

## **An Investigation into the Incidence and Correlates of Anemia among Pregnant Women receiving Antenatal Care at Jinja Regional Referral Hospital: A Prospective Study**

**Lutaaya Benjamin**

**Faculty of Clinical Medicine and Dentistry Kampala International University-Western Campus Uganda.**

---

### **ABSTRACT**

This cross-sectional study aimed to assess the prevalence of anemia and identify associated factors among pregnant women attending antenatal care at Jinja Regional Referral Hospital. Employing a quantitative approach, a systematic random sampling method recruited 358 pregnant women for the study. Data collection involved a comprehensive review of records using a checklist. Statistical analysis, conducted using Stata version 14, included descriptive statistics such as frequency tables, percentages, pie charts, and bar graphs. The study revealed a 14.25% prevalence of anemia among pregnant women, with 52 mothers exhibiting Hb levels below 11mg/dl. Adjusting for potential confounders, socio-demographic factors such as participants' age, trimester, and adherence to Iron/folic acid supplementation showed significant associations with anemia in pregnancy. The observed prevalence of anemia among pregnant women attending antenatal care at Jinja Regional Referral Hospital was 14.25%, indicating a lower incidence compared to other study sites. Notably, a minority of the participants presented anemia (Hb<11mg/dl). Additionally, socio-demographic factors such as age, trimester, and adherence to Iron/folic acid supplementation remained significantly linked to anemia in pregnancy after adjusting for confounders.

**Keywords:** Anaemia, Haemoglobin, Pregnancy, Antenatal care, Iron.

---

### **INTRODUCTION**

Anaemia in pregnancy is defined as a haemoglobin concentration of less than 11g/dl [1]. Also, anaemia is considered a condition in which the number and size of red blood cells, or the haemoglobin concentration, falls below an established cutoff value and, as a result, leads to impairment of the capacity of blood to transport oxygen around the body [2, 3]. Anaemia is a public health problem that affects populations in both rich and poor countries. Its primary cause is iron deficiency, but other conditions such as malaria, parasitic infections, other nutritional deficiencies, and haemoglobin myopathies are also responsible and often act in combination [4-6]. Anaemia has deleterious effects on both functional capacity and quality of life. It is a fact that anaemia is a worldwide disease that

can touch all individuals at any stage of life even though women and children are the most affected groups [7-9]. Anemia is observed as an indicator of both poor nutrition and poor health and by far is a worldwide public health problem affecting numerous people in all age groups [10, 11]. However, particularly the burden of the problem is higher among pregnant women. It impairs health and well-being in women and increases the risk of maternal and neonatal adverse outcomes. During pregnancy, anaemia is responsible for a lot of complications in women. Some of those associated problems are puerperal infection, postpartum haemorrhage, placenta Previa, cardiac failure, low birth weight, preterm delivery and prenatal deaths [12, 13]. Anemia is a major health concern in pregnant women in developing

Lutaaya countries and despite important advances in therapy, anemia remains a problem in many pregnant women with its prevalence remaining extremely high [14].

Pregnancy is a period of a significant increase in iron requirement over and above the non-pregnant state. Although iron requirements are reduced in the first trimester because of the absence of menstruation, they rise steadily thereafter from approximately 0.8 mg per day in the first month to approximately 10 mg per day during the last 6 weeks of pregnancy. The increased iron requirement is due to expansion of maternal red blood cell mass for increased oxygen transport, including transfer of iron, to both the growing fetus and the placental structures, and as a needed reserve for blood loss and lochia at parturition [15, 16]. Due to increased iron requirements, pregnancy is also a period of increased risk for anemia. Thus, a high proportion of women become anemic during pregnancy [17]. The contextual features contributing to anemia among pregnant women are diverse. Interaction of multiple factors like women's socio-demographic, economic, dietary practices, and health-related factors continue to be the main

causes of anemia in pregnant women [18]. Other prompting factors are grand multiparity, young age, low socio-economic status, illiteracy, inter-pregnancy spacing of <1 year, and late appointment [19]. Anemia in pregnancy continues to be a major health problem in many developing countries including Uganda and is associated with increased rates of maternal and prenatal mortality, premature delivery, low birth weight, diminished work capacity and physical performance, and other adverse outcomes. Maternal anemia and iron deficiency remain at epidemic levels among many expectant women in Uganda. Severe anemia in pregnancy is a major obstetrics problem in malaria-endemic areas, where it is responsible for a large proportion of maternal morbidity and mortality [20, 21]. Malaria continues to be a serious health risk for pregnant women in Uganda and is associated with increased risk for maternal anemia and perinatal mortality [22]. Thus, this study was designed to determine the prevalence and factors associated with anemia in pregnancy among pregnant mothers attending antenatal care at Jinja Regional Referral Hospital.

## METHODOLOGY

### Study Design

This was a cross study design employing quantitative methods to determine the prevalence of anaemia among pregnant women at Jinja Regional Referral Hospital (JRRH). Data on age, parity, gestational age at booking, interval between the last confinement and the LNMP, and HIV-status was obtained and analyzed.

### Area of Study

This study was carried out in the antenatal clinic of JRRH. Jinja RRH is a pioneer teaching hospital in eastern region of Uganda for Clinical-Officers trainees and nurse students. JRRH also offers internship for intern doctors under the supervision of consultants, senior medical officers and various specialists. The hospital offers both primary and specialized health service for the people of Jinja and the neighboring districts. It still serves as one of the major referral health centers in this region. The hospital is blessed with a number of senior

consultants, consultants, senior medical officers, laboratory technologists, nurses and various paramedical specialists and clinical officers. Jinja is about 81 Km west of Kampala. Jinja RRH is located within Jinja town along Nile Crest Street opposite main road to Nalufenya. The main economic activity in Jinja is agriculture characterized by farming and agro-based industrial work.

### Study Population

The study was conducted among pregnant women of reproductive age attending ANC in Jinja Regional Referral Hospital.

### Sample Size Determination

Determination of the sample size was by Kish Leslie's [23] formula.  $n = ZP \frac{(1-P)}{E^2}$

### Where:

n= Estimated minimum Sample size.  
Z =1.96 for 95% Confidence interval.  
P = Proportion of a characteristic sample.  
(56%) (Uganda Demographic and Health

Lutaaya

Survey., 2015)

E = Margin of Error (E = 5%)

$n = 1.96^2 \times (0.56)(1-0.56) / 0.05^2$

n= 378 pregnant women

#### **Sampling procedure**

A systematic random sampling method was used. On each day using a sampling interval of three pregnant women, random recruitment into the study was done. A sampling frame comprised all pregnant mothers coming for antenatal on each clinic day, every first out of 3 registered were selected for the study in order of first come basis. This procedure was repeated for each clinic day until a total number of 378 mothers were selected.

#### **Inclusion criteria**

Pregnant women attending Jinja Regional Referral Hospital antenatal care within the study time and had consented to participate into the study.

#### **Exclusion criteria**

Pregnant women who meet the inclusion criteria but with non-singleton pregnancy or presence of complain of vaginal bleeding.

#### **Independent Variables**

- Educational Level of respondents
- Religion of respondents
- Income level
- Parity
- Occupation of Respondents
- Gestational period
- Dietary habits

#### **Dependent Variables**

Anemia in pregnancy

#### **Data Collection Methods and Procedures**

A survey was carried out at Jinja Regional Referral Hospital by the researcher, permission was sought from the District Health Officer (DHO) of Jinja district and from the in charge of ANC. A study questionnaire was used to obtain information on the factors associated with anemia in pregnancy. The prevalence of anemia was determined from the laboratory results that examined participants' blood hemoglobin levels. Data was collected and recorded using log books, Microsoft Word documents, and Excel sheets and then later analyzed and

#### **Socio-demographic characteristics of the study participants**

This study enrolled a total of 358 out of

www.iaajournals.org

presented.

#### **Data Analysis Plan**

The data was analyzed using Statistical Package for Social Science (SPSS) version 15.01. Descriptive and inferential statistics were used to describe and make inferences from the data where applicable. Chi-square and confidence intervals of the main outcome variables were analyzed with independent variables including the social and economic characteristics of the women. The findings were presented in tables, graphs, and charts.

#### **Data management Plan**

Patient initials were used as identification marks for questionnaires. After data collection, each questionnaire was checked for completeness, clarity and consistency at the end of interview. Data was then cleaned up and irrelevant materials sorted out.

#### **Quality Control**

All data recorded was double checked to prevent and minimize errors. The study questionnaires were subjected to a pilot study and then refined according to feedback generated from the pre-testing exercise before data collection was started.

#### **Ethical considerations**

Study was conducted upon approval by the supervisor. This was followed by obtaining a letter of introduction from the office of the Dean faculty of Clinical Medicine and Dentistry of Kampala International University Western Campus which was then presented to the Hospital management upon arrival at the facility. The researcher also sought permission from the hospital management to be allowed to proceed with the research before embarking on data collection. Study participants were enrolled on free will after all procedures, benefits, and possible risks had been clearly explained to them. Confidentiality was ensured by avoiding the use of participant's names for identification but rather their initials. Data collected was also limited to access by any third party and it was only used for the purposes of the study.

## **RESULTS**

the 378 participants of the original sample size. This gives a response rate of about 94%. The mean age of the

Lutaaya

participants was 28.16 years and the standard deviation was SD±5.21 years. The majority 234(65.36%) were in the age range of 21-30, followed by 103(28.77%) above 30 years of age while the rest 21(5.87%) below 20 years of age. Nearly three quarters, 255(71.23%) were urban residents. Similarly, over 72% of the study participants were married 260(72.63%) while more than three quarters were Christians 274(76.54%), and reported an

www.iaajournals.org

informal employment status of 278(77.65%). Furthermore, the majority (over 89%) of the study participants reported having attained some level of formal education with more than half reporting to have attained either secondary or tertiary level of education. Similarly, more than three-quarters 274(76.53%) had a family size of 5 members or less.

**Table 1: Summary of the social demographic characteristics of the study participants**

Variable	N=358(%)	Variable	N=358(%)
<b>Age, Mean±SD</b>	28.16±5.21	<b>Education</b>	
20 below	21(5.87)	None	38(10.6)
21-30	234(65.36)	Primary	109(30.45)
Above 30	103(28.77)	Secondary	153(42.74)
		Tertiary	58(16.20)
<b>Residence</b>		<b>Employment</b>	
Urban	255(71.23)	Formal	80(22.35)
Rural	103(28.77)	Informal	278(77.65)
<b>Marital status</b>		<b>Religion</b>	
Single/Divorced	98(27.37)	Christian	274(76.54)
Married	260(72.63)	Muslim	84(23.46)
<b>Household size</b>			
5 below	274(76.53)		
Above 5	84(23.47)		

**Gynecological and obstetric characteristics of the study participants**

Less than half of the study participants were nulliparous while over a quarter reported history of abortion, once 65(18.16%) and twice or more (32(8.93%). Significantly, more than three quarters reported that their pregnancies were planned and they delivered in the hospital for their previous pregnancy 172(78.18%). The inter-pregnancy interval between the previous and current pregnancy was 2 years and below for the majority 196(54.75%) of the study participants. Additionally, nearly two thirds were

multigravidas 220(61.45%) and reported use of iron and folic acid supplements 218(60.89%). Correspondingly, over three quarters reported no history of previous abortion 286(79.89%), heavy menstrual bleeding 294(82.12%), postpartum hemorrhage 319(89.11%), and current or recent malaria in pregnancy 316(88.26%). Furthermore, over 90% had received malaria prophylaxis 324(90.50%) while almost all the study participants reported no history of anemia in the previous pregnancy 329(91.90%). Details are demonstrated in table 2 and figure 1 below.

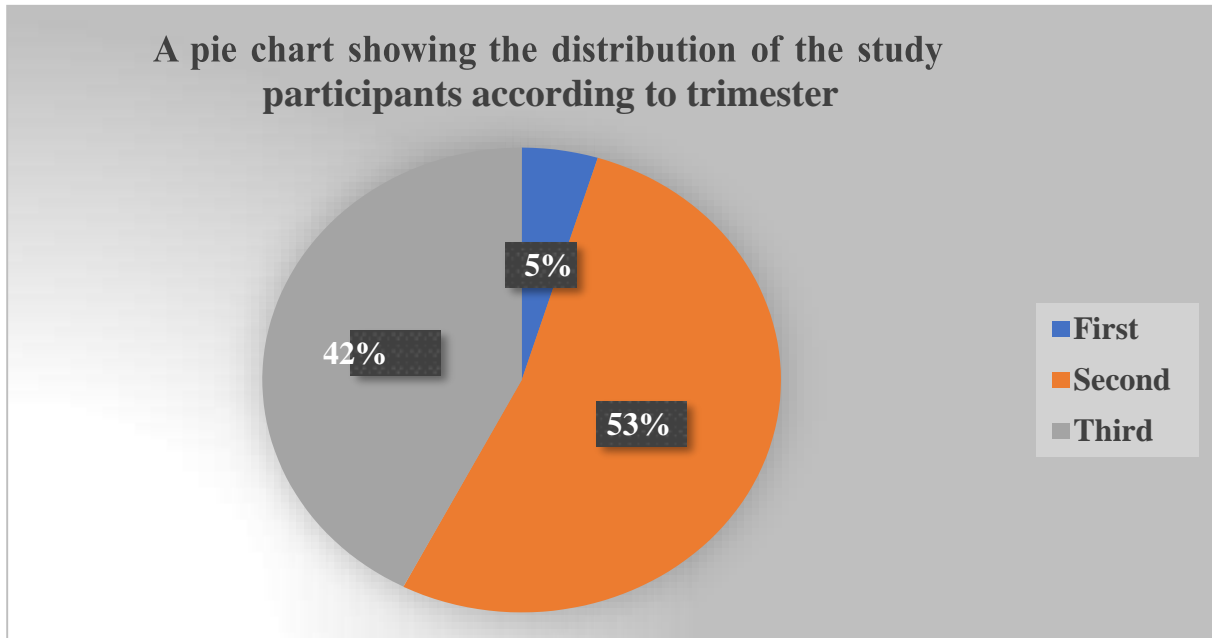


Figure 1: Distribution of the study participants according to trimester

Table 2: Gynecological and obstetric characteristics of the study participants

Variable	N=358(%)	Variable	N=358(%)
<b>Parity</b>		<b>Number of abortions</b>	
Nulliparous	138(38.55)	None	261(72.91)
1-2	167(46.65)	Once	65(18.16)
Above 2	53(14.80)	Two or more	32(8.93)
<b>Planned pregnancy</b>		<b>Previous and current pregnancy interval</b>	
Yes	275(76.81)	2 years and below	196(54.75)
No	83(23.19)	Above 2 years	189(45.25)
<b>Trimester</b>		<b>Place of delivery</b>	
First	17(4.75)	Hospital	172(78.18)
Second	189(52.79)	Home	43(19.55)
Third	152(42.46)	TBA	5(2.27)
<b>Gravidity</b>		<b>Anemia in previous pregnancy</b>	
Primigravida	138(38.55)	Yes	29(8.10)
Multigravida	220(61.45)	No	329(91.90)
<b>Previous abortion</b>		<b>Heavy menstrual bleeding</b>	

Yes	72(20.11)	Yes	64(17.88)
No	286(79.89)	No	294(82.12)
<b>History of PPH</b>		<b>Anemia before in pregnancy</b>	
Yes	39(10.89)	Yes	7(1.96)
No	319(89.11)	No	351(98.04)
<b>Iron/Folic acid supplements</b>		<b>IPT Prophylaxis</b>	
Yes	218(60.89)	Yes	324(90.50)
No	140(39.11)	No	34(9.50)
<b>Current or recent malaria history</b>		<b>APH history</b>	
Yes	42(11.74)	Yes	11(3.07)
No	316(88.26)	No	347(96.93)

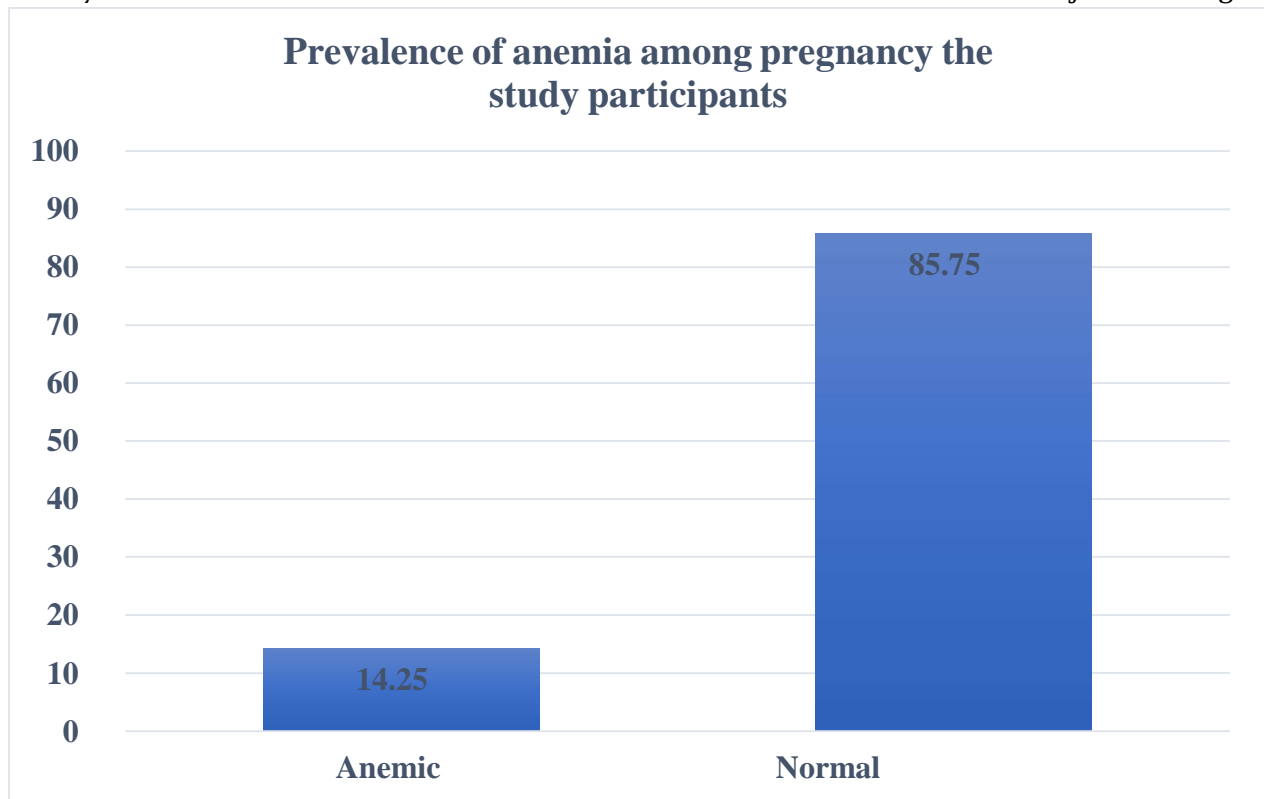
### Participants' food habits and practices and haemoglobin levels

Regarding food habits, more than two-thirds of 243(67.88%) reported having two meals or less daily. Similarly, nearly three-quarters of 265(74.02%) reported weekly consumption of green leafy vegetables. On the other hand, diary 114(31.84%),

eggs 175(48.88%), and fruit 118(32.96%) intake were reported mostly every week by less than half of the study participants. Concerning the prevalence of anaemia, few than one-fifth 51(14.25%) had a haemoglobin level below 11mg/dl or were considered to be anaemic.

**Table 3: Participants' food habits and haemoglobin levels**

Variable	N=358(%)	Variable	N=358(%)
<b>Meal frequency</b>		<b>Fruit intake</b>	
3 times or less	243(67.88)	No	16(4.47)
More than 3 times	115(32.12)	Daily	63(17.60)
<b>Green leafy vegetables</b>		Weekly	118(32.96)
No	28(7.82)	Monthly+	161(44.97)
Daily	57(15.92)	<b>Eggs intake</b>	
Weekly	265(74.02)	No	76(21.23)
Monthly+	8(2.24)	Daily	39(10.89)
<b>Diary/milk products</b>		Weekly	175(48.88)
No	135(37.71)	Monthly+	68(19.00)
Daily	44(12.29)	<b>Hemoglobin level</b>	
Weekly	114(31.84)	< 11mg/dl	51(14.25)
Monthly+	65(18.16)	≥11mg/dl	307(85.75)



**Figure 2: Anemia prevalence among the study participants**

**Bivariate and multivariate regression analysis showing the factors associated with anaemia among pregnant mothers**

After adjusting for possible confounders, participants' age, trimester, and Iron/folic acid supplementation were significantly associated with anaemia in pregnancy. Participants who were aged above 30 years were 2.18 times more likely to have

anaemia compared to those aged 20 years and below. Similarly, participants who did not receive iron/folic acid supplements were 4.21 times more likely to be anaemic compared to their counterparts. Further still, being in the second and third trimesters were respectively associated with 3.52 times and 6.8 times the likelihood of being anaemic.

**Table 4: Factors associated with anaemia among pregnant mothers**

<b>Anaemia in pregnancy</b>		
<b>Variable</b>	<b>COR (95% CI)</b>	<b>AOR (95% CI)</b>
<b>Age</b>		
20 below	Ref	Ref
21-30	1.14(0.49, 2.48)	0.68(0.1, 2.15)
Above 30	3.41(1.21, 3.62) *	2.18(0.84, 5.34) *
<b>Residence</b>		
Rural	8.2(3.21, 7.28) *	3.6(0.77,2.62)
Urban	Ref	Ref
<b>Planned pregnancy</b>		
Yes	Ref	Ref
No	1.6(1.02, 2.49)	1.2(1.51, 4.84)
<b>Trimester</b>		
First	Ref	Ref
Second	5.21 (0.74, 14) *	3.52 (0.55, 10.41) *
Third	7.40 (1.68, 21.58) *	6.80 (1.31, 18.4) *
<b>Folic acid</b>		
Yes	Ref	Ref
No	6.52(2.41, 8.24) *	4.21(1.71,6.32) *

\*p-value<0.05, COR-Crude Odds Ratios, AOR-Adjusted Odds Ratios



## DISCUSSION

This study aimed to determine the prevalence, and factors associated with anaemia in pregnancy among pregnant mothers attending ANC at Jinja Regional Referral Hospital. A total of 358 study participants were enrolled. In this study, the overall prevalence of anaemia among pregnant women was 14.25. The low prevalence of anaemia in this study was mostly related to high socio-demographic factors, good obstetrical history, and proper dietary habits.

### **Social demographical factors**

The majority of the respondents 234(65.36%) were in the age range of 21-30, followed by 103(28.77%) above 30 years of age while the rest were 21(5.87%) below 20 years of age. It is comparable to the studies by Obai et al. [22], Ayano & Amentie [24], and Getahun et al. [25]. This may be due to recurrent pregnancies and poor birth spacing in reproductive-age women. Nearly three quarters, 255(71.23%) were urban residents. This is similar to Mihiretie et al. [26] (62%), and Bansal et al., [27], (65.9%). The reason for the lower prevalence of anaemia in the urban population may be related to the accessibility of healthcare centres. Similarly, over 72% of the study participants were married 260(72.63%), Married wives, on the other hand, could have high family income which makes them remain in the house. Furthermore, it may be postulated that being a married wife has the added advantage of having adequate resources such as good housing, clean water, sanitation, and enough time to attend ANC clinics. Similar findings were reported by Obai et al. [22] and Getahun et al. [25]. While more than three-quarters reported an informal employment status of 278(77.65%). It is also supported by the observation that women with low income tend to consume diets that are low in micronutrients, animal protein, and vitamins. Poor intake of micronutrients increases the risk of anemia and other biochemical abnormalities [28-30]. This study correlates with a study by Okube et al.

[31], and Lokare et al. [32] where women of a high socioeconomic group had a lower prevalence of anaemia. Furthermore, the majority (over 89%) of the study participants reported to have attained some level of formal education with more than half reporting to have attained either a secondary or tertiary level of education. However, another study done by Bansal et al. [27] showed a direct relationship between the impact of literacy and anaemia. Similarly, more than three-quarters 274(76.53%) had a family size of 5 members or less. There may be a direct relationship between family size with anaemia due to food security for small family sizes. Similarly, Beyene [33], also showed a lower incidence of anaemia in family size <5.

### **Gynaecological and obstetric**

#### **characteristics of the study participant**

More than three quarters reported that their pregnancies were planned and they delivered in the hospital for their previous pregnancy 172(78.18%). This may be the reason for the lower anaemia prevalence due to proper hospital attendance. These results were different from the study conducted by Gautam et al. [34]. The inter-pregnancy interval between the previous and current pregnancy was 2 years and below for the majority 196(54.75%) of the study participants. Similarly, studies conducted by Gautam et al. [34] showed a higher prevalence of anaemia in those with repeated pregnancies with poor birth spacing. Additionally, nearly two-thirds were multigravidas 220(61.45%) and reported use of iron and folic acid supplements 218(60.89%). This may explain the lower anaemia prevalence because child spacing makes the patients less prone to malnutrition which may result in anemia thus reducing maternal iron reserves at every pregnancy by causing blood loss at each delivery. This study is contrary to the study conducted by Ayano & Amentie [24] which concluded that multiparous women had a higher risk of anaemia. Women with prior pregnancy sustain a 500-600 mg iron loss per

Lutaaya

pregnancy, which is increased by haemorrhage after delivery. Iron deficiency is, therefore, definitely more common as parity increases so, mothers should be supplemented with folic acid. Correspondingly, over three quarters reported no history of previous abortion 286(79.89%), heavy menstrual bleeding 294(82.12%), postpartum hemorrhage 319(89.11%), and current or recent malaria in pregnancy 316(88.26%). Furthermore, over 90% had received malaria prophylaxis 324(90.50%) while almost all the study participants reported no history of anemia in the previous pregnancy 329(91.90%). The absence of all these factors contributed to lower prevalence of anemia in this study.

#### **Socio-demographic factors associated with anemia in pregnancy**

In this study, Socio-demographic factors associated with anaemia in pregnancy, after adjusting for possible confounders, participants' age, trimester, and Iron/folic acid supplementation were significantly associated with anaemia in pregnancy. Participants who were aged above 30 years were 2.18 times more likely to have

This study concluded that the prevalence of anemia among the women attending antenatal clinic was 14.25% which was considered lower in the study site. It was observed that a few of the antenatal women were anaemic (Hb<11mg/dl).

#### **Recommendations**

Although the prevalence was low in this study, special attention should be given to older mothers and those with second and

www.iaajournals.org

anaemia compared to those aged 20 years and below. This may be due to the recurrent pregnancies and poor birth spacing in reproductive-age women which make them more prone to anemia. Different results were obtained in a study conducted by Okube et al. [31]. Similarly, participants who did not receive iron/folic acid supplements were 4.21 times more likely to be anaemic compared to their counterparts. This may be due to increased iron requirements to supply the expanding blood volume of the mother with a rapidly growing fetus and placenta. Our study is in agreement with the study conducted by Gebreweld & Tsegaye [35]-[42]. Further still, being in the second and third trimesters were respectively associated with a 3.52 times and 6.8 times likelihood of being anaemic. Due to the physiological hemodilution which peaks during the second trimester and the third trimester, the high prevalence of anaemia during this period can be explained [43]-[47]. Similar results were seen in a study conducted by Bansal et al. [27].

#### **CONCLUSION**

third-timers. Women should be encouraged and counseled to eat more diversified extra meals and iron-rich foods than usual to reduce the incidence of anaemia during the antenatal period. Continuous advice and counseling should be given to all pregnant women to avail the facility of haemoglobin estimation freely available at rural and urban health centers.

#### **REFERENCES**

1. Ifeanyi, O. E. A review on pregnancy and haematology. *Int. J. Curr. Res. Biol. Med*, 2018; 3(5), 26-28. DOI:http://dx.doi.org/10.22192/ijcrbm.2018.03.05.006.
2. Obeagu, E. I., Ali, M. M., Alum, E. U., Obeagu, G. U., Ugwu, O. P. C. and Bunu, U. M. An Update of Aneamia in Adults with Heart Failure. *INOSR Experimental Sciences*, 2023; 11(2):1-16.
3. Alum, E. U., Ugwu, O. P. C., Aja, P. M., Obeagu, E. I., Inya, J. E., Onyeije, P. E., Agu, E. and Awuchi, C. G. Restorative effects of ethanolic leaf extract of *Datura stramonium* against methotrexate-induced hematological impairments, *Cogent Food & Agriculture*, 2023; 9:1, DOI: 10.1080/23311932.2023.2258774.

Lutaaya

- <https://doi.org/10.1080/23311932.2023.2258774>.
4. Ekpono, E. U., Aja, P. M., Ibiam, U. A., Alum, E. U., & Ekpono, U. E. Ethanol Root-extract of *Sphenocentrum jollyanum* Restored Altered Haematological Markers in Plasmodium berghei-infected Mice. *Earthline Journal of Chemical Sciences*. 2019; 2(2): 189-203. <https://doi.org/10.34198/ejcs.2219.189203>.
  5. Egwu, C. O., Alope, C., Chukwu, J., Agwu, A., Alum, E., Tsamesidis, I, et al. A world free of malaria: It is time for Africa to actively champion and take leadership of elimination and eradication strategies. *Afr Health Sci*. 2022 Dec;22(4):627-640. doi: 10.4314/ahs.v22i4.68.
  6. Alum, E. U., Obeagu, E. I., Ugwu, O. P. C., Samson, A. O., Adepoju, A. O., & Amusa, M. O. Inclusion of nutritional counseling and mental health services in HIV/AIDS management: A paradigm shift. *Medicine (Baltimore)*. 2023;102(41): e35673. <http://dx.doi.org/10.1097/MD.000000000035673>. PMID: 37832059; PMCID: PMC10578718.
  7. Orji, O. U., Ibiam, U. A., Aja, P. M., Ezeani, N., Alum, E. U., & Edwin, N. Haematological Profile of *Clarias gariepinus* (Burchell 1822) Juveniles Exposed to Aqueous Extract of *Psychotria microphylla* Leaves. *IOSR-JESTFT*, 2015; 9 (9): 79-85. [https://www.iosrjournals.org/iosr-jestft/papers/vol9-issue9/Version-1/M09917985.JESTFT%20\[ZSEP08\].pdf](https://www.iosrjournals.org/iosr-jestft/papers/vol9-issue9/Version-1/M09917985.JESTFT%20[ZSEP08].pdf)
  8. Aja, P. M., Uzuegbu, U. E., Opajobi, A. O., Udeh, S. M.C., Alum, E. U., Abara, P. N., Nwite, F., & Ibere, J. B. Comparative Effect of Ethanol Leaf-Extracts of *Ficus capensis* And *Moringa oleifera* on some haematological indices in normal Albino Rats. *Indo American Journal of Pharmaceutical Sciences*, 2017; 4 (2): 471-476.
  9. Obeagu, E. I., Bot, Y. S., Obeagu, G. U., Alum, E. U., & Ugwu, O. P. C. Anaemia and risk factors in lactating mothers: a concern in Africa. *International Journal of Innovative and Applied Research*, 2023; 11(2): 15-17. Article DOI: 10.58538/IJIAR/2012 DOI URL: <http://dx.doi.org/10.58538/IJIAR/2012>.
  10. Alum, E. U., Oyika, M. T., Ugwu, O. P. C., Aja, P. M., Obeagu, E. I., Egwu, C. O., & Okon, M. B. Comparative analysis of mineral constituents of ethanol leaf and seed extracts of *Datura stramonium*. *IDOSR Journal of Applied Sciences*, 2023; 8(1):143-151. <https://doi.org/10.59298/IDOSR/2023/12.1.7906>.
  11. Alum, E. U., Aja, W., Ugwu, O. P. C., Obeagu, E. I., & Okon, M. B. Assessment of vitamin composition of ethanol leaf and seed extracts of *Datura stramonium*. *Avicenna J Med Biochem*. 2023; 11(1):92-97. doi:10.34172/ajmb.2023.2421.
  12. Obeagu, E. I., Nimo, O. M., Bunu, U. M., Ugwu, O. P.C., & Alum, E.U. Anaemia in children under five years: African perspectives. *Int. J. Curr. Res. Biol. Med.*, 2023; (1): 1-7. DOI: <http://dx.doi.org/10.22192/ijcrbm.2023.08.01.001>.
  13. Ifeanyi, O. E., & Uzoma, O. G. A review on anaemia in pregnancy. *Hematol Transfus Int J*, 2018; 6(3), 114-117.
  14. Chukwuemeka, I., Utuk, G. S., Ugwu Okechukwu, P. C., Ibiam, U. A., Aja, P. M., & Offor, C. E. The effect of ethanol leaf extract of *Jatropha curcas* on some haematological parameters of cyclophosphomide induced anaemia in wister albino rats. *European Journal of Applied Sciences*, 2015; 7(1), 17-20.
  15. Ifeanyi, O. E., & Uzoma, O. G. An update on Anaemia, Iron, Folic acid and Vitamin B 12 in Pregnancy and Postpartum. *Int. J. Curr. Res. Med. Sci*, 2018; 4(5), 62-70.

www.iaajournals.org

[https://www.iajps.com/pdf/february2017/38.%20\(1\).pdf](https://www.iajps.com/pdf/february2017/38.%20(1).pdf)

16. Leticia, O. I., Ifeanyi, O. E., Elemchukwu, Q., & Chinedum, O. K. Determination of ferritin level and total iron binding capacity in pregnancy and postpartum subjects in Owerri. *J Dent and Med Sci*, 13(9), 70-73.
17. Nakubulwa, S., Kaye, D. K., Bwanga, F., Tumwesigye, N. M., & Mirembe, F. M. Genital infections and risk of premature rupture of membranes in Mulago Hospital, Uganda: a case-control study. *BMC Research Notes*. 2015; 1-9. <https://doi.org/10.1186/s13104-015-1545-6>.
18. Addis, A. K., & Mohamed, D. A. Prevalence of Anemia and Associated Factors among Pregnant Women in an Urban Area of Eastern Ethiopia. *Anemia*. 2014; 561567. doi: 10.1155/2014/561567. Epub 2014 Aug 25. PMID: 25215230; PMCID: PMC4158560.
19. Lee, A. I., & Okam, M. M. Anemia in pregnancy. *Hematol Oncol Clin North Am*. 2011; 25(2):241-59, vii. doi: 10.1016/j.hoc.2011.02.001. PMID: 21444028.
20. Egwu, C. O., Alope, C., Chukwu, J., Nwankwo, J. C., Irem, C., Nwagu, K. E., et al. Assessment of the Antimalarial Treatment Failure in Ebonyi State, Southeast Nigeria. *J Xenobiot*. 2023; 13(1):16-26. doi: 10.3390/jox13010003.
21. Kungu, E., Inyangat, R., Ugwu, O.P.C., Alum, E. U. Exploration of Medicinal Plants Used in the Management of Malaria in Uganda. *Newport International Journal of Research In Medical Sciences*. 2023; 4(1):101-108. <https://nijournals.org/wp-content/uploads/2023/10/NIJRMS-41101-108-2023.docx.pdf>
22. Obai, G., Odongo, P., & Wanyama, R. Prevalence of anaemia and associated risk factors among pregnant women attending antenatal care in Gulu and Hoima Regional Hospitals in Uganda: A cross-sectional study. *BMC Pregnancy and Childbirth*, 2016; 16(1), 1-7.
23. Wiegand, H., & Kish, L., Survey Sampling. John Wiley & Sons, Inc., New York, London 1965, IX + 643 S., 31 Abb., 56 Tab., Preis 83 s. *Biometrische Zeitschrift*. 10, 88-89 (1968). <https://doi.org/10.1002/bimj.19680100122>
24. Ayano, B., & Amentie, B. Assessment of prevalence and risk factors for anaemia among pregnant mothers attending ANC clinic at Adama Hospital Medical College, Adama, Ethiopia, 2017. *Journal of Gynecology and Obstetrics*, 2018; 6(3), 31-39.
25. Getahun, W., Belachew, T., & Wolide, A. D. Burden and associated factors of anaemia among pregnant women attending antenatal care in southern Ethiopia: cross-sectional study. *BMC Research Notes*, 2017; 10(1), 1-7.
26. Mihiretie, H., Fufa, M., Mitiku, A., Bacha, C., Getahun, D., Kejela, M., Sileshi, G., & Wakshuma, B. The magnitude of anaemia and associated factors among pregnant women attending antenatal care in Nekemte Health Centre, Nekemte, Ethiopia. *Journal of Medical Microbiology & Diagnosis*, 2015; 4(3), 197. doi:10.4172/21610703.1000197
27. Bansal, R., Bedi, M., Kaur, J., Kaur, K., Shergill, H. K., Khaira, H. K., & Suri, V. Prevalence and factors associated with anaemia among pregnant women attending antenatal clinic. *Adesh University Journal of Medical Sciences & Research*, 2020; 2(1), 42-48.
28. Offor, C. E., Ugwu, O. P. C., & Alum, E. U. Determination of ascorbic acid contents of fruits and vegetables. *Int J Pharm Med Sci*. 2015;5(1):1-3. doi: 10.5829/idosi.ijpms.2015.5.1.1105.
29. Aja, P. M., Nwobasi, C. S., Alum, E. U., Udeh, S. M. C., Edwin, N., Orinya, F. O., et al. Mineral and Proximate Compositions of *Nauclae latifolia* Root bark from Abakaliki, Ebonyi State, Nigeria. *International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)*, 2017; 6 (2): 375-382.

Lutaaya

- <https://ijbpas.com/pdf/2017/February/1486920748MS%20IJBPAS%202017%204088.pdf><https://ijbpas.com/pdf/2017/February/1486920748MS>  
IJBPAS 2017 4088.pdf
30. Aja, P. M., Uzuegbu, U. E., Opajobi, A. O., Udeh, S. M., Alum, E. U., Ominyi, M. C., et al. Amino acid profile, vitamin and reducing sugar compositions of ethanol fruit-extract of *Phoenix dactylifera* (date fruit) sold in Abakaliki, Ebonyi state, Nigeria. *Int J Biol Pharm Allied Sci.* 2017;6(2):349-62.  
<https://ijbpas.com/pdf/2017/February/1486920628MS> IJBPAS 2017 4086.pdf
31. Okube, O. T., Mirie, W., Odhiambo, E., Sabina, W., & Habtu, M. Prevalence and factors associated with anaemia among pregnant women attending antenatal clinic in the second and third trimesters at Pumwani Maternity Hospital, Kenya. *Open Journal of Obstetrics and Gynecology*, 2016; 6: 16-27.
32. Lokare, P. O., Karanjekar, V. D., Gattani, P. L., & Kulkarni, A. P. A study of the prevalence of anaemia and sociodemographic factors associated with anaemia among pregnant women in Aurangabad city, India. *Annals of Nigerian Medicine*, 2012; 6(1), 30.
33. Beyene, T. Prevalence and factors associated with anaemia among pregnant women attending antenatal care in Shalla Woreda, W/Arsi Zone, Oromia region. *International Journal of Green Pharmacy (IJGP)*, 2018;12(01).
34. Gautam, V. P., Bansal, Y., Taneja, O. K., & Saha, R. Prevalence of anaemia amongst pregnant women and its socio-demographic associates in a rural area of Delhi. *Indian Journal of Community Medicine*, 2002; 27(4), 157.
35. Gebreweld, A., & Tsegaye, A. Prevalence and Factors Associated with Anemia among Pregnant Women Attending Antenatal Clinic at St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia. *Advances in Hematology*, 2018. <https://doi.org/10.1155/2018/3942301>
36. Deo Namwokoyi. Evaluation of Factors that Influence High Morbidity Rate in Pregnant women Attending Antenatal Care at Kampala International University-Teaching Hospital (KIUTH), Bushenyi. *INOSR Experimental Sciences*, 2023; 11(1), 99-111.
37. Hadijah Nakibuuka. Evaluation of factors associated with low utilization of family planning services among mothers attending maternal child health services at KIU-TH Bushenyi District, Uganda. *INOSR Scientific Research*, 2023; 9(1), 80-96.
38. Lodger Katigi. Factors Influencing the Elimination of Mother to Child HIV Transmission Services at Mbarara Regional Referral Hospital, Mbarara District, Uganda. *IDOSR Journal of Biology, Chemistry and Pharmacy*, 2023; 8(1), 15-32.
39. Rogers Mugerwa Antenatal Care Services among Pregnant Women in Kampala International University Teaching Hospital Bushenyi-Ishaka Municipality. *INOSR Scientific Research*, 2023; 9(1), 38-49.
40. Primah Kyarisiima. Factors influencing the use of Traditional Medicine during Labour among women attending maternity ward at Ishaka Adventist Hospital, Bushenyi District. *IAA Journal of Biological Sciences*, 2023; 10(1), 18-37.
41. Viola Nankya, Namuddu Rebecca, Nuruh Ndagire, & Emmanuel Ifeanyi Obeagu. Factors leading to increased use of Herbal Medicines by Mothers during Labour in Kakanju HC III Kakanju-Parish, Bushenyi District. *Newport International Journal of Research in Medical Sciences*, 2023; 3(1), 10-21.
42. Isaac Mujjasi Factors Contributing to Perineal Tears among Mothers during Labour/Delivery in Kibuku Health Centre IV Kibuku District. Newport

Lutaaya

International Journal of Public Health and Pharmacy, 2023; 3(2), 20-30.

43. Ezekwe CI, CR Uzomba, OPC Ugwu (2013). The effect of methanol extract of *Talinum triangulare* (water leaf) on the hematology and some liver parameters of experimental rats. *Global Journal of Biotechnology and Biochemistry*,8(2): 51-60.
44. Enechi OC, CC Okpe, GN Ibe, KO Omeje, PC Ugwu Okechukwu (2016). Effect of *Buchholzia coriacea* methanol extract on haematological indices and liver function parameters in *Plasmodium berghei*-infected mice. *Global Veterinaria*,16(1); 57-66.
45. Ugwu, O. P.C., Nwodo, O. F.C., Joshua, P. E., Odo, C. E., Bawa, A., Ossai, E. C. and Adonu C. C. (2013). Anti-malaria and Hematological Analyses of Ethanol Extract of

www.iaajournals.org

- Moringa oleifera Leaf on Malaria Infected Mice. *International Journal of Pharmacy and Biological Sciences*,3(1): 360-371.
46. Ugwu OPC, OFC Nwodo, PE Joshua, CE Odo, EC Ossai, B Aburbakar (2013). Ameliorative effects of ethanol leaf extract of *Moringa oleifera* on the liver and kidney markers of malaria infected mice. *International Journal of Life Sciences Biotechnology and Pharma Research*, 2(2): 43-52.
47. Nwaka AC, MC Ikechi-Agba, PC Ugwu Okechukwu, IO Igwenyi, KN Agbafor, OU Orji, AL Ezugwu (2015). The effects of ethanol extracts of *Jatropha curcas* on some hematological parameters of chloroform intoxicated rats. *American-Eurasian Journal of Scientific Research*,10(1): 45-49.

**CITE AS: Lutaaya Benjamin (2023). An Investigation into the Incidence and Correlates of Anemia among Pregnant Women receiving Antenatal Care at Jinja Regional Referral Hospital: A Prospective Study. IAA Journal of Applied Sciences 10(1):32-45. <https://doi.org/10.59298/IAAJAS/2023/3.1.1000>**