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COLLEGE OF HEALTH SCIENCES

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DETERMINANT OF ANEMIA AMONG PREGNANT WOMEN WHO ATTEND ANTENATAL CARE IN THREE SELECTED PUBLIC HOSPITALS ADDIS ABABA, ETHIOPIA; A CASE CONTROL STUDY, 2021.

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July, 2021

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APPROVAL SHEET

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES, SCHOOL OF MEDICINE, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY POST GRADUATE PROGRAM

I hereby certify that I have read and evaluated this research thesis entitled Determinant of anemia among pregnant women attended Antennal care clinic in selected Public hospitals, case control study, in Addis Ababa, Ethiopia, 2021 prepared under my guidance by Asrar Seman (MD)

Asrar Seman (MD) _____ _____

Principal investigator Signature Date

I recommend that it is submitted as fulfilling the requirements of research thesis.

_____ _____ _____

1. Advisor Signature Date

_____ _____ _____

2. Advisor Signature Date

As a member of the …… research open defense examination, I certify that I have read and evaluated the thesis prepared by Asrar Seman (MD), and examined the candidate. I recommend that the thesis be accepted as fulfilling the thesis requirements for the degree of Specialty in obstetrics and Gynecology.

_____ _____ _____

Examiner Signature Date

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LIST OF ACRONYMS AND ABBREVIATIONS

AAU	Addis Ababa University
ALERT	All Africa Leprosy Research and Training Center
ANC	Antenatal care
AOR	Adjusted Odd ratio
CI	Confidence Interval
COR	Crude Odd ratio
EDHS	Ethiopian Demographic and health Survey
GMH	Gandhi Memorial Hospital
GYN	Gynecology
HCT	Hematocrit
HGL	Hemoglobin
HIV	Human Immune Virus
IDA	Iron Deficiency Anemia
MMR	Maternal Mortality Rate
MUAC	Middle Upper Arm Circumference
OBS	Obstetrics
ZMO	Zewditu Memorial Hospital

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ABSTRACT

Background: Anemia is a common clinical problem contributing to increased maternal and fetal morbidity and mortality during pregnancy. Anemia can be caused by different factors apart from known diseases. The main aim of this study is to identify determinants of anemia among pregnant women attending antenatal care at the public health facilities of GMH,ZMH and ALERT hospitals

Objective: -This study aims to assess the determinant factors of anemia among pregnant women attending Antenatal Care (ANC) in three selected public hospitals (GMH, ZMH and ALERT hospitals), Addis Ababa Ethiopia, case- control study.

Methods: - A health facility-based unmatched case control study design was applied, among 126 cases and 252 controls from JAN,2021-APRIL, 2021G.C in three public hospitals in A.A, Ethiopia. Data were collected using interviewer-administered questionnaires. Controls were pregnant ladies whose hemoglobin level was 11 g/dl and above at their first antenatal care clinic, and cases were pregnant ladies whose hemoglobin level less than 11 g/dl in the first and 3rd trimester and 10.5g/dl in the second trimester. collected data were entered using SPSS version 25 for analysis. First Bi-variable logistic regressions were used to find out determinant factors of anemia at P –value ≤ 0.025, and then multivariable logistic regressions were used to control out confounding variables. Adjusted odds ratio (AOR) with 95% confidence interval (CI) and p-value<0.05 will be used to see the significant association.

Result: According to bivariate analysis result; educational level of mothers and occupational status of respondents, family monthly income, those mothers have history of abortion, number of family living together, parity of mothers, those others had history of abortion and those women's had intestinal parasite parity, were significantly associated with maternal anemia. After controlling the effect of confounding factors (variables) multiple logistic regression analysis revealed that: family monthly income between 1001 – 3500 ETB., were with (AOR = 5.252; 95% CI (2.346,11.746), those mothers who had parity four and above with (AOR = 5.623; 95% CI; (2.023, 15.592),and those mothers had History of abortion with (AOR= 1.971, 95% CI (1.124,3.459), had significant association with anemia.

Conclusion. monthly family income, having previous history of abortion and parity are positively associated with anemia in current pregnancy. Early identification of determinants of anemia and appropriate interventions have paramount importance in fighting anemia to help mothers enjoy their pregnancy. family planning, hemoglobin determination in all pregnant women are valuable

1. INTRODUCTION

1.1. Background

Anemia is defined as a decrease in the concentration of circulating red blood cells or in the hemoglobin concentration and a concomitant impaired capacity to transport oxygen. It has multiple precipitating factors that can occur in isolation but more frequently co-occur. These factors may be genetic, such as haemoglobinopathies; infectious diseases, such as malaria, intestinal helminthes, and chronic infection or nutritional deficiency, which includes iron deficiency as well as deficiencies of other vitamins and minerals, such as foliate, vitamins A and B12, and copper (1).

Anemia is a global public health problem affecting both developing and developed countries with major consequences on human health as well as social and economic development. It occurs at all stages of the life cycle but is more prevalent in pregnant women and young children (2).

Globally anemia affects around 32.4 million (38.2%) of pregnant women. It is a severe public health problem in Africa (46.3%) (3)

Maternal death continues to be a major health and development concern globally, particularly in the developing world (4, 5).

Anemia is multifactorial in etiology; the disease is thought to be mainly caused by iron deficiency in developing countries. In sub-Saharan Africa where iron deficiency is common, the prevalence of anemia has often been used as a proxy for iron deficiency anemia (IDA) (6). Other micronutrient deficiency (vitamins A and B12, riboflavin, and folic acid) has also been a cause of anemia during pregnancy (7). Likewise, Infectious diseases such as malaria, helminths infestations, and HIV are also implicated with high prevalence of anemia in sub-Saharan Africa (8, 9).

There was also a considerable variation in the prevalence of anemia during pregnancy because of the differences in socioeconomic conditions, lifestyles, and health seeking behaviors of different population across different countries and cultures and obstetrics and gynecological related condition of pregnant mothers. In 2013 alone, there were an estimated 289,000 maternal deaths (210 deaths per 100,000 live births) across the globe, of which the sub-Saharan Africa region accounting for 62% (179,000) of these. During the same period, the mortality rate in developing

regions (230) was 14 times higher than in developed regions (16) whilst the sub-Saharan Africa recorded the highest (510) regional MMR (10).

Anemia is one of the leading indirect causes of maternal mortality and it is the most common and intractable nutritional problem globally (1).

In developing countries, pregnant women start pregnancy with already depleted body stores of iron and other vitamins. This is mainly due to poor nutritional intake, repeated infections, menstrual blood loss and frequent pregnancies. It is also associated with socioeconomic conditions, lifestyles, and health-seeking behaviors across different cultures (11, 12).

However, there is no local document on the determinants of anemia to avert its consequences. Therefore, this study set out to identify determinants of anemia among pregnant women ANC clinics in public health facilities of GMH,ZMH,and ALERT hospitals in A.A, Ethiopia(33)

1.2. Statement of the Problem

Anemia is observed as an indicator of both poor nutrition and poor health. It impairs health and well-being in women and increases the risk of maternal and neonatal adverse outcomes. During pregnancy anemia is responsible for a lot of complications in women. Some of those associated problems are less exercise tolerability, puerperal infection, thromboembolic problems, postpartum hemorrhage, pregnancy induced hypertension, placenta previa, cardiac failure, low birth weight, preterm delivery, and prenatal death (12).

Even if anemia is a worldwide public health problem affecting numerous people in all age groups, particularly the burden of the problem is higher among pregnant women (15). Like other developing countries the magnitude of problem associated with anemia is unquestionably high in Ethiopia. In Ethiopia, anemia is the severe problem affecting 62.7% of pregnant mothers and 52.3% non-pregnant women. According to the Ethiopian Demographic and Health Survey (EDHS) report, 17% of reproductive age women are estimated to be anemic and 22% of the pregnant women are anemic (16).

Different studies showed that the determinants of anemia is varied in different regions of the country. This indicates a need for local data to address the problem., in the study area, factors associated with anemia among pregnant mothers are limited or non-existent. Therefore, this study has addressed the identified gaps and examined the determinants of anemia using case control study among pregnant women attending antenatal care in health facilities of in 3 public hospitals in Addis Abab

1.3. Significance of the Study

The causes of anemia in pregnancy are multi-factorial. Iron, folate, amino acids, vitamin A, C and other vitamin B complex deficiencies, intestinal helminthic infections, malaria, and chronic illnesses are among the most common causes [27]. The other risk factors include poverty, grand parity, too early pregnancies, too many children, frequent pregnancy spacing of less than one-year, low socioeconomic status, illiteracy, late booking for antenatal care and gestational age

Although a lot of researches have been conducted about anemia during pregnancy in Ethiopia, there is still a paucity of published data on determinants of anemia among pregnant women in the current study area.

The study is; therefore, aimed to identify determinants of anemia among pregnant women in three public hospitals in A.A, Ethiopia.

The findings of this study would help to guide the antenatal care service providers and other concerned stakeholders to work more towards alleviating the problem. Also, it might be used as a base line data for other researchers who are interested on this area.

2. LITERATURE REVIEW

2.1. Definition of Anemia in Pregnancy

Anemia is defined as a low number of red blood cells. In a routine blood test, anemia is reported as a low hemoglobin or hematocrit. Hemoglobin is the main protein in our red blood cells. It carries oxygen, and delivers it throughout our body. If we have anemia, our hemoglobin level will be low too. If it is low enough, our tissues or organs may not get enough oxygen. Symptoms of anemia -- like fatigue or pain -- happen because our organs aren't getting what they need to work the way they should. Women are at risk of iron-deficiency anemia because of blood loss from their periods and higher blood supply demands during pregnancy (20).

2.2. Factor of Anemia during Pregnancy

2.2.1. Socio-demographic factor

According to case control study on 150 cases and 450 controls done by Kidanemariyam Berhe in eastern Tigray, intestinal parasites (adjusted odds ratio (AOR)=3.4; 95% confidence interval (CI): 1.2, 17.9), farmer occupation (AOR=3, 95% CI: 1.4, 10.8), unprotected sources of drinking water (AOR=3; 95% CI: 1.7, 16.9), drinking coffee/tea with or immediately after meal daily (AOR=1.9;95%CI: 1.04, 8.7) and diet diversity score (DDS) of less than 3 (AOR=3; 95% CI: 1.5, 5.5) were statistically significant for anemia among pregnant women(21)

According to research finding in Durtame town which is case control study among 111cases and 222 controls shows, the major determinant factors were parasitic infection (AOR: 3.67, 95% CI: 1.72-7.86), not taking additional diet during pregnancy (AOR: 2.49, 95% CI: 1.22-5.08), consuming tea/coffee immediately after food (AOR: 3.58, 95% CI: 1.72-7.42), not eating meat (AOR: 2.07, 95% CI: 1.03-4.15), previous heavy menstrual blood flow (AOR: 2.62, 95% CI: 1.18-5.84), and being housewife (AOR: 2.38, 95% CI: 1.02-5.57)(22)

A research finding of Arbamnch showed that, monthly income of the family (AOR = 4.0; 95% CI: 5.62–11.01), family size (AOR = 2.8; 95% CI: 1.17–6.8), birth interval (AOR = 3.1; 95% CI: 6.01, 10.23), were found to be independent predictors of anemia in pregnancy (25).

According to study done in Gonder ,low monthly family income (AOR = 3.15, 95%CI: 1.19, 8.33), large family size (AOR = 4.13, 95% CI: 1.62, 10.52), being independent predictors of pregnancy anemia (26).

2.2.2. Health Status and lifestyle-related Factors

according to study finding in Horo Guduru Zone, Western wollega,Pregnant women who took iron supplements irregularly were almost 3 times more likely to be anemic than their counterparts (AOR = 2.87, 95%CI: 1.41, 5.84). A strong association was also seen between the occurrence of anemia and low dietary diversity score of 24 hours recall (AOR = 12.3, 95%CI: 4.64, 32.72). Likewise, there was also a significant association between medium DDS and occurrence of anemia among pregnant women (AOR = 3.40, 95%CI: 1.48, 7.84). Gestational age was not significant predictor of anemia ($P > 0.05$). Anemia was almost 6 times more common among pregnant women who had intestinal helminthic infection than those with no intestinal helminthic infection (AOR = 6.31, 95%CI: 3.44, 11.58). Pregnant women infected with Ascaris

Lumbricoides, Tricuris Trichiura, Hookworm and Hymenolepis nana were significantly affected associated with anemia (AOR = 6.81, 95%CI: 3.35, 13.85, AOR = 8.12, 95% CI: 2.85, 23.16, AOR = 13.03, 95%CI: 5.24, 32.45, AOR = 4.88, 95%CI: 1.38, 17.14), respectively (27).

A health facility based case control study done in Dessie showed that the odds of getting anemia in pregnant mothers who didn't consume dark green leafy vegetables were five times greater than the odds of mothers who consume on a daily basis (AOR = 5.02, 95% CI: 2.16,11.71). This study signifies that pregnant women who didn't take chicken were 2.7 times more likely to have a risk of developing anemia than who took once per two weeks (AOR = 2.68, 95% CI: 1.22, 5.86). The odds of developing anemia among HIV reactive pregnant women were 6.8 times higher than HIV non-reactive pregnant mother (AOR = 6.78, 95% CI: 2.28, 20.18). In this study medication was also found to be a significant predictor of anemia. Those mothers who take medication were 3.6 times more likely to develop anemia than those who didn't take any medication (AOR = 3.57, 95% CI: 1.60, 7.98) (28).

2.2.3. Obstetrics Related Characteristics of the Study Participants.

Among pregnant mothers who were receiving antenatal care at health facilities, 86 (77.5%) cases and 156 (70.9%) controls had previous history of pregnancy. From those who had history of birth, nearly one-third of the cases, 33(38.4%), and 125 (80.1%) controls had birth interval of more than two years. Among those who had history of birth, 53 (47.7%) cases and 155 (69.8%) controls had the less than or equal to four children. Among ANC attendees, 43 (38.7%) cases and 125 (56.3%) controls had history contraceptive use. More than half of the ANC attendees, 73 (65.8%) cases and 195 (87.8%) women, had no heavy menstrual flow before they become pregnant. the odds of getting anemia in pregnant mothers were higher among mothers whose birth interval was less than two years (AOR=4.78, 95% CI:2.68 -9.64). This study showed that pregnant women who had heavy menstrual blood flow were 2.6 times more likely to have a risk of developing anemia than who did not have history of heavy menstrual blood flow (AOR=2.62, 95% CI:1.18 – 5.84) (22).

Most of the study participants, 98% (185/188) of cases and 96.3(366/380) of controls, were married with a mean age of 19(± 2.3). Clinically, 63.9% (122/191) of cases and 63% (241/382) of controls were at their third trimester. The proportion of heavy menstrual bleeding (using more than 7 tampons per menstrual period) was two times more in cases than in controls (32% and

16%, respectively. Anemia was more prevalent among those with heavy menstrual bleeding before index pregnancy than their counterparts (AOR = 2.38, 95%CI: 1.38, 4.09) (27).

According to this study pregnant mothers who were in the first trimester were almost two times more likely to develop anemia than those in the second trimester (AOR = 2. 07, 95% CI: 1.12, 3.84). Similarly, pregnant mothers in the third trimester were almost three times more likely to be anemic than those in the second trimester (AOR = 2. 96, 95% CI: 1.53, 5.72) (28).

Parity groups had a significant association with anemia in pregnancy thus: Linear-by-linear association showed an increasing prevalence of anemia across the parity sub-groups (P = 0.04). The odds of developing anemia were compared among the parity sub-groups using the multipara (para 1–4) as the baseline, a significant increase was only observed within the nulliparous group (OR = 1.9 [CI 95%: 1.03, 3.62], P = 0.04). Gestational age of <28 weeks had no significant association with anemia in pregnancy (OR = 1.5 [CI 95%: 0.81, 2.81], P = 0.19), and this did not change after controlling for the effect of first trimester (OR = 1.7 [CI 95%: 0.92, 3.28], P = 0.09). (30).

According to the study finding in Ghana the significant factor of anemia a Crude odds ratio

Regarding to multivariate analysis unemployment primigravida (AOR= 2.13 (CI: 1.34–3.18); p = 0.0201), nulliparity (AOR = 1.92 (CI: 1.23–2.86); p = 0.0231), first antenatal visit in second trimester (AOR = 1.71 (CI: 1.33–3.12); p = 0.0149) and visit in third trimester (AOR = 2.73 (CI: 1.24–4.35); p = 0.0017), (31).

Multivariate logistic regression analysis revealed that Pregnant women in the third and second trimesters were 3.32 (95% CI 1.84–6.0) and 2.87 (95% CI 1.61–5.17) times more likely to be affected by anemia as compared to pregnant women in the first trimester, respectively. Similarly, those pregnant women who had 3–5 pregnancies were 1.95 times more likely to be anemic, compared with those who had less than 3 pregnancies (AOR =1.95 (95% CI=1.19–3.19)). Similarly, pregnant women with MUAC ≥ 23 were 59% less likely to be anemic compared with those with MUAC < 23 (AOR = 0.41 (95% CI: 0.27–0.63) (32)

According to this study pregnant mothers who were in the first trimester were almost two times more likely to develop anemia than those in the second trimester (AOR = 2. 07, 95% CI: 1.12, 3.84). Similarly, pregnant mothers in the third trimester were almost three times more likely to be anemic than those in the second trimester (AOR = 2. 96, 95% CI: 1.53, 5.72). The odds of

developing anemia among HIV reactive pregnant women were 6.8 times higher than HIV non-reactive pregnant mother (AOR = 6.78, 95% CI: 2.28, 20.18). Those mothers who take medication were 3.6 times more likely to develop anemia than those who didn't take any medication (AOR = 3.57, 95% CI: 1.60, 7.98) (29).

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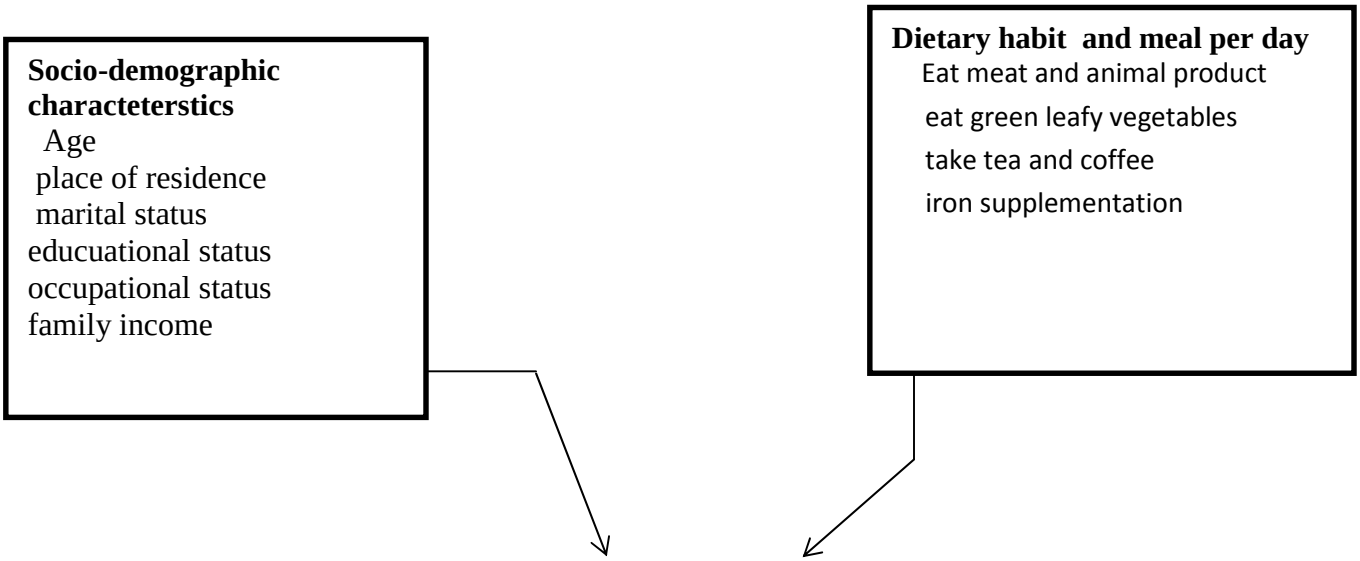
2.3. Conceptual frame work

Studies and reports in different parts of the world reviewed different factors associated with anemia. For this study according to the literature review the main factors identified are socio demographic factors, dietary habit, obstetric factor and maternal health condition. This conceptual framework was adopted by the author from the literature.

Conceptual framework



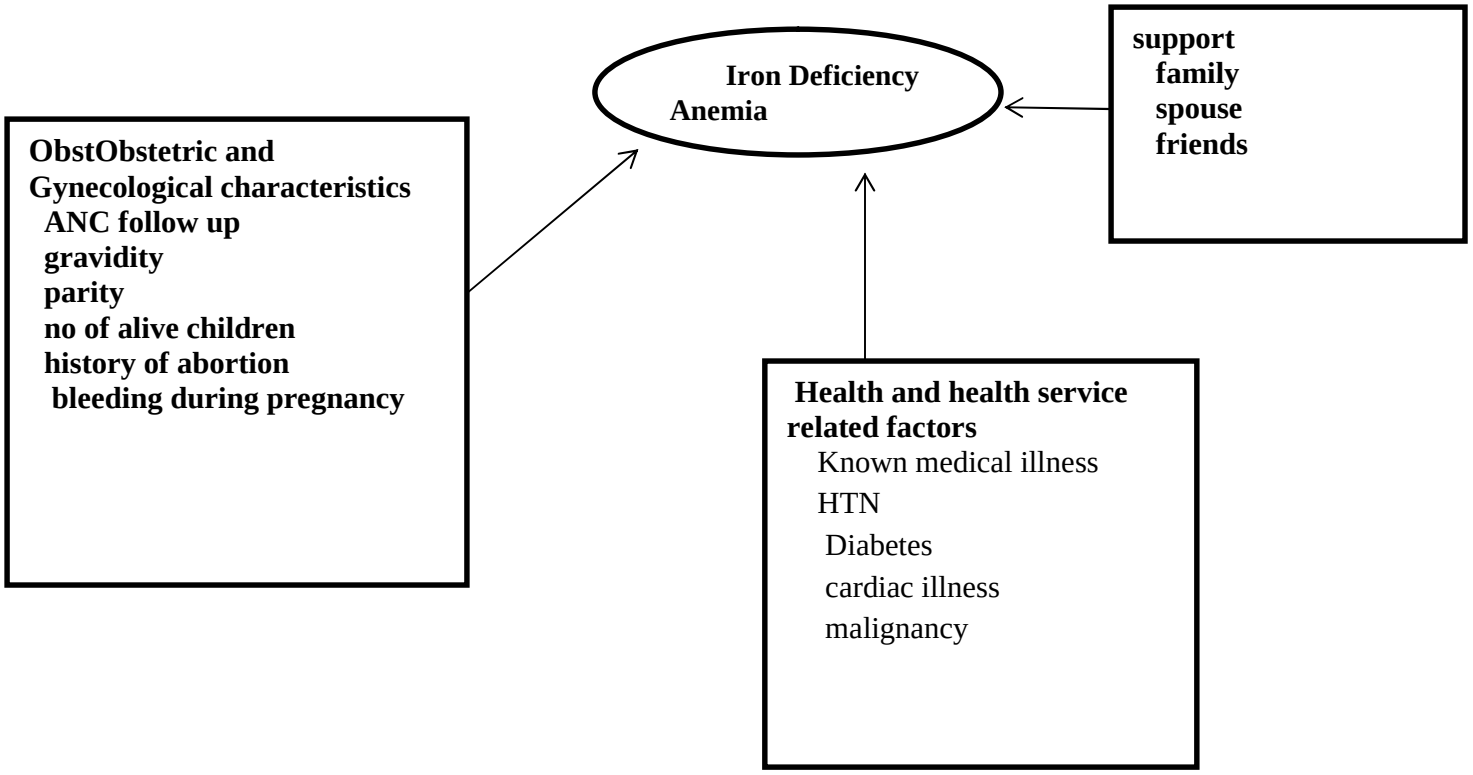


Figure 1: The conceptual frame work of the determinants of anemia among pregnant women adapted and modified from Ocala 2008.

3. OBJECTIVES

3.1. General Objectives

- ✓ To determine determinants of anemia among pregnant women attending Antenatal Care (ANC) in GMH, ZMH and ALERT hospitals, in Addis Ababa, Ethiopia, Case control study, 2021.

3.2. Specify objectives

- ✓ To assess the impact socio-demographic and economic factors on anemia in the three selected public hospitals, in Addis Ababa, Ethiopia, 2021.

- ✓ To assess the impact of medical co-morbidities on anemia among pregnant women attending ANC in the three selected public hospitals, in Addis Ababa, Ethiopia, 2021.
- ✓ To assess the impact of Dietary diversity on anemia among pregnant women's attending ANC in the three selected public hospitals, in Addis Ababa, Ethiopia, 2021.
- ✓ To assess the impact of obstetric and gynecologic characteristics on anemia among pregnant women attending ANC in the three selected public hospitals, in Addis Ababa. Ethiopia, 2021.

4. METHODS AND MATERIAL

4.1. Study Area

The study is conducted in Addis Ababa, according to Addis Ababa Health Bureau; currently the city has more than 41 hospitals, 28 health centers, 35 health posts and more than 500 clinics. There are 11 public and more than 30 private hospitals in the city. The study was conducted GMH, ZMH and ALERT hospitals in Addis Ababa, Ethiopia. these are one of the largest public hospitals in Ethiopia. The hospitals have maternity ward, labor ward, Emergency OPD, ANC, and different subspecialty OPDs and Gynecology ward.

4.2. Study design and Periods

Institutional based unmatched case control study design were applied among pregnant mother attending antenatal care (ANC) in GMH, ZMH and ALERT specialized hospitals, from JAN 1/2021 May 20/2021.

4.3. Population

4.3.1. Source Population

The source populations for this study were all pregnant women attending antenatal care (ANC) unit in GMH, ZMH and ALERT specialized hospitals during the study period.

4.3.2. Study Population

All pregnant women attending antenatal care (ANC) service at GMH, ZMH and ALERT hospitals that fulfill the inclusion criteria during the data collection period were considered as study participants.

4.4. Eligible Criteria

4.4.1. Inclusion criteria

- ✓ All pregnant women who attended their antenatal care clinic
- ✓ Pregnant women who were willing to participate in the study

4.4.2 Exclusion Criteria

- ✓ Pregnant women who are severely ill
- ✓ Pregnant women were unable to speak
- ✓ Pregnant women who were not interested to participate in the study

4.5. Sample Size Determination

The sample size was calculated by using open, Epi-Info for unmatched case control study. To determine the sample size, intestinal parasite was taken as a risk factor for anemia among Ethiopia pregnant women and this variable (intestinal parasitosis) (13) was selected among other significant variables because it gave a large sample size. based on this , the intestinal parasitic infection was taken as main exposure variable with a proportion of 57.97 among cases and 42.03 among controls with OR=1.9.The following assumptions were considered; 95% confidence interval, 80% power and case to control ratio 1:2. Considering 10% nonresponse rate, the sample size was 382 of these 128 were cases and 254 were controls.

4.6. Sampling Procedures

Systematic random sampling technique is used to select study participants using their average previous two months antenatal care users used as the sampling frame. In Addis Ababa city administration, there are 11 public hospitals, which give antenatal care service to the pregnant mother. Three of them were selected by using simple random sampling technique and included and sample was allocated proportionally to population across three health facilities. Cases were selected using systematic random sampling technique and two consecutive controls that came after selection of cases were allocated for each case.When consecutive cases were found, consecutive controls were taken according to the proportion. in order to avoid repetition of cases, unique sign was put on the charts

4.7. Proportional allocation

In the study area there are 11 Government hospitals three were selected randomly the total number of pregnant mothers were 1604, out of this 599 in Gandhi memorial Hospital, 683 Zeweditu Memorial Hospital, and 322 ALERT Hospital. Based on proportional allocation to size this 382 study subjects will distributed to each Hospital`s using the following formula.

$$nk = \frac{nxNk}{N}$$

- ✓ Where: nk =required sample size from each Hospital(GMH, ZMH, AL.H)
- ✓ n=the total sample size = 382
- ✓ NK=total number of pregnant mothers (NkGMH =599, Nk, ZMH =683, Nk AL.H=322)
- ✓ N=total number Eligible pregnant mothers in selected hospital's

After that the sample size was allocated to each hospitals as follows;

- ✓ $n\,GMH = \frac{n \times NGMH}{N} = \frac{599x382}{1604} = 143$

- ✓ $n\,ZMH = \frac{n \times NZMH}{N} = \frac{683x382}{1604} = 163$

✓ n AL.H= $\frac{n \times Nw07}{N} = \frac{322x382}{1604} = 77$

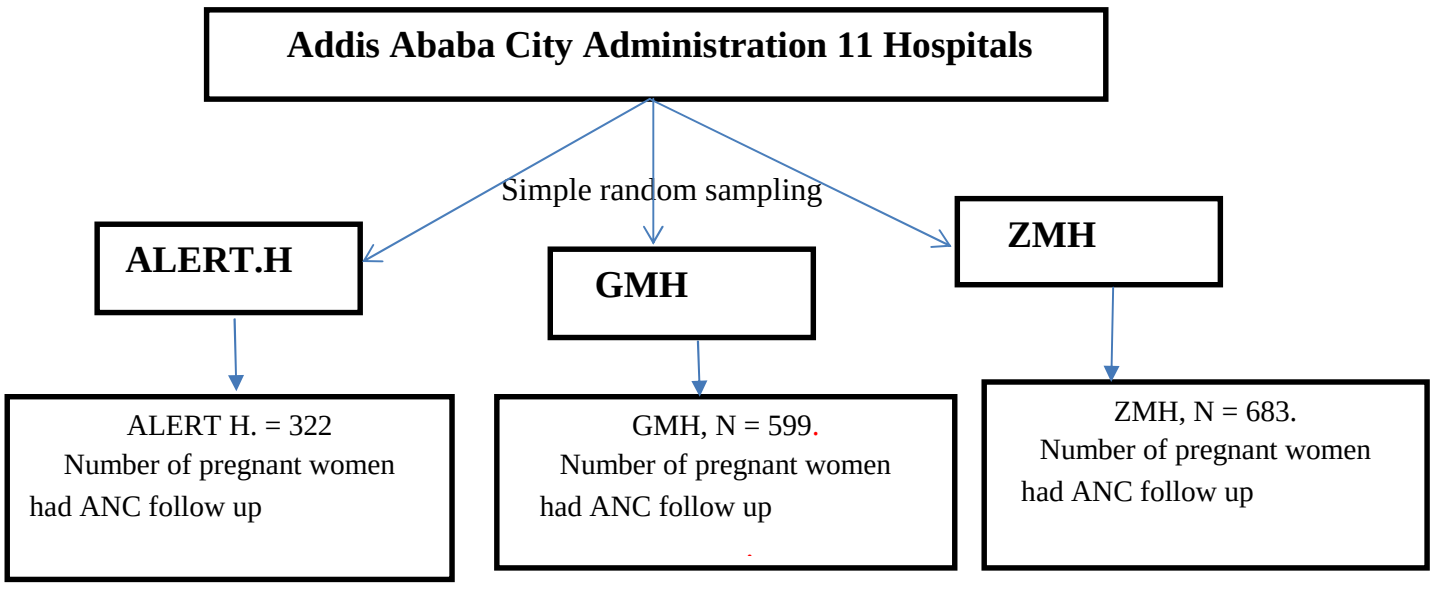
Note: ZMH: - Zeweditu Memorial Hospital

GMH: - Gandhi Memorial Hospital

AL.H:- ALERT Hospital

4.7.1. Schematic representation of sampling procedure

A total of 384 mother were sampled, and systematic random sampling method were used to get study subjects. These was achieved in four month from FEB, to May, 2021.



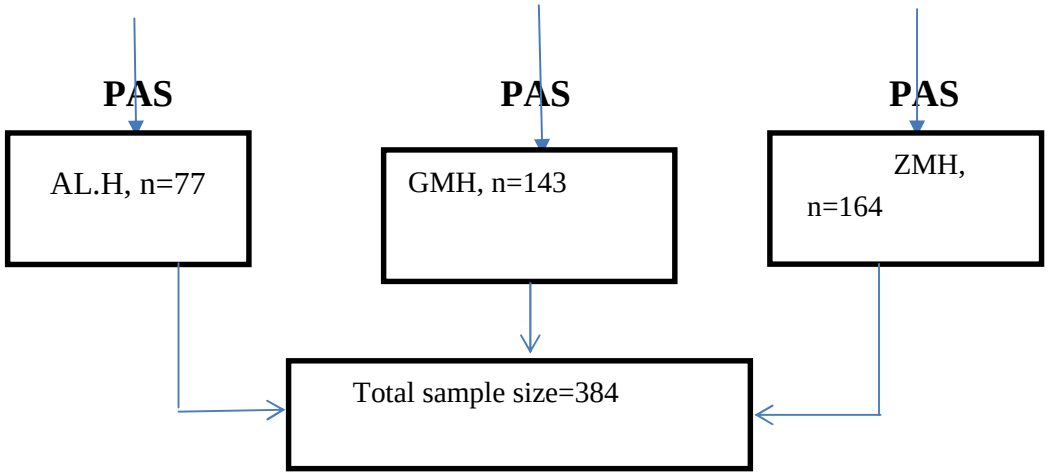


Figure 2: The Schematic representation of the sampling procedure

- ✓ N.B: N= Total number, n= sample number, PAS: proportional allocation to size

Figure 2: Schematic representation of sampling procedure

4.8. Data Collection Tools and Technique

The study were conducted over a period of 4month,and information were collected from participants by using a structured interview administered questionnaire and reviewing medical records of the mother's medical record. The questionnaires adopted and modified from the EDHS (Ethiopian Demographic and Health Survey) and other similar literatures to collect data quantitatively. Each pregnant mother who has ANC follow up was interviewed in order to get data regarding Iron deficiency Anemia and its associated factors. Three BSc degree holder nurses and midwife data collectors and one MSc supervisor with previous experience of data collection were recruited to participate in data collection.

Data collectors were trained for one day in order to understand the objectives of the study and how to collect the data. The questionnaire gathered four groups of participants' characteristics,

Socio-demographic and economic, Health service and health related, gynecological and obstetric, dietary habit related factors.

Information related to socio-demographic characteristics and pregnancy-related (obstetrics and gynecologic variables) factors of respondents was collected through face-to-face interview by using a pretested structured questionnaire which was done after laboratory test results were obtained because cases and controls cannot be identified before hemoglobin test results. Hemoglobin and stool examination results are taken from the chart if recently done, otherwise will be requested as routine investigation for mothers who are anemic and the controls

Dietary Diversity Score (DDS) was calculated from a single 24-hour dietary recall data. All the foods and the liquids consumed a day before the study was categorized into 9 food groups. Consuming a food item from any of the groups was assigned a score of 1 and if no food was taken a score of 0 was given. Accordingly, a DDS of 9 points was computed by adding the values of all the groups (all starchy sample food, beans and peas, nuts and seeds, dairy, flesh foods, eggs, vitamin A-rich foods, other vegetable's and other fruits) .respondents who list at least 4 items of food from each specific item had good diversity for this research. Study participants were assessed for nutritional status by measuring MUAC by tape meter, and cut of point of < 23cm and ≥ 23 cm were used. MUAC will be taken from left arm on midpoint between olecranon and acromium by tape meter already provided.

4.10. Data quality control

The questionnaire was pretested on 10% (14 cases and 24 controls) of the sample to assess the reliability of the data collection instruments.. The collected data were checked by supervisors and data collectors for consistency and completeness every day at the end of each data collection day and necessary corrective measures were taken from the area where difficulty was identified.

4.11. Study Variables

4.11.1. Dependent Variable:

- ✓ Iron Deficiency Anemia.

4.11.2. Independent Variables:

Socio-demographic factors

- ✓ Age
- ✓ Occupation
- ✓ Marital status
- ✓ Educational status
- ✓ Residence
- ✓ Income

Obstetric history

- ✓ Gravida (number of pregnancy)
- ✓ Parity (number of delivered children)
- ✓ Number of alive children
- ✓ History of Abortion
- ✓ Number of abortion
- ✓ Gestational Age
- ✓ Birth intervals
- ✓ Multiple pregnancies
- ✓ History of heavy menstrual bleeding
- ✓ Current obstetric complication (APH, PIH, and PROM, others

Dietary habits

- ✓ MUAC
- ✓ Eat meat and animal products
- ✓ Eat green leafy vegetables
- ✓ Taking fruit's after meal
- ✓ Taking tea and coffee after meal

Health related

- ✓ Known medical illness
- ✓ GHTN
- ✓ GDM
- ✓ History of malaria
- ✓ Current history of intestinal parasitosis

4.12. Operational definitions

Anemia in pregnancy: Hemoglobin level below 11 g/dl during first and third trimester and 10.5 during second trimester pregnancy (WHO).

Mild anemia: Hemoglobin level from 10-10.9 g/dl.

Moderate anemia: Hemoglobin level from 7-9.9 g/d.

Severe anemia: Hemoglobin level from 7 g/dl.

Pregnant woman: A woman whose pregnancy was confirmed by ultrasound

Last menstrual period (LMP): The first date of the last menstrual period

Parity: The number of births the mother experienced after 28 weeks whatever the status of the newborn is.

Abortion: The process of expulsion of conceptus tissue before 28 weeks of gestation.

4.13. Data Processing and Analysis

For data processing a template were prepared. The data was entered, categorized, coded, and summarized using EPI info.7 software, and then, it was transferred to statistical package for the social science (SPSS) version 25 software, for further analysis.

Descriptive statics was used to indicate the determinants of Anemia in case and controls. in addition, it was used for the description of demographic and socio- economic variable using frequencies, mean, and standard deviation.

Bivariate and multivariable logistic regression analyses were performed to test association between dependent and independent variables. Variables having P values < 0.2 in the bivariate analysis was entered in to a multiple logistic regression model to control the confounding effect of the variables. OR, 95% confidence level, and P value < 0.05 were used to determine the significance of the variables.

4.14. Ethical Consideration

Prior to data collection an official written letter from Addis Ababa University obstetrics and Gynecology department were received to the responsible unit hospital administration office. Subjects were informed about the objective of the study and verbal consent was made with the right to participate in the study. Honesty and confidentiality were maintained through the process of data collection and analysis. cases who were anemic and found to have intestinal parisitosis were treated after communicating with treating physician.

5. RESULT

5.1. Socio demographic Characteristics of study participant

A total of 378 pregnant women (126 cases and 252 controls) participated in this study making a response rate of 98.4375%. The age of respondents ranges from 18 to 41 years with the mean age of 27.89 ± 5.884 for both case and control groups. 39 (31%) of cases and 90 (35.7%) of the controls of respondent were in the age group of 25 – 29 years. Concerning educational status, 11(8.7%) of cases and 10 (4%) of controls had read and write only and in 26 (23.4%) of cases and 42 (17.55) of controls husbands had complete primary education only; regarding occupational status 90 (71.1%) cases and103 (40.9%) in controls were house wife's respectively (Table 1).

Table 1: Socio-demographic characteristics of pregnant women attending antenatal follow-up-care, in selected public ***hospitals of Addis Ababa, from Jan to May 2021***

Variables	**category**	**Case n= 126 (%)**	**Control n=252 (%)**
Age of respondents	15 - 19	8(6.3)	26(10.3)
	20 – 24	33(26.2)	45(17.9)
	25 – 29	39(31)	90(35.7)
	30 – 34	24(19)	61(24.2)
	35 - 39	22(17.5)	30(11.9)
Marital status of respondents	Single	14(11.1)	13(5.2)
	Married	112(88.9)	239(94.8)
Place of residence	Urban	102(81)	224(88.9)
	Rural	24(19)	28(11.1)
Religions	Muslim	29(23)	115(45.6)
	Orthodox	91(72.2)	120(47.6)
	Protestant	6(4.8)	17(6.7)
Educational status of mothers	Read and write	11(8.7)	10(4)
	primary education	40(31.7)	45(17.9)
	Secondary education	49(38.9)	101(40.1)
	Diploma and above	26(20.6)	96(38.1)
Occupational status of mothers	House wife	90(71.1)	103(40.9)
	Government employ	18(14.3)	83(32.9)

	Private company	12(9.5)	39(15.5)
	daily laborer	6(4.8)	27(10.7)
Educational status of husband	primary education	26(23.4)	42(17.5)
	Secondary education	33(29.7)	61(25.4)
	diploma and above	52(46.8)	137(57.1)
Husband employment status	Private company	25(22.5)	58(24.2)
	Governmental employ	37(33.3)	80(33.3)
	Merchant	27(24.3)	79(32.9)
	Daily laborer	22(19.8)	23(9.6)
Family monthly income in ETB.	1001 – 3500	22(17.5)	85(33.7)
	3501 - 5000	55(43.7)	73(29)
	≥ 5001	49(38.9)	94(37.3)

5.2. Obstetrics and gynecological characteristics of pregnant women

From those who had a previous history of abortion, 31(58.5%) of cases and 24(43.6%) of control also had induced abortion (figure 3). From those who had a history of childbirth, more than two third of 48(94.1%) of cases and 126(92.6%) of controls had a birth interval of greater than or equal to two years. From ANC attendees, 24(19%) of cases and 32(12.7%) of controls had vaginal bleeding on current pregnancy, and 38(30.3%) cases, 59 (23.4%) control had parity greater than or equals to four (Table 2).

Table 2.: Obstetrics and gynecology-related characteristics of pregnant women attending ANC, in selected public hospitals, in Addis Ababa, Ethiopia, from Jan to May, 2021

Variables	Category	Case n= 126 (%)	Control n=252 (%)
ANC follow up in previous pregnancy	No	32(25.4)	43(17.1)
	Yes	94(74.6)	209(82.9)
Gravid a (Number of pregnancy)	1	29(23)	47(18.7)
	2 – 3	91(72.2)	176(69.8)
	≥ 5	6(4.8)	29(11.5)
Parity (Number of deliveries after 28 wks.	Have no	46(36.5)	74(29.4)
	1	35(27.8)	86(34.1)
	2 - 3	38(30.2)	59(23.4)
	≥ 4	7(5.6)	33(13.1)
Number of alive children	Have no	30(23.8)	63(25)
	One	84(66.7)	154(61.1)

	two to three	12(9.5)	35(13.9)
No. of family living together	≤ 2	32(25.4)	61(24.2)
	3 - 4	87(69)	151(59.9)
	≥ 5	7(5.6)	40(15.9)
History of abortion	No	81(64.3)	198(78.6)
	Yes	45(35.7)	54(21.4)
Birth interval from preceding baby	< 24 months	3(5.9)	10(7.4)
	≥ 24 months	48(94.1)	126(92.6)
Gestational age of current pregnancy	2nd trimester	66(52.4)	106(42.1)
	3rd trimester	60(47.6)	146(57.9)
Modern contraceptive use	No	16(12.7)	44(17.5)
	Yes	110(87.3)	208(82.5)
History of bleeding on current pregnancy	No	102(81)	220(87.3)
	Yes	24(19)	32(12.7)
Sensations of flooding during period time	Never, rarely or some	108(85.7)	232(92.1)
	Ever, most period	18(14.3)	20(7.9)
During period used tampons or napkin / 2 hrs.	Never, rarely or some	110(87.3)	230(91.3)
	Ever, most period	16(12.7)	22(8.7)

Types of abortion: the overall rates of abortion types, the mothers face in both case and controls

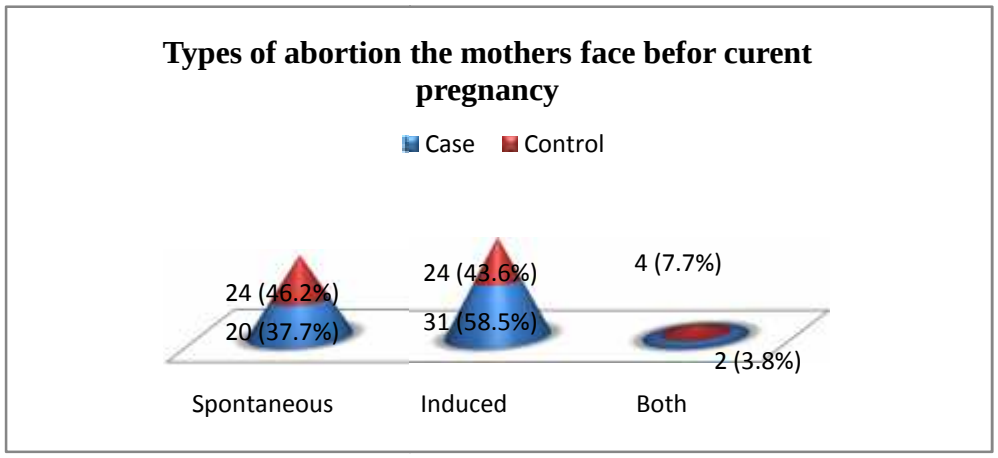


Figure 2: Types of abortion the mothers face before current pregnancy in case and control, among pregnant women those attended antenatal clinic, in selected public hospital, in Addis Ababa, Ethiopia, 2021

Menstrual period lasts: out of the pregnant women those whose menstrual period lasts were showed in the figure bellow

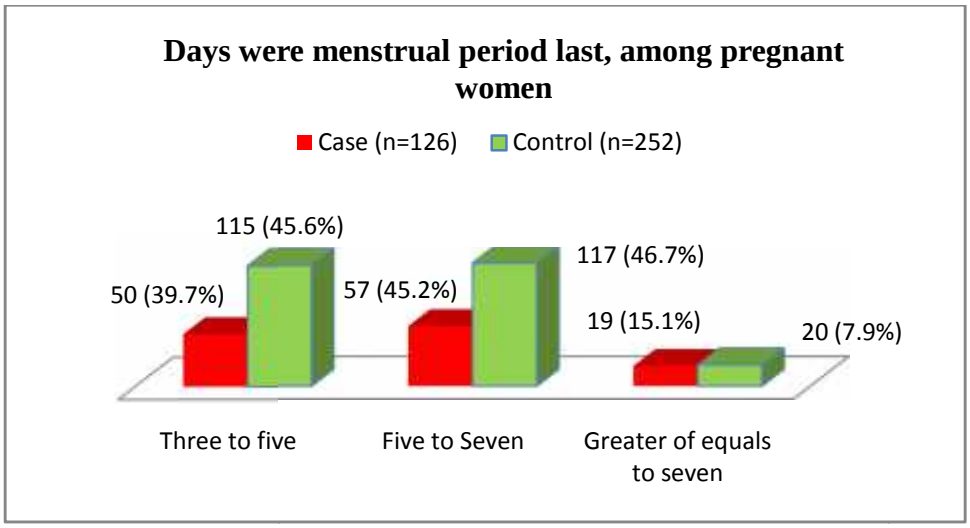


Figure 3.**:** Days were menstrual period lasts among pregnant women those attended antenatal clinic, in selected public hospital, in Addis Ababa, Ethiopia, 2021.

5.3. Health Related Characteristics of the Pregnant Women

Nearly a quarter, 38(30.2%) of cases and 54(21.4%) of controls, were had known medical illness during pregnancy. Among known medical illness of the mothers 37 (29.4%) of cases and 50 (19.8%) of control were had GHTN, and 6(4.8%) of cases and 1(0.4%) of control, 7 (5.6%) cases and 9 (3.6%) controls and 5 (4%) cases and 1(0.4%) controls of participants were affected by intestinal parasites that is both Endameba histolytic a, giardia lamblia, Entamoeba histolytic a and Giardia lablia respectively (Figure 3).

Table 3: Health and health service -related characteristics of pregnant women, attending ANC, in selected public hospitals, in Addis Ababa, Ethiopia, from Jan. to May, 2021

Variables	Category	Case n= 126 (%)	Control n=252 (%)
Known medical illness	No Yes	88(69.8) 38(30.2)	198(78.6) 54(21.4)
Had hypertension during pregnancy	No Yes	89(70.6) 37(29.4)	202(80.2) 50(19.8)
Had DM	No Yes	121(96) 5(4)	241(95.6) 11(4.4)
Had history of malaria treatment	No Yes	121(96) 5(4)	239(94.8) 13(5.2)
HIV status of respondents	Negative positive	121(96) 5(4)	247(98) 5(2)
Types of anemia	Moderate Mild	41(32.5) 85(67.5)	41(32.5) 85(67.5)

MUAC	≤ 23 ≥ 23.00001	31(24.6) 95(75.4)	41(16.3) 211(83.7)

Stool examination: The overall result of stool examination using SOP procedures.

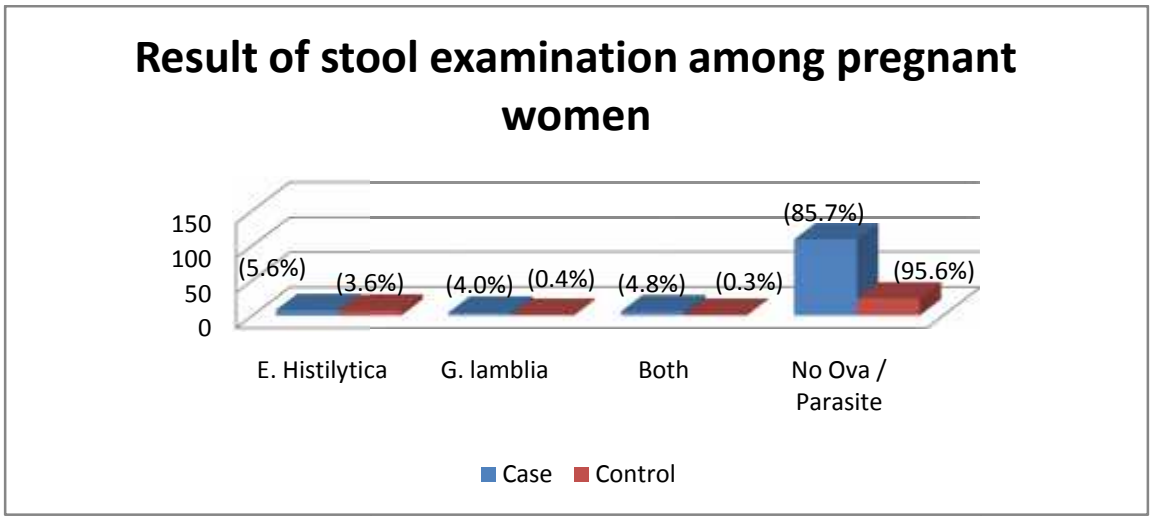


Table 4.: intestinal parasitosis among pregnant women those attended antenatal clinic, in selected public hospital, in Addis Ababa, Ethiopia, 2021.

5.4. Dietary habits related characteristics of pregnant women

Nearly one third, 103(81.7%) of cases and 187(74.2%) of controls eat three times per day. Regarding meat and animal products 28(22.25%) of cases and 81(32.1%) of control were eat once per week, and more than half of cases 89 (70.6%) and 156(61.9%) of control took iron supplementation during the current pregnancy, (Table 4).

Table 5: Dietary habits related characteristics of pregnant women, attending ANC, in selected public hospitals, in Addis Ababa, Ethiopia, from Jan. to May, 2021

Variables	**Category**	**Case n= 126 (%)**	**Control n=252 (%)**
Meal per day	≤ 2 times 3 times ≥ 4 times	7(5.6) 103(81.7) 16(12.7)	8(3.2) 187(74.2) 57(22.6)
Eat meat and animal products per week	Don't eat Once / week	98(77.8) 28(22.2)	171(67.9) 81(32.1)
Eating green leafy vegetable per	< 3 times	99(78.6)	173(68.7)

week	≥ 3 times	27(21.4)	79(31.3)
Taking fruits after meal	No	109(86.5)	195(77.4)
	Yes	17(13.5)	57(22.6)
Taking tea or tea with in one hr. after meal	No	47(37.3)	106(42.1)
	Yes	79(62.7)	146(57.9)
Iron supplementation during current pregnancy	No	37(29.7)	96(38.1)
	Yes	89(70.6)	156(61.9)

5.5. The 24 hour Dietary Recall Characteristics of Pregnant Women those eat for the Last 24 hours before reach to ANC Clinics

Among respondents asked to recall their last 24 hour food dietary types 102 (81%) of cases and 209 (82.9%) control were eat nuts and seeds, for the last 24 hours, and 41 (32.5%0 cases and 84 (33.3%) of controls take fruits for the last 24 hours respectively (Table 5).

Table 6.: the 24-hour Food Dietary Recall characteristics of pregnant women, attending ANC, in selected public hospitals, in Addis Ababa, Ethiopia, from Jan to May, 2021

Variables	Category	Case n= 126 (%)	Control n=252 (%)
Taking starchy foods for the last 24 hrs.	No	42(33.3)	71(28.2)
	Yes	84(66.7)	181(71.8)
Taking beans and peens for the last 24 hrs.	No	41(32.5)	74(29.4)
	Yes	85(67.5)	178(70.6)
Taking nuts and seeds for the last 24 hrs.	No	24(19)	43(17.1)
	Yes	102(81)	209(82.9)
Taking dairy products for the last 24 hrs.	No	81(64.3)	163(64.7)
	Yes	45(35.7)	89(35.3)
Taking flesh foods for the last 24 hrs.	No	105(83.3)	220(87.3)
	Yes	21(16.7)	32(12.7)
Taking eggs for the last 24 hrs.	No	105(83.3)	214(84.9)
	Yes	21(16.7)	38(15.1)
Taking vit A rich foods for the last 24 hrs.	No	68(54)	145(57.5)
	Yes	58(46)	107(42.5)
Taking fruits for the last 24 hrs.	No	85(67.5)	168(66.7)
	Yes	41(32.5)	84(33.3)

5.6. Determinants of Anemia in Pregnancy women from those mothers attended ANC clinic in selected Public Hospitals

To identify factors associated with iron deficiency anemia among pregnant women attending Antenatal clinics, each variable were assessed independently whether they were predictors or not. First variables in bivariate analysis were done to test for significant associations between independent variables in case control type, and anemia, by using structured questionnaire and by reviewing patient's card. Variables which were associated in the bivariate logistic regression analysis at P-Value; ($P < 0.025$) were; Educational status of the mothers, Occupational status, Family monthly income the pregnant women, Parity of respondents, those pregnant women's which had history of abortion and those mothers infected by intestinal parasite during pregnancy, were associated with iron deficiency anemia in bivariate analysis. Variables which were associated in the bivariate analysis were tested in the final multivariate analysis to see their significant association with IDA among pregnant women's. After adjusting for potential confounders in multivariate logistic regression analysis; that's pregnant mothers whose family monthly income between 1001-3500 ETB, were 5.252 times more develop anemia than that of pregnant women's their income were ≥ 5001 ETB, with (AOR= 5.252; 95% CI, [(2.348,11.746))], Being a mothers whose parity 4 and above were positively associated with iron deficiency anaemia during pregnancy with (AOR=5.623, 95% CI; ((2.023,15.592) from those mothers does not give birth. In this study those mothers who had history of abortion were 19. 71% times develop anemia than that of their counter parts, with [(AOR= 1.971, 95% CI; (1.124, 3.459)], and the result of this study signifies that the odds of getting anemia in pregnant women were negatively associated with those mothers infected by intestinal parasite than their counter parts with [(AOR= 0.052, 95% CI; (0.006,0.493)], at a P-Value 0.010 (table 6).

Table 7.: Determinants of anemia among pregnant women attending ANC, in selected public hospitals, in Addis Ababa, Ethiopia, from JAN to May, 2021 (multivariable analysis)

Variable	Anemia		COR 95% CI	P-Value	AOR 95% CI	P-value
	Case n=126(%)	Control (n= 252(%))				
Educational status of respondents						
Read and write	11(52.4)	10(47.6)	1		1	
Primary education	40(47.1)	45(52.9)	1.237(0.48,3.22)	0.662	0.629(0.20,1.97)	0.425
secondary	49(32.7)	101(67.3)	2.27(0.90,5.70)	0.082	1.659(0.54,5.11)	0.377

Diploma and above	26(21.3)	96(78.7)	**4.1 (1.55, 10.6)**	**0.004***	2.399(0.63,9.09)	0.198
Occupational status of the mothers						
House wife	90(46.6)	103(53.4)	**0.25(1.0,0.64)**	**0.004***	0.4(0.14,1.24)	0.110
Government employ	18(17.8)	83(82.2)	1.0(0.37,2.84)	0.963	1.5(0.49,4.39)	0.480
Private employ	12(23.5)	39(76.5)	0.7(0.24,2.16)	0.561	1.1(0.32,3.71)	0.886
Family monthly income in ETB.						
Daily laborer	6(18.2)	27(81.8)	1		1	
1001 – 3500	22(20.6)	85(79.4)	**2.0(1.13,3.60)**	**0.018***	**5.3 (2.35,11.75)**	**0.000***
3501 - 5000	55(43)	73(57)	0.69(0.42,1.13)	0.142	1.809(0.88,3.73)	0.109
≥ 5001	49(34.3)	94(65.7)	1		1	
parity (number of delivery)						
Have no	46(38.3)	74(61.7)	1		1	
1	35(28.9)	86(71.1)	1.5(0.89,2.63)	0.123	2.21(1.15,4.22)	0.017
2 - 3	38(39.2)	59(60.8)	0.96 (0.56,1.67)	0.899	1.38(0.69,2.78)	0.359
≥ 4	7(17.5)	33(82.5)	**2.9 (1.19,7.17)**	**0.019***	**5.62(2.02,15.59)**	**0.001***
Had history of abortion						
No	81(29)	198(71)	1		1	
Yes	45(45.5)	54(54.5)	**2.0 (1.27,3.27)**	**0.003***	**1.97(1.12,3.46)**	**0.018***
Result of stool examination						
Both	6(85.7)	1(14.3)	**0.1(0.09,0.63)**	**0.017***	0.05(0.01,1.49)	0.100
Enatmoeba histolytic a	7(43.8)	9(56.3)	0.5 (0.20,1.59)	0.286	0.89 (0.27,2.89)	0.843
Giardia labilea	5(83.3)	1(16.7)	0.1(0.01,0.78)	0.029	0.24(0.03,2.36)	0.221
No Ova /parasite	108(30.9)	241(69.1)	1		1	

6. DISCUSION

Anemia is one of the determinant factors for maternal mortality in the globe. So, this study assessed the determinant and major cause for anemia in pregnancy due to the fact that maternal anemia affects both maternal and fetal health. Its impact which includes rising the chance of maternal and child morbidity and mortality reduced cognitive and physical development in children and decreased work activity in adults is high in developing countries like Ethiopia (33).

Therefore, it is important to identify determinants that contribute to the development of anemia in pregnant women to successfully prevent it. Family monthly income, Parity of mothers, previous history of abortion, and those mothers infected by intestinal parasite were found to be anemic among pregnant women in the current study.

Accordingly, participant having a monthly income of less than 3500birr had more than five times increase risk of developing anemia than those having monthly income greater than 5000 Birr. This finding is consistent with another study conducted in Azezo health center and Sidama Zone, Ethiopia (39, 40). The similarity is may be due to the fact that, one of the causes for anemia is lack of adequate nutrition during pregnancy. So, to fulfill the basic nutrition during pregnancy money or adequate income was mandatory. Therefore, that's why low income women had increased the numbers of folds to develop anemia.

In the current study, having previous history of abortion was statistically significantly associated with the occurrence of anemia when compared to not having previous history of abortion. This finding is consistent with other studies from Bahir Dar town and South Ethiopia where previous history of abortion was positively associated with the occurrence of anemia (46, 47). This is may

be due to recurrent pregnancy, excess amount of blood loss with related to unsafe abortion, lack of taking iron supplement in the previous post abortion.

women having more than four viable pregnancies had also increase the chance of developing anemia by almost six folds than had no viable pregnant women. This result was similar with the study findings conducted previously in Southern Ethiopia [52], Southeast Ethiopia [49], Ghana [50] and Iran [51]. This may be due to recurrent (short spacing) pregnancy, in adequate nutrition due to increase the family size.

7. CONCLUSION AND RECOMMENDATION

7.1. Conclusions

This study identified important factors that determine anemia among pregnant women in the study area. Among the studied factors, Family monthly income in ETB, parity (number of delivery), mothers had history of abortion, were the factors which was associated with anemia during pregnancy.

7.**2. Recommendation**

To study area: - advice pregnant women about family planning and early initiation of ANC so that we can identify anemic mothers and treat early. it is also crucial to advice on safe abortion methods and post abortion care

To health bureau: - encourage family planning for limited the number of delivery and avoiding abortion in related to unwanted pregnancy

For the government: - increase women empowerment in economically and that may improve maternal anaemia in related to low-income level.

For Researchers: -Researchers recommended conducting similar study in the area with another design, especially follow-up studies, are suggested to explore the actual levels of anaemia and to further examine variables associated with the anaemia in community level.

8. STRENGTH AND LIMITATION

8.1. Strength of the Study:

- ✓ In this study were determined the hemoglobin level of each client in spite of recorded previous hemoglobin level which gives good reliability.
- ✓ It determines stool lab results rather than asking the patients in word regarding intestinal parasite

8.2. Limitation of the Study:

The findings of this study should be interpreted with caution due to the following limitations of the study.

- ✓ Its institutional based study, included those mother who came for ANC follow up only, so it is better to see it in community based study
- ✓ There was both social desirability and re call bias while subjects were requested to give dietary information and monthly income.

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10. ANNEXES

ANNEX I– Information Sheet

Here, I the undersigned, at Addis Ababa University College of Health Science, Department of Obstetrics and gynecology, currently I will be undertaking research on a topic entitled Assessment determinant factors of iron deficiency anemia among pregnant women in case control study, on pregnant women who are attending antenatal care clinic at selected health public hospitals in Addis Ababa, Ethiopia. For this study, you will be selected as a participant and before getting your assent or permission of your participation, you need to know all necessary information related to the study. Thus, this information will be detailed as;

Objective: To assess Determinant factors of iron deficiency anemia among pregnant women who are attending antenatal care at selected Public hospitals in Addis Ababa, Ethiopia.

Significance of the study: The research finding can be an input for concerned policy makers in decision making process around antenatal anemia. And also it serves as an input in the health education program by different organizations so as to keep the community being aware of the importance of treating and preventing the causes,

Participants to be included: All pregnant mothers who are attending in the antenatal care and who are voluntary to participate in the study included.

Confidentiality: All information you give will be kept confidential and won't be accessible to any third party. Your name won't be registered on the question sheet so that you will not be identified.

Risks and Benefits of the study: The study will be carried out by interviewer administered questionnaire. The procedure doesn't bear any physical or psychological trauma. Furthermore, you will not be forced to respond to the information you do not know, and you have full right to not accept the laboratory investigation. No payment for your participation in the study but participating in the study and giving your information to questions asked will have great input in efforts to improve the health of pregnant and delivered mother's.

Assent: Your participation in the study will be totally based on your willingness. You have the right not to participate from the beginning, or stop any time after starting participation. You will not be forced to respond to the question you do not know and you can ask any question whenever you like.

Name of principal investigator (PI):

Asrar Seman Date: _____ Signature _____

Address of PI: Mobile: +251- 09-74-11-36-10; E- Mail: Asrarseman123@gmail.com

Data Collector Name _____ Date _____ Signature _____

Supervisor Name _____ Date _____ Signature _____

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE SCHOOL OF MEDICINE

DEPARTMENT OF OBSTATRIC AND GYNACOLOGY

Good morning/afternoon. My name is _____ and I am working _____. I am studying on determinate factors of iron deficiency anemia among pregnant women who are attending antenatal care on behalf of Dr. Asrar Seman, who is post graduate specialist student at Addis Ababa University, college of health science, Department of OGS/GYN. I would like you to respond to only if you wish to do so. I assure you that the information you provide are will be kept confidential. Your name will be not written on the questionnaire to ensure your confidentiality. Make sure that, there should be no harm caused because you are involved in this study. You have full right to decline to the interview partly or totally. In case you consent for the interview, I need you to provide me your honest answer to the questions you want to respond as this would help us to come up with genuine conclusions and recommendations that would potentially help Ministry of Health of Ethiopia and health facilities improve these services.

Consent I have fully understood its contents and I have agreed to participate in this research project. Make (right sign) if she will or not

Yes---------- No----------

Thank you for giving us your consent.

Name of data collector ---------- Sign---------- date ----------

Annex III: Questionnaire

Instruction: Circle the code number, given parallel to the answer you choose and for Questions that you give direct answer, write the answer in the space provided

S. No	Questions	Alternative Answers	Skip	Remark
101	**Socio-demographic characteristics**			
1	Age of respondent	---------- Years		
2	Place of residence	A. Urban B. Rural		
3	Marital status	A. Single B. Married C. Divorced D. Others specify...……..		
4	Religions	A. Muslims B. Orthodox C. Protestant D. Others specify ……		
5	Educational status of the mothers	A. illiterate B. Read and write c. Primary education D. secondary education E. Diploma and above		
6	Occupational status	A. House wife B. governmental employ C. Private employ D. Merchant E. Daily Laborer F. Others specify ……		
7	Husband's education	A. illiterate B. Read and write c. Primary education D. secondary education E. Diploma and above		
8	Husband's occupational status	A. Unemployed B. governmental employ C. Private employ D. Merchant E. Daily Laborer F. Others specify ……		

9	Current family size	A. Less than / equal to two B. 3 – 4 C. greater /equals to five		
10	Family monthly income in ETB	…….		
102	**Dietary habits of the mothers**			
1	How many days do you eat meat and animal products / week	A. less than 3 times B. Greater /equals to 3 times		
2	Meals per day	…….		
3	Eating green leafy vegetables	A. < 3 times B. ≥ times		
4	Taking fruits after meal	A. Yes B. No		
5	Taking Tea or coffee within one hour after meal	A. Yes B. No		
6	Do you take any iron supplementation in current pregnancy	A. Yes B. No		
103	**Obstetrics and gynecology characteristics**			
1	Gravidity / number of pregnancy	…….		
2	Parity / number births after 28 weeks	…….		
3	Number of alive children	……..		
4	History of abortion	A. Yes B. No		
5	If your answer to question no. 4 is yes, types of abortion	A. spontaneous B. Induced C. Both types		
6	If your answer to question no. 4 is yes how many	……		
7	Birth interval from previous deliver	A. less than 24 months B. greater than 24 months		
8	Gestational age of current pregnancy	……. In weeks		
9	ANC follow up in previous pregnancy	A. Yes B. No		
10	Bleeding in current pregnancy	A. Yes B. No		
11	Modern contraceptive use	A. Yes B. No		
12	History of malaria treatment in the last one year	A. Yes B. No		
13	How many days do your menstruation lasts	A. 3 – 4 days B. 5 – 7 days C. Greater than 7 days		
14	How often did you experience a sensations of flooding or gushing during your periods	A. Never, Rarely or some periods		

		B. Ever or most periods C. Don't know		
15	During your period did you ever have bleeding where you would bleed through a tampon or napkin in 2 hours or less	A. Never, Rarely or some periods B. Ever or most periods C. Don't know		
104	**Maternal health characteristics**			
1	Have you known medical illness	A. Yes B. No		
2	If your answer to question number 1 is yes, which one, Multiple answer is possible	A. DM B. Hypertension C. Cardiac illness D. Malignancy E. others specify …….		
3	HIV status of the mothers	A. Positive B. Negative		
105	Laboratory investigation and results			
1	Hemoglobin level	……..g/dl		
2	Stool examination, types of ova/parasite	……. …… ……. …….		
3	MUAC	A. < 23 cm B. > 23 cm		

CURRUCULUM VITAE

1. PERSONAL INFORMATION.

Full name – Dr. Asrar seman

Date of birth – …….

Place of birth – ……..

Religion – Muslim

Nationality – Ethiopian

Health -- fit for all activity

Marital Status - Married

Current address – Addis Ababa

Sex - Male

Address – +251- 09-74-11-36-10

- Addis Ababa.

E-mail: Asrarseman123@gmail.com

2. LANGUAGES SPOKEN AND WRITTEN

English: Excellent

Amharic: Excellent

3. EDUCATION:

Higher Education – (place of study) ……

4. Qualification

Doctorate in MD, and candidate for OBS/GYN specialization

5. EXPERIENCES

……

…….

6. HOPPY …….

DECLARATION

By ma signature below, I declare and affirm that this thesis is my own work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources in this document. Every serious efforts been made to avoid any plagiarism in the preparation of this thesis.

This thesis is submitted in partial fulfilment of the requirement for the degree of specialization in Obstetrics and Gynaecology in Addis Ababa University School of Medicine. I would like to declare that this thesis has not been submitted to any other institution anywhere for the award of any academic specialization, degree, diploma or certificate.

Name: _____ Signature _____ Date _____