normocytic (n=588, 68.9%) (10).

A hospital based cross-sectional study design was including 258 pregnant women on kenya. The study revealed that the prevalence of anemia among the pregnant women was 57%. Advanced maternal ag, government/private employed women and self-employed women compared to housewives, not taking iron/folic acid supplementation (IFAS) and mid-upper arm circumference (MUAC) less than 23 cm were found to be predictors of anemia(11).

2.3. Prevalence of anemia among pregnant women in Ethiopia

On a study done aims to assess the prevalence and factors associated with anemia among pregnant women attending antenatal care in health institutions of Arba Minch town using institution-based, cross-sectional, 332 pregnant women were included. The result shows that prevalence of anemia among antenatal care attendant pregnant women of Arba Minch town was 32.8%. Low average monthly income of the family (AOR = 4.0; 95% CI: 5.62–11.01), having birth interval less than two years (AOR = 3.1; 95% CI: 6.01, 10.23), iron supplementation (AOR

= 2.31; 95% CI: 7.21, 9.31), and family size>2 (AOR = 2.8; 95% CI: 1.17, 6.81) were found to be independent predictors of anemia in pregnancy(12).

On another study aimed at determining the prevalence and predictors of anemia among pregnant women residing in the rural surroundings of Arbaminch Town ,341 pregnant women participated of which 118 (34.6%) were anemic. The median age of the pregnant women was 25 years (Inter-quartile range: 23–29). The mean HCT was 35.2% (95% CI: 34.6%–35.8%) with SD of $\pm 5.5\%$. Of those 118 anemic women; 73(61.9%) were mildly anemic, 38(32.2%) were moderately anemic, and 7(5.9%) were found to be severely anemic. The prevalence of asymptomatic malaria parasitemia was 9.1% (31/341). The odds of being anemic were 15.72 times [AOR: 15.72, 95% CI (3.97, 62.22), P-value ≤ 0.001] more likely to occur in parasitemic individuals relative to the non parasitemic pregnant women. Not using insecticide treated bed net (ITN) was a significant predictor of anemia among the pregnant women [AOR: 3, 95% CI: (1.72, 5.22), P < 0.001](13).

A cross-sectional study was conducted at Azezo Health Center, north west Ethiopia involving 384 study participants. In this study the prevalence of anemia was 21.6%. Over half (64.8%) of the pregnant women attended antenatal care in the second trimester. Majority (97.1%) of the pregnant women had normocytic normochromic red cell morphology. The majority of anemic cases (49 %) were of the mild type followed by 46% cases of moderate anemia and 5% severe anemia. Pregnant women with age>34, rural residence, history of malaria attack, hookworm infection and absence of iron supplements are significantly associated with increased risk of anemia. The most prevalent intestinal parasite among pregnant women was hookworm (4.7%)(14).

On a facility-based cross-sectional study, involving 258 pregnant women, was conducted from March to June 2013. Hemoglobin was measured using a hematology analyzer and faecal specimens were examined to detect intestinal parasites. Overall, prevalence of anemia was 27.9%, of which 55% had mild anemia. Rural residence, intestinal parasitic infection (IPI) and history of heavy cycle were predictors of anemia(15).

A study was done to assess the magnitude of maternal anemia during pregnancy at last antenatal care (ANC) visit at Bahirdar Felege-Hiwot referral hospital ANC clinic institutional based retrospective study was conducted in Bahirdar Felege-Hiwot Referral hospital from September 2012 to August 2013. Data were collected from clinical recording charts using data extraction

sheet. Of total 1120 pregnant women, 508 (45.4%) of them were anemic. The mean Hemoglobin level of pregnant women was 10.98g/dL (± 1.68 standard deviation). Majority (50.4%) of these anemic women were mildly anemic. The remaining 46.5% and 3.1% were moderately and severely anemic. Immunodeficiency virus (HIV) infection was significantly associated with maternal anemia (16).

A health center based cross-sectional study was conducted in Bodditi Health Centers from April 12 to June 23, 2012. The prevalence of anemia obtained in this study was 61.6%, with mild anemia (53.2%), moderate anemia (46.8%), with no cases of severe anemia. The prevalence of anemia in this study was 58.4% and 41.5% for primigravida and multigravida, respectively ($P < 0.05$). Anemia was also found to increase as the gestational age increases, showing the highest prevalence in the third trimester (46.7%) than second (45.4%) and first trimester (7.8%), ($P < 0.001$) (17).

On a study done to assess the prevalence and determinant factors of anemia among pregnant women attending antenatal care follow up at Tikur Anbessa specialized hospital, 395 pregnant mothers who had been attending antenatal care were involved. It is found that the overall prevalence of anemia in this study was 21.3% with 80.95% have mild anemia, 17.86% moderate anemia and 1.19% with severe anemia. Age, education status, family size, gestational age, birth intervals, history of blood loss, antenatal care, contraception, gravidity, parity were significantly associated with anemia (18).

3. OBJECTIVE OF THE STUDY

3.1. General objectives

- To determine prevalence and level of anemia among pregnant mothers attending antenatal care at SPHMMC in September 2014- September 2016.

3.2. Specific objectives

- To determine the prevalence of anemia among pregnant mothers attending antenatal care at SPHMMC in September 2014- September 2016.
- To describe the level of anemia among pregnant mothers attending antenatal care at SPHMMC in September 2014-sep 2016.

4. METHODS AND MATERIALS

4.1. Study area

The study was conducted in St. Paul's Hospital Millennium Medical College (SPHMMC). SPHMMC is one of the tertiary teaching hospital located in the capital of Ethiopia, Addis Ababa. It is located in the southwestern part of AA called Gullele around 6 km from the center Piazza, center of AA, Ethiopia(19).

As one of the largest Hospitals in the country it supplies different health services to patients of Addis Ababa and regional residents. These services include as an outpatient and inpatient departments. The outpatient department is organized into regular and emergency OPDs. The emergency OPD is currently working in different structures which are pediatrics EOPD, EGOPD, ESOPD, EMOPD and AaBET (for traumatic emergency). Among these departments any case who require emergency operations will be treated in surgical department excluding purely obstetric and gynecological cases(19).

As a regular OPD SPHMMC has many departments. This include general surgery, urology, orthopedic, neurosurgery, internal medicine with different specialties, OBGYN, pediatrics, ENT, dentistry, maxillofacial surgery , ophthalmology, dermatology and venereology , psychiatry, ART and etc.. In regular OPD OBGYN will have ANC for pregnancy mother in the morning and gynecologic illness in the afternoon. There is also OBGYN specialty clinic (19).

4.2. Study design

A retrospective descriptive cross-sectional study was conducted among pregnant mothers who visited ANC at SPHMMC.

4.3. Study period

The data was collected from charts of pregnant women who visited ANC at SPHMMC during the two years period(September 2014-september 2016G.C)

4.4. Source population

All women attending ANC in SPHMMC are considered the source population of this study.

4.5. Study population

All women who visited ANC in SPHMMC during the years 2015-2016 are the study population of this study.

4.6. Sample size determination

The total sample size will be calculated based on the standard formula for sample size determination using 95% confidence interval and 5% degree of freedom. Taking a prevalence of anemia in pregnant mothers from EDHS 2011(22%).

$$n = \frac{(Z_{\alpha/2})^2 P (1-p)}{d^2}$$

Where: n = required sample size

Z $\alpha/2$ = Critical value=1.96(Standard normal deviation usually set at 1.96 which corresponds to 95% confidence interval)

p= 0.22

d= precision (marginal error) =0.05

Therefore: $n = \frac{(1.96)^2 (0.22*0.78)}{(0.05)^2} = 263$

Adding 10% non-retrieval rate the total sample size will be **290**.

4.7. Sampling techniques

Among list of charts in the study period **290** charts was selected by systematic random sampling method. Initially the record of antenatal care visit was taken from the ANC station and the total number of pregnant mothers who visited the hospital were counted. It was found that the total number of the population was 8700. Dividing this by the sample size the interval will be app. 30. So every 30th number was selected after the initial number was selected by lottery method.

4.8. Inclusion and exclusion criteria

4.8.1. Inclusion criteria

Charts of pregnant women who are selected based on the techniques used.

4.8.2. Exclusion criteria

Charts of patients with no adequate data regarding different variable of the study.

Charts of patients which can't be retrieved

4.9. Study variables

4.9.1. Dependent variables

- Prevalence of anemia
- Level of hemoglobin

4.9.2. Independent variables

- Age
- Residence
- Educational status
- Marital status
- Ethnicity
- Gravidity
- Parity
- Fe-fol supplementation
- HIV status
- Additional assessment

4.10. Operational definition

Anemia: hemoglobin of less than 11mg/dl in first trimester and third trimester of pregnancy and 10.5mg/dl in the second trimester of pregnancy

Mild anemia: level of hemoglobin above 10mg/dl regardless of gestational age

Moderate anemia: Level of hemoglobin from 7-10mg/dl

Severe anemia: Level of hemoglobin less than 7 mg/dl

4.11. Data collection

Data of this research was collected from charts of patients who visited ANC of SPHMMC during the study period. Charts was retrieved from the chart office after it is selected based on the criteria used. Data was copied to data collection instrument who is adopted from similar research done in Ghana and modified (23). The data was entered into SPSS version 21.0. Data was collected be the researcher and collaborators. The collaborators were told about the aim of the research and assist in filling the data to the data collection instruments. The collaborators were from fourth year students of SPHMMC.

4.12. Data analysis

After the data entered to SPSS 21 different socio-demographic variables was analyzed for different descriptive statistics and presented with different graphs and tables.

4.13. Ethical Clearance

After getting an approval and ethical clearance from the department of public health and the school the charts of selected patients was retrieved from the record office. The charts were returned soon as the data are copied. The data was looked by the researcher and who are medical professionals. There was no any identification marker in the study. The confidentiality of the data will be kept in the whole data collection, analysis and presentation of this research.

4.14. Dissemination of the result

After completion of data collection, analysis and writing the result will be presented to department of public health for approval. After its approval the result will be submitted for the PHD, OBGYN department and medical service offices. The researcher also will try to publish the result to different journals of public health and obstetrics. Also the results will be uploaded on the internet for other researchers.

5. RESULT

Two hundred and eighty-two study subjects were included in the study with the response rate of 97.2%. Eight charts couldn't be retrieved despite repeated trial.

5.1. Sociodemographic variables of the study subjects

Age and residence were the only socio-demographic characteristics that were consistently recorded in their charts. Hence these variables were analyzed. Accordingly, the age of the study participants ranges from 17-42 with mean age of 26 ± 4.47 . The age is grouped below using the age range used in similar studies done previously. This shows most of the study subjects are in the age range of 21-30 years. Residence frequency shows that 163(57.8%) live in AA while 119(42.2%) are from outside AA(Table 1).

Table 1: Socio-demographic variables of the pregnant women attended antenatal care from September 2014-september 2016G.C in SPHMMC (n=282)

Variable		Frequency	Percentage
Age	≤20	38	13.5
	21-25	95	33.7
	26-30	125	44.3
	31-35	12	4.3
	36-40	9	3.2
	≥41	3	1.1
	<u>Subtotal</u>	282	100
Residence	Adiss Ababa	163	57.8
	Outside AA	119	42.2
	<u>Subtotal</u>	282	100

5.2. Obstetrical variables of the study subjects

It is found that among the study subjects 77(27.3%) had no previous pregnancy while 97(34.3%) of them had no children. In this study 58(20.6%) of the study subjects had prior abortion(s). The trimester at which this mothers visited the hospital was also analyzed showing that 204(72.3%) of the study subjects visited the hospital during the third trimester of their pregnancy(table 2).

Variables		Frequency	Percent
Gravidity	Primigravida	77	27.3
	2-4	185	65.6
	≥ 5	20	7.1
	<u>Subtotal</u>	282	100
Parity	None	97	34.3
	1-4	174	61.8
	≥ 5	11	3.9
	<u>Subtotal</u>	282	100
Previous abortion history	Yes	58	20.6
	No	224	79.4
	<u>Subtotal</u>	282	100
Gestational age at first visit	First trimester	8	2.8
	Second trimester	41	14.5
	Third trimester	233	82.3
	<u>Subtotal</u>	282	100

5.3. Prevalence and level of anemia among the study subjects

The research assessed the prevalence of anemia using the operational definition mentioned. In the data hemoglobin was measured/documented in all the study subjects while hematocrit was recorded only in 159(56.4%) of the study subjects. So, hemoglobin level was used as criteria to define anemia. Among the total study subjects the hemoglobin level is found to be in the range of anemia in 74(26.2%) of the total study subjects. These pregnant ladies with anemia were in their third trimester of their pregnancy. None of the mothers with anemia were in their first or second trimester of pregnancy. So, among the third trimester pregnant mothers who attend ANC at SPHMMC 36.2% of them are anemic. Red blood cell indices were also analyzed for possible indication of the cause of anemia. Mean corpuscular volume(MCV) of the study subjects has mean 89.5fl

The level of anemia was assessed among the study subjects showing 36(48.6%) have mild anemia and the remaining 33(44.5%) have moderate anemia according to the operational definition. In this study subjects 5(6.9%) of the study subjects were found to have severe anemia according to the operational definition(figure 1).

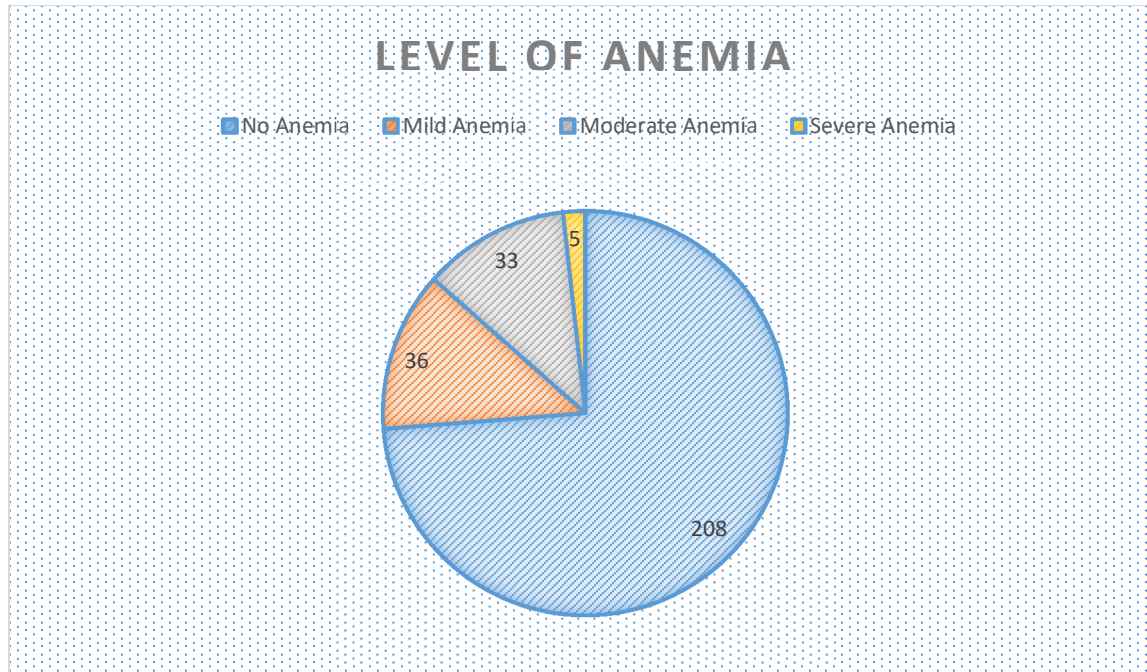


Figure 1: Prevalence and level of anemia among pregnant women attending ANC at SPHMMC(n=282)

Prevalence and of anemia is illustrated in the following table in comparison to different sociodemographic and obstetric variables that the study subjects have.

Table 3: level of anemia for different sociodemographic and obstetric variables pregnant women attended antenatal care from September 2015-september 2016G.C in SPHMMC (n=282)

Variables	Categories	Level of anemia			
		No anemia	Mild	Moderate	Severe
Age	≤20	30	4	4	-
	21-25	68	14	11	2
	26-30	92	15	15	3
	31-35	7	2	3	-
	36-40	8	1	-	-
	≥41	3	-	-	-
	<u>Subtotal</u>	208	36	33	5
Residency	Adiss Ababa	126	20	15	2
	Outside AA	82	16	18	3
	<u>Subtotal</u>	208	36	33	5
Gravidity	Primigravida	58	8	9	2
	2-4	136	26	20	3
	≥5	14	2	4	-
	<u>Subtotal</u>	208	36	33	5
Parity	None	71	15	10	1
	1-4	129	20	21	4
	≥5	8	1	2	-

	<u>Subtotal</u>	208	36	33	5
History of abortion	Yes	45	7	5	1
	No	163	29	28	4
	Subtotal	208	36	33	5
GA at first visit	First trimester	8	-	-	-
	Second trimester	41	-	-	-
	Third trimester	159	36	33	5
	Subtotal	208	36	33	5

6. DISCUSSION

In this research, the prevalence and level of anemia among the pregnant women attending ANC at SPHMMC were assessed. This result showed the prevalence of anemia is 26.2 % among pregnant attending ANC at SPHMMC. Similar results was reported from researches done in Azezo(21.6%), Basidimo(27.9%), Nekemte(29%),Tikur Anbessa Hospital(21.3%),Tanzania(23%) and Pakistan(24%)(8,14,15,18,20,21).

A higher prevalence was reported from researches done in Arbaminch(34.6%), Bahirdar (45.4%), East Ethiopia(43.9%), Wolayita Sodo(39.9%) and kenya(36.2%). These differences may be explained by research methods used, prevalence of malaria and intestinal parasites in the areas studied, operational definition used to define anemia, sociodemographic and cultural differences in nutritional intake, utilization and adherence to the iron/folate supplementation and the total number of study subjects used in the studies(11,13,16,22,23).

Also a very wide gap was found between this research and the research done in Boditti (61.6%) and Diredawa(57.2%) from our country and Uganda(63.1%) and India(70.7%%). This very wide gap can be because the data from Uganda was collected from rural area only as compared to this research which include both the rural and urban areas. Additional health care seeking behavior of the two people may be different. The result from the studies in our country may be widely differed from this research because of lower sample size and the geographical difference between this study areas (5,7,17,24).

A lower result of prevalence of anemia was documented on a research done from DebreBirhan (9.7%) and Iran (4.7%). The difference between this research and the research from Debrebirhan may be explained by longer inter-pregnancy period, better health institution delivery of previous pregnancy and geographical difference between the study areas. About the study done in Iran the difference may be because of difference in sociocultural and geographic difference between the study areas and exclusion of mother with thalassemia in Iran study. Additionally the Iranian research was a meta-analysis of studies (25,26).

7. CONCLUSION

Two hundred and eighty-two study subjects were included in the study covering for 97.2% of the initial planned sample size to assess the prevalence and level of anemia and possible associated factors among pregnant women attending antenatal care in SPHMMC. The age of the study participants ranges from 17-42 with mean age of 26. More than half of the study subjects in AA.

Among the study subjects nearly quarter of them had no previous pregnancy while a third of them had no children. Among the study subjects nearly three quarter of them visited the hospital during the third trimester of their pregnancy. Using the criteria defined by WHO prevalence of anemia was assessed showing the prevalence of anemia among the study subjects is 26.2% of the total study subjects. All this pregnant woman with anemia were in their third trimester of their pregnancy. Among the pregnant women with anemia 48.6% have mild anemia and 44.5% have moderate anemia.

8. STRENGTH AND LIMITATION OF THE STUDY

Strength of the study

- The study involves anemia in pregnant women (one of the public health issue)
- The study was conducted in SPHMMC- A comprehensive hospital which have catchment area involving many rural areas.

Limitation of the study

- This study was conducted using secondary data a source which makes some of the sociodemographic variables incomplete.
- There may be difference in laboratory method used and accuracy among laboratories as all the data were not from the same laboratory. Red blood cell indices were not entirely documented or measured.
- Some of the charts of the pregnant women were not found.

9. RECOMMENDATION

After completing the study, the researcher recommends the following for different stakeholders.

For the ministry of health and similar regional health bureau: as the research shows high prevalence of anemia, efforts to eliminate anemia in pregnancy should continue.

For other researchers repeated researches in the college and the catchments should continue to assess the progress of level of anemia among pregnant women.

Additionally researchers are recommended to determine the outcome of pregnancy among mothers with anemia.

REFERENCE

1. S. Sifakis And G. Pharmakides: Anemia in Pregnancy. Annals of the New York Academy of Sciences ·February 2000 DOI: 10.1111/j.1749-6632.2000.tb06223.x
2. Chowdhury S, Rahman M and Moniruddin ABM: Anemia in Pregnancy. Medicine today 2014 Volume 26 Number 01
3. New S, Wirth M. Anemia, pregnancy, and maternal mortality: the problem with globally standardised haemoglobin cutoffs. BJOG 2015;122:166–169.
4. Rajamouli J, Ravinder A, SCK Reddy, Sujatha Pambi. Study on prevalence of anemia among pregnant women attending antenatal clinic at rural health training centre (RHTC) and chalmeda anand rao institute of medical sciences teaching hospital, karimnagar, Telangana, India. International Journal of Contemporary Medical Research 2016;3(8):2388-2391.
5. Prathvim Raj BU, Vijayalaxmi Mangasuli: Retrospective study on prevalence of anemia among pregnant women at booking in a health care centre in Yadwad, Dharwad, Karnataka, India Int J Community Med Public Health. 2016 Oct;3(10):2762-2765
6. Renu Bedi, Rekha Achary, Rashmi Gupta, Swati Pawar and Mr. Rakesh Sharma: Maternal factors of anemia in 3rd trimester of Pregnancy and its association with fetal outcome International Multispecialty Journal of Health (IMJH) Vol-1, Issue-7, Sept.- 2015
7. MA Mbule, YB Byaruhanga, M Kabahenda, A Lubowa :Determinants of anemia among pregnant women in rural Uganda. Rural and Remote Health13: 2259. (Online) 2013
8. Svengudmundhinderaker, Bjørge Jensen, Perbergsjø, Rolvterjelie, Petergasheka And Gunnarkvåle :Anemia in pregnancy in the highlands of Tanzania. Acta Obstet Gynecol Scand 2001; 80: 18–26
9. Sia E. Msuya, Tamara H. Hussein, Jacqueline Uriyo, Noel E. Sam And Babill Stray-Pedersen: Anemia among pregnant women in northern Tanzania: prevalence, risk factors and effect on perinatal outcomes
10. K Tunkyi J Moodley Prevalence of anemia in pregnancy in a regional health facility in South Africa . SAMJ January 2016, Vol. 106, No. 1
11. Okube, O.T., Mirie, W., Odhiambo, E., Sabina, W. and Habtu, M. (2016) Prevalence and Factors Associated with Anemia among Pregnant Women Attending Antenatal Clinic in

- the Second and Third Trimesters at Pumwani Maternity Hospital, Kenya. *Open Journal of Obstetrics and Gynecology*, 6, 16-27. <http://dx.doi.org/10.4236/ojog.2016.61003>
12. Alemayehu Bekele, Marelign Tilahun and Aleme Mekuria: Prevalence of Anemia and Its Associated Factors among Pregnant Women Attending Antenatal Care in Health Institutions of Arba Minch Town, Gamo Gofa Zone, Ethiopia: A Cross-Sectional Study Hindawi Publishing Corporation Volume 2016, Article ID 1073192, 9 pages <http://dx.doi.org/10.1155/2016/1073192>
 13. Desalegn Nega, Daniel Dana , Tamirat Tefera and Teferi Eshetu: Anemia associated with asymptomatic malaria among pregnant women in the rural surroundings of Arba Minch Town, South Ethiopia: *BMC Research Notes* (2015) 8:110:DOI 10.1186/s13104-015-1081-4
 14. Meseret Alem, Bamlaku Enawgaw, Aschalew Gelaw, Tigist Kena, Mohammed Seid and Yadessa Olkeba: Prevalence of anemia and associated risk factors among pregnant women attending antenatal care in Azezo Health Center Gondar town, Northwest Ethiopia. *J Interdiscipl Histopathol* 2013; 1(3): 137-144
 15. Filagot Kefiyalew, Endalew Zemene, Yaregal Asres and Lealem Gedefaw: Anemia among pregnant women in Southeast Ethiopia: prevalence, severity and associated risk factors. *BMC Research Notes* 2014,7:771 <http://www.biomedcentral.com/1756-0500/7/771>
 16. Mulugeta Melku and Aster Agmas: Maternal anemia during pregnancy in Bahirdar Town, Northwestern Ethiopia: A facility-based retrospective study. *Applied Medical Research*, 2015 Vol Issue 1
 17. Dereje Lelissa, Matiyas Yilma, Weldesenbet Shewalem, Amanuel Abraha, Mesfin Worku, Henock Ambachew, Misganaw Birhaneselassie.: Prevalence of Anemia Among Women Receiving Antenatal Care at Boditii Health Center, Southern Ethiopia. *Clinical Medicine Research*. Vol. 4, No. 3, 2015, pp. 79-86. doi: 10.11648/j.cmr.20150403.14
 18. Jufar AH, Zewde T (2014) Prevalence of Anemia among Pregnant Women Attending Antenatal Care at Tikur Anbessa Specialized Hospital, Addis Ababa Ethiopia. *J Hematol Thromb Dis* 2: 125 doi: 10.4172/2329-8790.1000125
 19. www.sphmmc.edu
 20. Mihiretie H, Fufa M, Mitiku A, Bacha C, Getahun D, et al. (2015) Magnitude of Anemia and Associated Factors among Pregnant Women Attending

- Antenatal Care in Nekemte Health Center, Nekemte, Ethiopia. *J Med Microb Diagn* 4: 197. doi:10.4172/21610703.1000197
21. Tabassum Zehra, Rafeeq Alam Khan and Farida Qadir: Anemia in Pregnancy a Study of Karachi in a Tertiary Care Centre: *American Journal of Phytomedicine and Clinical Therapeutics: AJPCT*[2][10][2014]1224-1233
 22. Kedir H, Berhane Y, Worku A (2013) Khat Chewing and Restrictive Dietary Behaviors Are Associated with Anemia among Pregnant Women in High Prevalence Rural Communities in Eastern Ethiopia. *PLoS ONE* 8(11): e78601. doi:10.1371/journal.pone.0078601
 23. Lealem Gedefaw¹, Asrat Ayele¹, Yaregal Asres¹, Andualem Mossie: Anemia And Associated Factors Among Pregnant Women Attending Antenatal Care Clinic In Wolayita Sodo Town, Southern Ethiopia: *Ethiop J Health Sci*. Vol. 25, No. 2:155-162
 24. Etsegenet Yeshitila: Anemia and Associated Factors among Pregnant Women Attending ANC Service in Rural Health Centers of Dire Dawa, Eastern Ethiopia: june 2016 Haramaya University, Harar: MPH Research Thesis
 25. Ayenew F, Abere Y, Timerga G (2014) Pregnancy Anaemia Prevalence and Associated Factors among Women Attending Ante Natal Care in North Shoa Zone, Ethiopia. *Reprod Syst Sex Disord* 3: 135. doi:10.4172/2161-038X.1000135
 26. Milad Azami,Zahra Darvishi and Kourosh Sayehmiri :Systematic Review and Meta-Analysis of the Prevalence of Anemia Among Pregnant Iranian Women (2005 - 2015): *Shiraz E-Med J*. 2016 April; 17(4-5):e38462

ANNEX: DATA COLLECTION INSTRUMENT

S.no		Variables	Alternatives
1.	Socio-demographic variables	Age (In years)	
2.		Residence	1. AA 2. Outside AA
3.		Educational status	1. Illiterate 2. Primary education 3. Secondary education 4. College or university
4.		Marital status	1. Single 2. Married 3. Divorced 4. Widow
5.		Ethnicity	1. Oromo 2. Amhara 3. Tigre 4. Gurage 5. Others(mention)
6.	Obstetric variables	Gravidity	
7.		Parity	
8.		Abortion	
9.		Place of birth(for multigravida)	
10.		Outcome of birth	1. Alive 2. IUFD 3. END 4. Admitted to NICU
11.		Fe-fol supplementation during this pregnancy	1. Yes 2. No
12.		HIV status	1. Reactive 2. Non-reactive
13.		Diagnosis of HIV	1. Pre-pregnancy 2. During the current pregnancy
14.		HAART started	1. Yes 2. No
15.		Additional assessment (if any eg PIH,GDM, APH...)	
16.		Type of hypertension(if any)	1. Diastolic only 2. Systolic only 3. Both diastolic and

			systolic
17.		Number of ANC visit prior to blood measurement	
18.		Interval between the last birth and this pregnancy	
19.		Reason for referral	
20.		Place of referral	1. Health center 2. Other hospital 3. Private clinic 4. Self-referral
21.		Malaria	1. Yes 2. No
22.		Intestinal parasite	1. Yes 2. No
23.		Which type of intestinal parasite?	1. Hookworm 2. Ascaris 3. Giardiasis
24.	Investigations done	Weight (the earliest)(in kg)	
25.		Conjunctiva	1. Pale 2. Pink 3. Injecting
26.		Pulse rate (beats/min)	
27.		Hemoglobin level(mg/dl)	
28.		Hematocrit (in percentage)	
29.		MCV	
30.		MCH	
31.		MCHC	
32.		RDW	
33.		GA at which CBC was done(in weeks)	